AGENDA

<table>
<thead>
<tr>
<th>Item</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Declarations of Conflict of Interest</td>
<td></td>
</tr>
</tbody>
</table>
  a. Excerpt from Bylaw 1, section 8* | Information |
| 2. Minutes of 12 June 2016* and Business Arising | Decision (SGRC) |
| 3. Co-chairs’ Remarks | 
  | 
| 4. Curricular Submissions | 
  a. Applied Health Sciences* | SEN-regular |
  b. Arts** | Decision (SGRC) |
| 5. New and Continuing Memberships - Clinical Research Ethics Committee* (Leggett) | Decision (SGRC) |
| 6. Change to Terms of Reference – Clinical Research Ethics Committee* (Leggett) | SEN-regular |
| 7. Academic Program Review Reports* | 
  - Handling Of Final Assessment Reports Related To Academic Program Reviews And Follow-Up Two-Year Progress Reports* | Information |
  a. Final Assessment Report – School of Environment, Resources and Sustainability* | Decision (SGRC) |
  (Muirhead and Ozsu) | 
  c. Final Assessment Report – Geography and Environmental Management* | Information |
| 8. Graduate Awards* (Hildebrandt) | 
  a. Faculty of Arts Graduate Enhancement Scholarship – Faculty trust funds | Decision (SGRC) |
  b. School of Pharmacy Annual Graduate Awards – operating funds | Decision (SGRC) |
  c. Millennium Graduate Bursary – operating funds | Information |
| 9. Changes to Constitution – Survey Research Centre* (Mary Thompson, 11:30 a.m.) | SEN-regular |
| 10. Other Business | 
  | 
| 11. Next Meeting: Monday 17 October 2016 from 10:30 a.m. to 12 noon in NH 3318 | 
  | 

* material attached
** to be distributed separately
“SGRC” to be approved on behalf of Senate
“SEN” to be recommended to Senate for approval

7 September 2016

Mike Grivicic
Assistant University Secretary
<table>
<thead>
<tr>
<th>8.01</th>
<th>At the beginning of each meeting of Senate or any of Senate’s committees or councils, the chair will call for members to declare any conflicts of interest with regard to any agenda item. For agenda items to be discussed in closed session, the chair will call for declarations of conflict of interest at the beginning of the closed portion of the meeting. Members may nonetheless declare conflicts at any time during a meeting.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.02</td>
<td>A member shall be considered to have an actual, perceived or potential conflict of interest, when the opportunity exists for the member to use confidential information gained as a member of Senate, or any of Senate’s committees or councils, for the personal profit or advantage of any person, or use the authority, knowledge or influence of the Senate, or a committee or council thereof, to further her/his personal, familial or corporate interests or the interests of an employee of the university with whom the member has a marital, familial or sexual relationship.</td>
</tr>
<tr>
<td>8.03</td>
<td>Members who declare conflicts of interest shall not enter into debate nor vote upon the specified item upon which they have declared a conflict of interest. The chair will determine whether it is appropriate for said member to remove themselves from the meeting for the duration of debate on the specified item(s).</td>
</tr>
<tr>
<td>8.04</td>
<td>Where Senate or a committee or council of Senate is of the opinion that a conflict of interest exists that has not been declared, the body may declare by a resolution carried by two-thirds of its members present at the meeting that a conflict of interest exists and a member thus found to be in conflict shall not enter into debate on the specified item upon which they have declared a conflict of interest. The chair will determine whether it is appropriate for said member to remove themselves from the meeting for the duration of debate on the specified item(s).</td>
</tr>
</tbody>
</table>
University of Waterloo
SENATE GRADUATE & RESEARCH COUNCIL
Minutes of the 13 June Meeting
[in agenda order]

Present: Robert Bruce, George Dixon, Lowell Ewert, Jim Frank, Rhona Hanning, Anwar Hasan, Bruce Hellinga, Sarah Hildebrandt, Robert Hill, Tim Kenyon, Srinivasan Keshav, Raymond Legge, Tamer Özsu, Paul Parker, Richard Staines, Jackie Stapleton, Mike Stone, Linda Warley

Secretariat: Mike Grivicic

Resources: Jennifer Kieffer

Guests: Trevor Clews, Amanda McKenzie

Regrets: Adam Dor On, Bernard Duncker*, Richard Kelly, Bruce Muirhead*, Maureen Nummelin*, Samantha Shortall, Mike Szarka, Aaron Thompson, John Thompson

*regrets

Organization of Meeting: Jim Frank, co-chair of the council, took the chair, and Mike Grivicic acted as secretary. The secretary advised that due notice of the meeting had been given, a quorum was present, and the meeting was properly constituted.

1. DECLARATIONS OF CONFLICT OF INTEREST
No conflicts of interest were declared.

2. MINUTES OF 9 MAY 2016 AND BUSINESS ARISING
By consensus the minutes were approved as distributed.

   a. Graduate admissions converted to arrivals in 2015, with breakdown by thesis- vs. course work based programs. This item was deferred to the next meeting.

   b. Regarding the graduate awards from the previous meeting, Hildebrandt noted that the changing of the Beltz award name was OK in consultation with the department, and that a prize is for an essay or similar work whereas an award covers a broader spectrum of achievement. She noted that the parental leave bursary is impacted by the NSERC parental leave, where a student is disqualified for the latter if qualified for the former. It is hoped that NSERC will review these rules in the future.

3. CO-CHAIRS’ REMARKS
Dixon observed that this was Jim Frank’s last meeting and thanked him for his service and for the considerable changes he has shepherded through in his term as associate provost, graduate studies.

Dixon indicated that the federal government is undertaking to review its research support activity, with six months allocated for consultation and changes expected to impact the 2018 funding year. Frank noted: the 3MT national winner from Waterloo, and thanked Warley for her efforts in organizing the 3MT this year; recent meeting with associate deans for graduate studies re: funding and potential increases; revisions to parental leave support for graduate students; support for Libyan students funded by scholarship program; increases in graduate student applications and enrollment this year.

4. CURRICULAR SUBMISSIONS
   a. Applied Health Sciences. Council considered section 1 and heard a motion to approve the items as presented. Hanning and Staines. Carried. Council took the items 2, 3 and 4 together and heard a motion to approve the items as presented. Hanning and Staines. Carried. Council took 5 and 6 together and discussed: residency requirements for course-based plan, and residency requirement in general need greater clarity; funding for thesis-based students. Council heard a motion to approve the items in section 5 and 6 as presented. Hanning and Staines. Carried.

   b. Applied Health Sciences. Council considered item 1.1 and noted that the courses have not been offered recently and other offerings cover the same content. Council heard a motion to approve the items in 1.1 as presented. Hanning and Staines. Carried. Council took the remaining items in 1 along with items 2, 3 and 4 together and heard a motion to approve the items as presented. Hanning and Staines. Carried.

SGRC 12 September 2016, page 3 of 235
c. **Arts.** Council took all the items together and noted that item B will be recommended to Senate for approval. Council heard a motion to approve the items. Warley and Kenyon. Carried.

d. **Environment.** Council took all the items together and Parker noted that fees ranges are provided with Kieffer affirming that the fees are compliant with existing guidelines. Council heard a motion to approve the submission as presented. Parker and Bruce. Carried.

e. **Science.** Hill informed council that item 1 will be deferred. Council considered item 2 and heard a motion to recommend the item to Senate for approval subject to clarifying suspension vs. withdrawal from the collaborative program. Hill and Hellinga. Carried.

5. **BEST PRACTICES RE: GUIDELINES PERTAINING TO LEARNING RESOURCES AND FIELD TRIPS**
Kieffer provided an overview of the document and noted that in the year since the revision the guidelines are working well, though technology is constantly advancing and so the guidelines may require future revisions. She asked that IAP be consulted when planning field trips beyond Ontario. Parker noted that field trips are subsidized from course resources and the net effect can be that students not taking the field trip are effectively subsidizing those that do to some extent.

6. **NEW AND CONTINUING MEMBERSHIP TO RESEARCH ETHICS COMMITTEES**
   a. **Human Research Ethics Committee.** Council heard a motion to approve the new member as presented. Dixon and Parker. Carried.
   
   b. **Clinical Research Ethics Committee.** Council heard a motion to approve the reappointment of a member as presented. Dixon and Staines. Carried.

7. **ACADEMIC PROGRAM REVIEWS**
   a. **Two-Year Progress Report – School of Public Health and Health Systems.** Council discussed the report: information available to discussants which draws from the recommendations of the reviewers; implementation of template; compressed rationales would be useful; final assessment reports should include recommendations. Council heard a motion to approve the report as presented. Hanning and Kenyon. Carried.

8. **GRADUATE AWARDS**
Council took items (a) and (b) together and heard a motion to approve the items as presented. Hildebrandt and Warley. Carried. Items (c) through (f) were accepted for information.

9. **GENDER NEUTRAL DEGREE OPTION**
Hildebrandt provided an overview of the submission and observed: OUAC provides for applications with gender listings beyond male/female; this has been done at other universities; this will appear on diplomas but not in QUEST or on transcripts. Members discussed: fee charged is only for replacement diplomas should a person decide to get a replacement, and not for change to degree name; in the future this change needs to be incorporated into electronic systems e.g. QUEST and transcripts; anticipated that this change will accompany similar change at undergraduate level; master is not strictly the same as magisteriate and may cause confusion, though this could be addressed in the transfer guide. Council heard a motion to recommend that Senate approve the gender neutral degree option as presented. Hildebrandt and Warley. Carried.

10. **OTHER BUSINESS**
There was no other business.

11. **NEXT MEETING**
The next meeting will be on Monday 12 September 2016 from 10:30 a.m. to 12 noon in NH 3318.

1 September 2016

Mike Grivicic  
Assistant University Secretary
The following motion was approved by the Applied Health Sciences Faculty Council on April 29, 2016 and is being forwarded to Senate Graduate & Research Council. Would you please place them on the agenda for the next Senate Graduate & Research Council meeting?

Thank you!
1. ACADEMIC PLAN CHANGES (for approval)
1.1 Recreation and Leisure Studies.................................3
Graduate calendar changes for Applied Health Sciences

1. ACADEMIC PLAN CHANGES
   1.1 Recreation and Leisure Studies

1.1.1 Motion: To change the coursework requirements for the Ph.D. in Recreation and Leisure Studies as follows, effective Fall 2017:

Doctoral students are required to take a minimum of 9 graduate courses (0.5 unit weight) beyond the Honours BA level. These must include: At least one course in each of the three areas of study (Administration and Management of Services, Leisure Behaviour and Cultural Studies, and Recreation and Leisure Resources); REC 792; and REC 700. REC 600; REC 700; REC 701; one of REC 772 or REC 773 or an equivalent. Students entering the PhD program following completion of the MA degree in the Department of Recreation and Leisure Studies (University of Waterloo), or its equivalent, will usually have already completed 6 of the 9 required courses, and therefore will need a minimum of 4 additional (0.5 unit weight) graduate courses. If students have not previously taken REC 600; REC 700; REC 701; one of REC 772 or REC 773, or their equivalents, these courses would take precedence over elective courses. Elective courses can be taken either within or outside the Department, and can be at either the 600 or 700 level. In addition to their course work, doctoral students must complete the AHS Academic Integrity Milestone and the Research Presentation Milestone.

Rationale: After a thorough review of our graduate curriculum, revisions to the doctoral program were deemed necessary to improve student training. In particular, the previously identified areas of study were perceived to be outdated and a poor reflection of our current departmental interests; and REC 792 was thought to be more effective if offered as a required course with a relatively set curriculum.
Faculty: Applied Health Science  
Program: PhD in Recreation and Leisure Studies  
Program contact(s) (name): Sherry Dupuis  
Form completed by: Tracy Taves

Description of proposed changes: To change the coursework requirements for the Ph.D. in Recreation and Leisure Studies as follows, effective Fall 2017:

Doctoral students are required to take a minimum of 9 graduate courses (0.5 unit weight) beyond the Honours BA level. These must include: At least one course in each of the three areas of study (Administration and Management of Services, Leisure Behaviour and Cultural Studies, and Recreation and Leisure Resources); REC 792; and REC 700. REC 600; REC 700; REC 701; one of REC 772 or REC 773 or an equivalent. Students entering the PhD program following completion of the MA degree in the Department of Recreation and Leisure Studies (University of Waterloo), or its equivalent, will usually have already completed 6 5 of the 9 required courses, and therefore will need a minimum of 4 additional (0.5 unit weight) graduate courses. If students have not previously taken REC 600; REC 700; REC 701; one of REC 772 or REC 773, or their equivalents, these courses would take precedence over elective courses. Elective courses can be taken either within or outside the Department, and can be at either the 600 or 700 level. In addition to their course work, doctoral students must complete the AHS Academic Integrity Milestone and the Research Presentation Milestone.

Is this a Major Modification to the program? Yes

Rationale for changes: After a thorough review of our graduate curriculum, revisions to the doctoral program were deemed necessary to improve student training. In particular, the previously identified areas of study were perceived to be outdated and a poor reflection of our current departmental interests; and REC 792 was thought to be more effective if offered as a required course with a relatively set curriculum.

Proposed effective date: Term: Fall Year: 2017

Current Graduate Studies Academic Calendar URL/webpage (include the link to the page where the changes are to be made): [https://uwaterloo.ca/graduate-studies-academic-calendar/applied-health-sciences/department-recreation-and-leisure-studies/doctor-philosophy-phd-recreation-and-leisure-studies#degree_requirements](https://uwaterloo.ca/graduate-studies-academic-calendar/applied-health-sciences/department-recreation-and-leisure-studies/doctor-philosophy-phd-recreation-and-leisure-studies#degree_requirements)

<table>
<thead>
<tr>
<th>Current Graduate Studies Academic Calendar content: (strikethrough content that is to be deleted)</th>
<th>Proposed Graduate Studies Academic Calendar content: (underline content that is to be added)</th>
</tr>
</thead>
</table>
| Degree requirements  
Thesis option:  
- Graduate Academic Integrity Module | Degree requirements  
Thesis option:  
- Graduate Academic Integrity Module |
• Doctoral students are required to take a minimum of 9 graduate courses (0.50 unit weight) beyond the Honours Bachelor of Arts (BA) level. These must include:
  • At least 1 course in each of the three areas of research—Administration and Management Services, Leisure Behaviour and Cultural Resources, and Recreation and Leisure Resources.
  • REC 792 Advanced Research Methods.
  • REC 700 The Interplay of Behaviour, Resources, and Policy in Leisure Studies.
  • The doctoral seminar REC 701 Recreation and Leisure Studies Research Seminar.
  • And one of the following:
    • REC 772 Qualitative Research Data Analysis and Interpretation
    • REC 773 Designing Advanced Qualitative Inquiry
    • Or an equivalent
• Students entering the PhD program following completion of the MA degree in the Department of Recreation and Leisure Studies at the University of Waterloo, or its equivalent, will usually have already completed 6 of the 9 required courses, and therefore will need a minimum of 4 additional (0.50 unit weight) graduate courses. Elective courses can be taken either within or outside the Department, and can be at either the 600 or 700 level.
doctoral students must complete the AHS academic Integrity Milestone and the Research Presentation Milestone.

How will students currently registered in the program be impacted by these changes?
Not at all

Departmental approval date: February 5, 2016
Reviewed by GSO (for GSO use only): ☐
Faculty approval date: April 29, 2016
Senate Graduate & Research Council (SGRC) approval date:
Senate approval date (if applicable):
Memorandum

To:       Members  
Senate Graduate and Research Council

From:    Jannet Ann Leggett  
Chief Ethics Officer  
Office of Research Ethics

Date:     August 17, 2016

Subject:  New and Continuing Membership to Research Ethics Committees

The following information on new and continuing members on the Clinical Research Ethics Committee is provided for approval by the Senate Graduate and Research Council at its September 2016 meeting:

Clinical Research Ethics Committee

The following information on new members seeking appointment and current members seeking re-appointment to the Clinical Research Ethics Committee is provided for approval by the Senate Graduate and Research Council at its September 2016 meeting:

New members:

Richard Hughson, PhD, for a 3 year term as a Kinesiology expert/representative, from October 1, 2016 to September 30, 2019. Please refer to the attached letter of interest and CV.

Marsha Mann, for a 1 year term as a community member, from October 1, 2016 to September 30, 2017. Please refer to the attached letter of interest and CV.

Joan Moller, for a 2 Year term as an alternate community member, from October 1, 2016 to September 30, 2017. Please refer to the attached letter of interest and CV.

Renewing members:

Andrea Edginton, PhD, for a 3 year term as the Chair of the Committee and providing expertise in pharmacy/pharmaceuticals/drug pharmacokinetics, from October 1, 2016 to September 30, 2019. Please refer to the attached letter of interest and CV.

Elizabeth Irving, OD, PhD, for a 3 year term as the Vice-Chair of the Committee and providing expertise in optometry/ocular science, from October 1, 2016 to September 30, 2019. Please refer to the attached letter of interest and CV.

Kelly Grindrod, PhD, for a 3 year term as the expert in pharmacy/community medicine/natural health products, from October 1, 2016 to September 30, 2019. Please refer to the attached letter of interest and CV.

Valerie Hoag was approved at the June SGRC meeting for a second 3 year term as a community member and alternate member with legal expertise. Valerie is no longer able to fulfill the role as community member on the committee. Valerie will remain on the committee for a second 3 year term as an alternate member with legal expertise.
July 21, 2016

Julie Joza, MPH
Senior Manager, Research Ethics
Office of Research, 3rd Floor, East Campus 5 Building (EC5)
University of Waterloo
Waterloo, Ontario N2L 3G1

Dear Julie,

I am writing to express an interest in being a member of the Clinical Research Ethics Committee. I have been conducting human-based research through my 39 years at the University of Waterloo.

Attached, please find my CV.

Yours sincerely,

Richard L. Hughson, Ph.D.
Professor
Schlegel Research Chair in Vascular Aging and Brain Health

Schlegel-University of Waterloo
Research Institute for Aging
250 Laurelwood Dr.
Waterloo, Ontario, Canada
N2J 0E2

(519) 904-0660 ext. 4204
http://healthy.uwaterloo.ca/~hughson/cvlab.html
hughson@uwaterloo.ca
RICHARD L. HUGHSON  (January 2016)

http://healthy.uwaterloo.ca/~hughson/cvlab.html

DEGREES RECEIVED:

<table>
<thead>
<tr>
<th>Degree</th>
<th>Institution</th>
<th>Year</th>
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</thead>
<tbody>
<tr>
<td>B.Sc.</td>
<td>U. of Western Ontario Physiolgy</td>
<td>1972</td>
</tr>
<tr>
<td>M.Sc.</td>
<td>U. of British Columbia Physiolgy</td>
<td>1973</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>McMaster University Medical Sci.</td>
<td>1977</td>
</tr>
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EMPLOYMENT HISTORY:

<table>
<thead>
<tr>
<th>Date</th>
<th>Position</th>
<th>Institution</th>
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</thead>
<tbody>
<tr>
<td>1976-77</td>
<td>Part-time Lecturer</td>
<td>Univ. of Waterloo Dept. of Kinesiology</td>
</tr>
<tr>
<td>1977-83</td>
<td>Assistant Professor</td>
<td>Univ. of Waterloo Dept. of Kinesiology</td>
</tr>
<tr>
<td>1983-1987</td>
<td>Associate Professor</td>
<td>Univ. of Waterloo Dept. of Kinesiology</td>
</tr>
<tr>
<td>1985-1986</td>
<td>Visiting Assoc. Prof.</td>
<td>Univ. of Colorado Medical Sci. Ctr. Dept. of Anesthesiology</td>
</tr>
<tr>
<td>1987-</td>
<td>Professor</td>
<td>Univ. of Waterloo Dept. of Kinesiology</td>
</tr>
<tr>
<td>1990-1991</td>
<td>Visiting Scientist</td>
<td>Laboratoire Physiologie Faculté Médecine Lyon Grange-Blanche</td>
</tr>
<tr>
<td>1993 (March)</td>
<td>Visiting Professor</td>
<td>Department of Internal Medicine University of Rome II</td>
</tr>
</tbody>
</table>
1994 (June-July)  Visiting Professor  Department of Biological Sciences
Faculty of Health Science
Univ. of Sydney

2004-2011  University Research Chair  University of Waterloo
Dept. of Kinesiology

2010 -  Schlegel Research Chair  Schlegel-University of Waterloo Research
In Vascular Aging and Institute for Aging
Brain Health

SCHOLARLY RANKING

As of August 2014, Hirsh (H) – index = 53
In June 2012, my H-index (47 at that time) was highest value in disciplines of Applied Health
Sciences in Canada (http://higheredstrategy.com/wp-content/uploads/2012/06/2012-Bibliometrics-
and-Publication-Culture-HESA.pdf, see p. 18)

AWARDS:

1977 Young Investigator Award, Canadian Association of Sport Sciences

1991 MRC-INSERM Visiting Scientist Award

1997 Honour Award, Canadian Society for Exercise Physiology

2000 University of Waterloo Award for Excellence in Research

2004-2010 University Research Chair, University of Waterloo

2005 Excellence in Graduate Supervision, University of Waterloo

2010 Schlegel Research Chair in Vascular Aging and Brain Health, University of Waterloo

SCHOLARLY AND PROFESSIONAL ACTIVITIES:

Editorial:

Associate Editor:  Can. J. Appl. Physiol.  2000-2003
Grant Review Panels:

Member, Natural Sciences and Engineering Research Council Grant Selection Committee #31 (Animal Physiology, 1992-95).


NASA Cardiopulmonary Peer Review Panel, 1996.

Heart & Stroke Foundation of Canada Junior Personnel Committee, 1999-2001

Canadian Institute for Health Research panel, 2003, 2006-2007

Heart and Stroke Foundation of Ontario, Grant Assessment Panel, 2009-11

Committees:

Canadian Association of Sports Sciences, Chairman of Position Papers, 1981-83.

Canadian Track and Field Association / Athletics Canada: Chairman of Sport Science Committee, 1983-87.

American College of Sports Medicine, Member Research Awards Committee, 1983-86.

American College of Sports Medicine, Area Representative (Respiratory Physiology), review of abstracts of 1989 Annual Meeting.

American College of Sports Medicine, Cardiorespiratory Special Interest Group, 1992-96.

Primary organizer: Seventh International Symposium on Modelling and the Control of Breathing, Huntsville, ON October 1997

Canadian Society for Exercise Physiology, President-Elect 2000-2002,

Canadian Society for Exercise Physiology, President 2002-2004.

Canadian Society for Exercise Physiology, Executive Director 2008-2010.

Schlegel-University of Waterloo Research Institute for Aging, Board of Directors 2007-. 
Chair, Ad-hoc Committee to establish Life Science Canada, 2008-09.

European Space Agency representative for cardiovascular physiology to international panel on standardization of procedures for bed rest studies, 2010-2012.

Scientific and Industrial Advisory Committee: Canadian Space Agency – Canadian Institutes of Health Research “Space Health and Ageing Research and Innovation Exploration (SHARE)” Workshop, June 11-12, 2012.

NASA Panel: 2013 Decadal study – the impact of sex and gender on adaptation to space (cardiovascular issues)

President, International Society for Gravitational Physiology (2013-2014), organizer of the first ever joint meeting in Canada of the International Society for Gravitational Physiology / European Space Agency Life in Space for Life on Earth to be held in conjunction with the first ever Aging in Space for Life on Earth in Waterloo, ON June 2014

Schlegel-University of Waterloo Research Institute for Aging: Member of building planning committee (2013-2015) responsible for providing input for construction of new research laboratories

Advisor to Inaugural Meeting between Space and Aging Health Researchers at the Gerontological Society of America (GSA) Annual Scientific Meeting in Orlando, Florida, November 19, 2015.
Major National or International Invited Presentations


28. Women’s cardiovascular health after bed rest or space flight. COSPAR, Montreal, July 17, 2008


35. Recent findings from Canadian cardiovascular research on ISS. International Society for Gravitational Physiology, Toyohashi, Japan, June 23-28, 2013

36. The cardiovascular challenge and strategy for expeditionary space travel, Canadian Society for Exercise Physiology, Toronto, October 16-19, 2013


Radio, Television and Media:

Sleeping for Space, Quirks and Quarks, CBC Radio, October 29, 2005; Story of WISE bed rest study, on line at [http://www.cbc.ca/quirks/archives/05-06/oct29.html#4](http://www.cbc.ca/quirks/archives/05-06/oct29.html#4)

Fainting Astronauts, Quirks and Quarks, CBC Radio, November 17, 2007; Story on CCISS astronaut return to Earth, on line at [http://www.cbc.ca/quirks/archives/07-08/nov17.html#4](http://www.cbc.ca/quirks/archives/07-08/nov17.html#4)


CTV-Southwestern Ontario May 13, 2009, Sept 21, 2009 and Dec 14, 2009. Three on-camera interviews by Health and Lifestyle specialist Leslie Gordon for separate 2.5 minute on-air segments in which the research activities conducted as part of the CCISS experiment on the International Space Station and related to the initiation of the Get Fit for Space program conducted within the Research Institute for Aging.

The following are a result of the Press Conference held October 29, 2009 at the Ontario Science Centre on the occasion of live downlink with Canadian astronaut Bob Thirsk who is performing the CCISS experiment while on orbit.

- 7-minute presentation to press and visitors at the downlink – an overview of science in the CCISS experiment [http://www.youtube.com/watch?v=XD30lSmyD2k&feature=related](http://www.youtube.com/watch?v=XD30lSmyD2k&feature=related)

- Discovery Channel, Daily Planet Oct 29, 2009 (4 minute on camera interview with Jay Ingram and setup for interview with Bob Thirsk from International Space Station) [http://watch.discoverychannel.ca/#clip229661](http://watch.discoverychannel.ca/#clip229661)

- InsideToronto.com, Nov 2009, quoted in “Canadian astronaut exercises in space”


- TheStar.com, Oct 30, 2009, quoted in “We’ve got the space station on line 1”

International Council on Active Aging – 2009 Innovators Awards: Get Fit for Space Challenge at the Oakwood-Winston Park Retirement and Long-Term Care Communities

Walking challenge gets local seniors active, January 9, 2010
http://news.therecord.com/article/653800

Thestar.com – A long walk to space, January 12, 2010
http://mobile.thestar.com/mobile/living/article/749341

Healthzone.ca article - A long walk to space, January 12, 2010
http://www.healthzone.ca/health/yourhealth/agingwell/article/749341--a-long-walk-to-space

http://www.waterloochronicle.ca/news/article/200907

CBC TV: Video, Astronaut’s exercise slows aging. September 6, 2010


American Physiological Society podcast (June, 2012):
http://ajpheart.podbean.com/2012/06/01/cerebrovascular-response-after-long-duration-spaceflight/


National Post - Researchers hope the secret to aging gracefully is in outer space (Dec 12, 2012) http://news.nationalpost.com/2012/12/12/researchers-hope-to-find-the-secret-to-aging-gracefully-in-outer-space/

The Record - UW researcher probes health problems shared by astronauts, seniors (Dec 14, 2012)

Global TV – Hadfield launch story and Waterloo research (Dec 19, 2012)
http://www.globalnews.ca/video/global+national+dec+19/video.html?v=2319046065&p=1&s=detail\video


CBC Kitchener-Waterloo Radio, Live on-air interview about Chris Hadfield in BP Reg experiment and link to Schlegel-UW RIA (April 18, 2013)

CTS Television (May 11, 2013) taped interview re: Chris Hadfield Documentary

Toronto Star, A look at astronaut Chris Hadfield’s scientific efforts aboard the International Space Station (May 12, 2013)
http://www.thestar.com/news/insight/2013/05/12/a_look_at_astronaut_chris_hadfields_scientific_efforts_aboard_the_international_space_station.html

Ottawa Citizen, Chris Hadfield: the spaceman who set the world a-Twitter (May 12, 2013)

The Record: UW researcher gets help from Chris Hadfield in space (May 12, 2013)

CBC The National, Health and Space Travel (May 13, 2013)

CBC Radio (May 13, 2013) 5 minute live segments on radio stations in Edmonton, Winnipeg, St. John’s, Saskatchewan, Toronto, Windsor, Vancouver, Halifax, Victoria.

CTV Canada am (May 15, 2013) live interview on science to be conducted with Chris Hadfield

Globe and Mail (Dec 4, 2013) In Waterloo, Chris Hadfield has his final stint as a lab rat

Radio Canada International (Dec 5, 2013) Astronaut’s arteries may reveal clues on ageing (with 7 minute interview (http://www.rcinet.ca/en/2013/12/05/astronauts-arteries-may-reveal-clues-on-ageing/)

Space.com (June, 2014) Astronauts May Suffer Artery Damage on Long Missions (https://uk.news.yahoo.com/astronauts-may-suffer-artery-damage-long-missions-


CTV News (Dec 1, 2015) Supplies for Waterloo research project blast off for ISS this week [http://mms.tveyes.com/transcript.asp?StationID=11305&DateTime=11%2f30%2f2015+8%3a42%3a45+PM&PlayClip=true](http://mms.tveyes.com/transcript.asp?StationID=11305&DateTime=11%2f30%2f2015+8%3a42%3a45+PM&PlayClip=true) [http://kitchener.ctvnews.ca/supplies-for-waterloo-research-project-blast-off-for-iss-this-week-1.2680451](http://kitchener.ctvnews.ca/supplies-for-waterloo-research-project-blast-off-for-iss-this-week-1.2680451)


**Websites**


BP Reg (Blood pressure regulation on return from spaceflight) [http://www.asc-csa.gc.ca/eng/iss/bpreg.asp](http://www.asc-csa.gc.ca/eng/iss/bpreg.asp) (includes video by Chris Hadfield posted Feb 2013)

PUBLICATIONS:

Refereed Publications (Trainees indicated by *)


39. Hughson, R.L., K.H. Weisiger and G.D. Swanson. Blood lactate increases as a continuous...


111. Pavy-Le Traon, A., D. Siguado, P. Vasseur, A. Maillet, J.O. Fortrat, R.L Hughson, G.


126. Serrador, J.M.*, H.C. Finlayson* and R.L. Hughson. Physical activity is a major contributor to the ultra-low frequency components of heart rate variability. *Heart* 82: e9, 1999. (http://www.heartjnl.com/cgi/content/full/82/6/e9)


136. MacDonald,M.J.*, Naylor,H.L.*, Tschakovsky,M.E.*, and Hughson,R.L. Evidence that peripheral circulatory factors limit the rate of increase in muscle O$_2$ uptake at the onset of


198. Faisal A*, Dyson KS*, Hughson, RL. Prolonged ischemia impairs muscle blood flow and


221. Platts SH, Bairey Merz CN, Barr Y, Fu Q, Gulati M, Hughson R, Levine BD, Mehran R, Stachenfeld N, Wenger NK. Effects of sex and gender on adaptation to space:

222. Fraser KS*, Heckman GA, McKelvie RS, Harkness K, Middleton LA, Hughson RL. Cerebral hypoperfusion is exaggerated with an upright posture in heart failure. JACC Heart Fail 3: 168-175, 2015. PMID: 25543970 (with Editorial Comment by William K. Cornwell, MD; Benjamin D. Levine, MD)


BOOK CHAPTERS:


to endurance exercise. In: *The Physiology and Pathophysiology of Exercise Tolerance*,

and/or chaotic breathing patterns in resting humans. In: *Bioengineering Approaches to
pp.187-196. (Invited)

5. Hughson, R.L., and R.L Bondar. Autonomic nervous system function in space. In:
*Handbook of Clinical Neurology*, Ed. O. Appenzeller, Vol. 74(30), Elsevier Science B.V.,
Amsterdam, 1999. Pp 273-305 (Invited)

Kinetics in Health and Disease. A.M. Jones and D. Poole Eds. Routledge Publishing House,
2005.


**BOOKS:**


2. Advances in Modeling and Control of Ventilation. R.L. Hughson, D.A. Cunningham and J.

**CONFERENCE PROCEEDINGS:**

on the sinoatrial node. Proceedings of International Congress of Physical Activity Sciences,
Quebec, 1976.

2. Hughson, R.L. The energy continuum: Laboratory tests as predictors of endurance in long-term,


Kinetics of oxygen uptake studied with two different pseudorandom binary sequences. In:


42. Beavers, KR*, DK Greaves*, P Arbeille and RL Hughson. WISE-2005: Orthostatic tolerance is


**PUBLISHED ABSTRACTS AND CORRESPONDENCE:**


134. Shoemaker, J.K.*, J. Halliwell, R.L. Hughson and M.T. Joyner. Evidence for nitric oxide-


216. Denniss, SG*, JWE Rush and RL Hughson. Lycopene protects against endothelial...


227. RL Hughson, M Hughes*, KS Pizzolitto*, J Kroetsch*. Portal vein blood flow during lower body negative pressure (LBNP) and tilt by Doppler ultrasound. Exp. Biol. 2004


261. Azmy Faisal*, Keith Beavers*, Andrew Robertson* and Richard Hughson. Prior Moderate and Heavy Cycling Exercise Accelerates Oxygen Uptake and Cardiac Output Kinetics in Endurance Athletes. Presented at Canadian Society for Exercise Physiology,
London ON, 2007. (Note: Presented in Graduate Student Competition, one of four selected on basis of student submission of 2 page paper.)


270. AR Roberston*, RL Hughson. Brain blood flow in the elderly population is independent of mean arterial pressure but dependent on peripheral vascular stiffness. CIHR YI Forum, August 2008.


292. Hughson RL. Comments on point:counterpoint: respiratory sinus arrhythmia is due to a
central mechanism vs. respiratory sinus arrhythmia is due to the baroreflex mechanism. J Appl Physiol. 2009 May;106(5):1745-9.


297. Arbeille, P; Shoemaker, K; Kerbeci, P; Schneider, S; Hargens, A; Hughson, R. Cardiac output, cerebral, and femoral arterial flow, and calf vein size response to Tilt + LBNP test after a 60 day HDT bedrest. Life in Space for Life on Earth, Trieste, Italy, June 13-18, 2010

298. Aletti, Federico; Ferrario, Manuela; Greaves, Danielle K; Shoemaker, J Kevin; Arbeille, Philippe A; Baselli, Giuseppe; Hughson, Richard L. Model of cardiorespiratory responses to random lower body negative pressure before and during head down tilt bed rest: effects on cardiac preload Life in Space for Life on Earth, Trieste, Italy, June 13-18, 2010

299. Edgell, H*; Grinberg, A*; Beavers, K*; Hughson, RL. Changes in vasoconstrictor hormones with lower body negative pressure (LBNP) in men and women before and after 4-hours of head down bed rest (HDBR). Life in Space for Life on Earth, Trieste, Italy, June 13-18, 2010


316. KS Fraser*, DK Greaves*, JK Shoemaker, AP Blaber, RL Hughson. Cardiovascular responses to daily activity and exercise countermeasures on the International Space Station. Accepted with Travel Award from Canadian Space Agency, International Astronautics Congress, South Africa, 2011
317. LK Fitzgibbon*, RL Hughson. The Effect of Artificial Gravity during Short-term Exposure to Simulated Microgravity on Cardiovascular Responses to Orthostatic Stress. Accepted with Travel Award from Canadian Space Agency, International Astronautics Congress, South Africa, 2011
318. AD Robertson*, D Greaves*, JK Shoemaker, RL Hughson. Carotid distensibility following a long-duration stay on the International Space Station. Accepted with Travel Award from Canadian Space Agency, International Astronautics Congress, South Africa, 2011
322. O Kos, D Hart, R Hughson, R Gorczynski. Bed rest studies support the hypothesis that signalling from the CD200:CD200R immune regulatory axis is altered under conditions associated with loss of bone mass. Canadian Space Congress, Calgary, November 2011
329. Brar I*, Robertson AD*, Hughson RL. The relationship between peripheral endothelial function and cerebrovascular reactivity to CO2 in older adults. Experimental Biology, Boston, April 2013.
333. Hughson RL, CCISS, Vascular and BP Reg: Canadian space life science research on ISS. Humans in Space Symposium, Cologne, Germany, July 2013.
336. Villar R*, Hughson RL. Reply to Pancheva, Panchev and Pancheva. J. Appl. Physiol. 114:


359. Beltrame T*, Hughson RL. EVALUATION OF OXYGEN UPTAKE DYNAMICS BASED ON STOCHASTIC CHANGES IN HIP ACCELERATION AND HEART RATE. CSEP 2015
361. Moroz D, Hughson RL. Brain blood velocity measured during ambulatory over-ground activities of daily living in young adults and seniors. CSEP 2015
365. Hughson RL, Greaves DK. Key results from the spaceflight experiment BP Reg. NASA Human Research Program Investigators’ Workshop, Galveston, TX, February 8-11, 2016
369. Fitzgibbon-Collins LK, Brar I, McIlroy WE, Heckman GA, Hughson RL. Reduced brain
oxygenation, postural stability and fall history in older adults. Four Cities Geriatric Research Day, Waterloo, June 2016


373. Zuj KA, Deglint J, Gawish A, Wong A, Clausi DA, Hughson RL. A new software for determining changes in arterial diameter over time. Poster session presented at: North American Artery. 6th Annual Meeting of North American Artery; 2016 Sept 8-10; Chicago, IL, USA

374. Technical Reports

1. Glaxo – Exercise induced asthma
RESEARCH GRANTS AND CONTRACTS:


4. Hughson, R.L. NSERC (3 year term) $8,188.00 per year. 1979-81. Cardiorespiratory and metabolic adaptations to work.


13. Co-investigator with H.J. Green and M.E. Houston. Medical Research Council (2 year term) $30,000.00, 1982; $26,000.00, 1983. Histochemical and metabolic correlates of respiratory muscle fatigue.


53. Hughson, R.L. Canadian Space Agency/NSERC Collaborative Activities Project $200,000


responses: effects of age and gender.


77. Hughson RL. Canadian Space Agency. $181,981 (2010-2012) CCISS data analysis.

78. Hughson, R.L. Canadian Space Agency. $155,000 (2010-2012) BP Reg: A simple in-flight method to test the risk of fainting on return to Earth after long-duration space flights (Pre-flight phase only)


80. Hughson, R.L. Canadian Space Agency. $464,009 (2012-2015) BP Reg: A simple in-flight method to test the risk of fainting on return to Earth after long-duration space flights (Flight phase)


82. Hughson RL. NSERC $40,000 (2012-2013) Dynamic cardio-respiratory-cerebrovascular
interactions.


89. Hughson RL. $40,000 Novel methods to study vascular health during spaceflight and on Earth. Canadian Space Agency

WISE 60-Day Bed Rest (Toulouse): PWGSC Contract #9F007-046025/001/ST

5-Day Bed Rest (Toulouse): #9F007-071471/001/ST

Twins Bed Rest (San Diego): #9F007-033004/001/ST

Vascular (Cardiovascular health effects of long duration spaceflight): #9F007-052819/001/ST

CCISS (Cardiovascular and cerebrovascular control upon return from ISS): #9F007-020213/001/ST

Vascular Echo (Ops) # 9F053-120610

BP Reg (Ops): 9F053-111259
GRADUATE STUDENT SUPERVISION:

As Supervisor

a) Ph.D. - 15 completed, 4 in progress

b) M.Sc. - 44 completed, 2 in progress

J. Vander Doelen. The effects of breathhold on the electrical activity of the dog myocardium. (M.Sc) 1978

J.M. Kowalchuk. The effects of dietary manipulation on the cardiorespiratory response to exercise. (M.Sc) 1980.


B.J. MacFarlane. Effect of specific exercise and propranolol on anaerobic threshold. (M.Sc) 1983.


M.D. Inman. A model estimate of tissue oxygen consumption in man following step function increase in work rate. (M.Sc) 1986.

G.J. Stoute. Peripheral circulatory adaptations to static quadriceps contraction of varying intensities with reference to central circulatory response. (M.Sc) 1986.


P.C. Murphy. Oxygen uptake and cardiovascular kinetics during step vs. ramp tests under normoxia and hypoxia. (M.Sc) 1988.

G.C. Butler. Cardiovascular adaptation to simulated microgravity: four hours of six degree head down tilt bed rest. (M.Sc) 1989.


M.E. Tschakovsky. Blood flow kinetics to the forearm at the onset of combined forearm and leg exercise in normoxic and hypoxia. (M.Sc) 1993.


R. Leask. Dynamics of the cardiovascular system. (co-supervisor, MASc.) 1996.


Stephane Perrey (co-supervisor) – Déterminants des différentes phases transitoires de la cinétique de la consommation d’oxygène chez l’homme, Université de Franche-Comté (Ph.D.) 2000.

Brad Matushewski Critical investigation of the pulse contour method for obtaining beat-by-beat cardiac output. (MSc) 2001
Daijiro Abe  Dynamic linearity of the cardiorespiratory responses at the exercise onset in humans. (MSc) 2001.

Andrew Betik Flow-induced dilation by reactive hyperemia requires large increases in blood flow: an investigation of five circulatory occlusion protocols. (MSc) 2001.

Brent Winnett. Platelet aggregation and prostaglandins during reactive hyperemia. (MSc) 2001.


Andrew Harvey, Physiological demands of fire fighting test circuit. (MSc) 2003.

Christa Chatten (M.Sc.), Baroreflex response to LBNP and exercise in normal and highly trained individuals. 2003.


Steven G. Denniss, Effect of lycopene supplementation on flow mediated dilation after high fat meal. (M.Sc.) 2004.

Tanya Marie Spitzig, Endothelial vasomotor function in pre- and post-menopausal women assessed by flow mediated dilation before and after a high-fat meal. (M.Sc.) 2004.


Darran M. Fischer. Cardiovascular response to 4-hour head down tilt bed rest. (M.Sc.) 2005.


Louis Mattar. The effect of 60-days of head down bed rest on vascular health. (M.Sc.) 2006

F. Michael Williams-Bell. Physiological demands and ventilatory requirements during simulated large structure firefighting tasks. (MSc) 2007.

Andrew D. Robertson, Vascular aging: influences on cerebral blood flow and executive function. (MSc) 2007.
Nathalie Gagné. Developing a non-invasive method to monitor cardiovascular control during orthostatic challenge considering the limitation of the Finometer. (MSc) 2009.

Keith R. Beavers. Investigating the efficacy of the NASA fluid loading protocol for astronauts: the role of hormonal blood volume regulation in orthostasis after bed rest. (MSc) 2009.

Kenneth S. Dyson. Exercise, shear stress, and flow-mediated dilation of human conduit arteries. (PhD) 2009

Anna Grinberg. Cardiovascular deconditioning resulting from 28-hour bed-rest and the efficacy of the fluid loading countermeasure. (MSc) 2010.

Heather Edgell. Cardiovascular responses of women to orthostatic stress, the effects of the menstrual cycle and age, and a comparison to men. (PhD) 2010

Azmy Faisal. Oxygen uptake and blood flow kinetics following the onset of exercise in trained humans. (PhD) 2010

Erin Mandell. Changes in conduit artery blood flow and diameter post blood flow restriction. (MSc) 2011

Chantel Tessmer. Cardio- and cerebrovascular responses to lower body negative pressure and standing in the elderly. (MSc) 2012

Rodrigo Villar. Effect of arterial blood perfusion pressure on vascular conductance and muscle blood flow at rest and exercise. (PhD) 2012

Kathryn Zuj. Analysis of transcranial Doppler ultrasound waveform morphology for the assessment of cerebrovascular dynamics. (PhD) 2012

Andrew Robertson. Cerebrovascular reactivity and vascular function in the elderly. (PhD) 2012

Katelyn Fraser. Postural effects on brain blood flow and cognition in heart failure. (MSc) 2014

Ikdup Brar. Exploring differences in vascular aging and cerebrovascular hemodynamics between older adults of white Caucasian and South Asian origin. (MSc) 2014

**In progress**

Jason Xeni. Aldosterone antagonism, vascular stiffness and brain blood flow in hypertension. (PhD)
Laura Fitzgibbon. Cardiovascular control and postural stability during ambulatory monitoring in the elderly. (PhD)

Dianne Moroz. Physical activity monitoring in activities of daily living and cardiovascular health. (PhD)

Thomas Beltrame. Oxygen uptake kinetics in activities of daily living. (PhD)

**Post-doctoral and Visiting Scholars**


Rodrigo Villar. Monitoring activities of daily living. 2012-2013


Cristina Oliveri. Adaptation to exercise in diabetics. 2015

1Winner 1996 Young Investigator Award, Canadian Society for Exercise Physiology.

2Winner 1998 Young Investigator Award, Canadian Society for Exercise Physiology.

3Winner 1999 Young Investigator Award, Canadian Society for Exercise Physiology.

**External Examiner Ph.D. Theses**

Université de Montréal, University of Cape Town (2), University of Western Ontario, McGill University, University of Toronto (2), Université Franche-Comté
August 3 2016

Dr. Andrea Edginton, Chair
Clinical Research Ethics Committee
Office of Research, 3rd Floor, East Campus 5 Building
University of Waterloo
Waterloo, Ontario N2L 3G1

Dear Dr. Edginton:

Re: Clinical Research Ethics Committee

Please accept this letter as an acknowledgment of my interest in the position of Community Member on the University of Waterloo’s Clinical Research Ethics Committee.

I have had the pleasure of speaking with Julie Joza, Senior Manager and appreciate the nature of and commitment involved in this position.

I have enclosed my curriculum vitae for your review.

Sincerely yours,

[Signature]

Marsha Mann

Enc.
Marsha Mann, B.Sc. M.Sc.F.

Education

1988    Master of Science in Forestry, University of New Brunswick
1984    Bachelor of Science in Forestry, University of New Brunswick

Experience

Owner
No Gaps Ltd.
September 2011 to present
- Litigation support to lawyers and law firms with respect to plaintiffs’ medical negligence cases
- Review of clinical notes and records from all sources, identifying medical issues, treatments, and inconsistencies
- Research medical issues, identifying potential experts
- Review hospital policies, protocols and guidelines
- Preparation of comprehensive memoranda and briefs
- Attend at Examinations for Discovery and Pre-Trials as required.

Owner
Accent the Details Inc.
July 2008 to October 2012
- Conducted market research to develop a vision of a unique retail experience
- Sourced and retained a creative team to brand the vision
- Designed the interior of the store and oversaw the renovation of the retail space
- Secured commitments of exclusivity with key product lines for the store
- Used social media to compliment print and radio marketing campaigns
- Established a loyal customer base from Toronto through Eastern Ontario and Upstate New York

Executive Director
Ontario Trial Lawyers Association
March 1995 to June 2008
- First full-time employee with the Association and tasked with building the Association
- Achieved membership growth from 150 to over 1200 members
- Responsible for managing the Association’s office, staffing and a budget in excess of $1 M
- Expanded print publication, introduced bi-monthly newsletter and public education materials
- Negotiated facilities contracts, organized spring and fall conferences, specialized section meetings, breakfast and luncheon sessions, Annual General Meeting
• Ensured compliance with Law Society of Upper Canada requirements for programs
• Represented OTLA on the Chief Justice of Ontario’s Advisory Committee on Professionalism
• Built and maintained a strong base of financial sponsorship support
• Organized fundraising events, including annual black tie dinner
• Facilitated the development of the “Helmets on Kids” program

Lecturer
University of New Brunswick
September 1988 to April 1989
• Taught two required courses (lectures and laboratory sessions) and participated on faculty committees

Memberships and Volunteer Experience

Founding President of the Cambridge Women’s Liberal Association, Director of the Cambridge Provincial Liberal Association and Director of the Cambridge Federal Liberal Association.

I am a member of Women for Nature, an initiative of Nature Canada.

I am a member of Ancient Mariners Canoe Club (Cambridge, Ontario).

I served as President of Alzheimer Society of New Brunswick.
An Expression of Interest in being a Community Member for the Clinical Research Ethics Committee of University of Waterloo

My name is Joan Moller.

I am a retired physiotherapist.

Research continues to be of interest to me as a retired health professional and as a member of the community. I read and hear results of research studies discussed in different forms of media, which can possibly affect decision-making of readers/listeners, including myself. Of course, the results of past research which are now in question are also publicized.

In the role of community member I can help promote well-written lay summaries. I think that lay summaries are a step between the researcher and the community, promoting better understanding of the one for the other, and knowledge transfer.

Protection of people studied during research is paramount. I will be pleased if I can help the committee to ensure research participants’ protection.

Sincerely,

Joan Moller
JOAN K. MOLLER

PROFILE SUMMARY

› Analytical
› Likes to dialogue in the professional situation, i.e. “sandpit”
› Area of specific interest is treatment of work injuries

PROFESSIONAL STATUS

› B.Sc. Physiotherapy, University of Toronto
› Retired physiotherapist

WORK EXPERIENCE

2011-now

➢ Child-minding my grandchildren
➢ Volunteering in elementary school, reading with children

1992-2011 Physiotherapist - Grand River Hospital, Kitchener

➢ Outpatient care of injured workers and motor vehicle accident injuries
➢ Chronic Pain Program
➢ Multidisciplinary Health Care assessments, Independent Medical Examination, Disability Assessments (with physicians)
➢ Functional Ability Evaluations

1977-1991

➢ Hospital-based and community-based work as physiotherapist, focused on patients with musculoskeletal problems.
Statement of Interest for Position of CREC Chair

Andrea Edginton

In 2009, I became a member of the Clinical Research Ethics Committee (CREC) as the Pharmacy representative. In 2013, I was appointed to be the Chair of this committee and have fulfilled that role for the past three years. In my time as Chair of this committee I have:

Volumes and Complexity

- Held monthly face to face meetings to review and approve all above minimal risk applications
- Reviewed 19 (2014) and 31 (2015) greater than minimal risk protocols
- Provided ongoing oversight for minimal risk research occurring under the jurisdiction of CREC
- Reviewed adverse events, protocol deviations and incidental findings occurring under CREC jurisdiction and provided timely and complete feedback to researchers and advice on mitigation activities to reduce risk for both the participants and institution as appropriate
- Dealt with procedures and protocols of increasing complexity which have required, on occasion, direct conversation with the principle investigators to clarify procedures and equipment functionality
- Together with ORE staff, met personally with Principal Investigators, as required, to share CREC feedback on contentious decisions

Membership

- Maintained stable membership and enhanced the breadth of skills available for decision making
- Secured the renewal of a third term for the clinician (Dr. Joe Kim)
- Added breadth to the clinical skills available with the addition of Dr. Mathieu Doucet
- Secured ad hoc membership of a statistician (Dr, Joel Dubin)
- Secured the renewal of a third term for a clinical cardiologist (Dr. Shekar Pandey)
- Added breadth to the clinical skills available with the addition of Dr. Peter Trainor
- Recruited a new member to represent Pharmacy (Dr. Kelly Grinrod)
- Implemented requirement for alternate community member to attend at least 5 CREC meetings per year to maintain contact with CREC
- Secured a commitment from the legal representative (who also has a biochemical background) to serve a third term

New Guidelines and Resources

- CREC reviewed, revised and then endorsed a number of new guidelines which were developed to provide additional transparency and guidance for researchers:
  - Conflict of Interest
  - Data Retention
  - Data Transfer
  - Course based research versus professional development
  - Guideline on SOP requirements
  - Incidental Findings
  - Quorum
  - Modifications
  - Attestation form for new members
- Policy 69 – revisions to Conflict of Interest form (via working group)
- Definition of a clinical trial, health interventions, health outcomes and registration requirements (via working group)
- Commercial cell lines and need for ethics review (discussion)
- Research during publicly declared emergencies
- Proposal concerning delegated review of minimal risk course based research

**Special Projects**

- Active participant on Research Ethics and Integrity Advisory Committee (REIAC) working group which developed a recommendation for institutional risk analysis support for medical devices which are not Health Canada regulated

- Active participant in the Clinical Trials Ontario accreditation process, including appearing before external accreditation and audit committee and reviewing submissions made on behalf of the university

As a member of the research community at the University of Waterloo, I am keenly aware of the important role that an ethics board has in the responsible conduct of research and the education and training of researchers. I look forward to continuing in the role as Chair for the next 3 years.
Andrea N. Edginton  
School of Pharmacy | University of Waterloo | 200 University Ave W  
aedginto@uwaterloo.ca  
+1 519 888 4567 x21315

WORK EXPERIENCE

2015-present  Programmatic Assessment Officer, School of Pharmacy, University of Waterloo, Waterloo, ON

2014-present  Associate Professor, School of Pharmacy, University of Waterloo, Waterloo, ON

2014-present  Vice President, Design2Code Inc, ON

- Consultancy company specializing in software design, development and application

2013-present  Special Graduate Faculty, Department of Pharmaceutical Sciences, University of Tennessee College of Pharmacy, TN, USA

2012-present  Special Graduate Faculty, Bioinformatics, Department of Computer Science, University of Guelph, Guelph, ON

2009-present  Cross-appointed Faculty, Department of Biology, University of Waterloo, Waterloo, Ontario

2008-2014  Assistant Professor, School of Pharmacy, University of Waterloo, Waterloo, Ontario

2010-2012  Graduate Officer, School of Pharmacy, University of Waterloo, Waterloo, Ontario, Canada

- Developed and maintained Pharmacy Graduate Program policies, curricular plan and day-to-day operations

2004-2008  Pharmacokinetics Consultant, Department of Systems Biology, Bayer Technology Services GmbH, Leverkusen, Germany

- Use PBPK simulation to address client-directed questions regarding candidate drugs

2004-2006  Post-Doctoral Fellowship, Physiology-Based Pharmacokinetic Modeling (PBPK), Systems Biology/Biophysics, Bayer Technology Services GmbH, Leverkusen, Germany

- Primary research on development and application of PBPK models to advance drug discovery process in pre-clinical and/or clinical development stages

2004  Study Director, Syngenta, Greensborough, NC, USA (work done in Guelph, ON)

- Planned, implemented and produced manuscript for research program regarding atrazine toxicokinetics and bioavailability in amphibians

2002-2004  Teaching Assistant, Pesticides in the Environment, Department of Environmental Biology, University of Guelph, ON

- Provided direction to students in development of realistic grant applications, including research proposal
2003  **Teaching Assistant**, Natural Chemicals in the Environment, Department of Environmental Biology, University of Guelph, ON

- Facilitated online conferences with students to advance their understanding of the course objectives

2001-2003;  **Lecturer**, 4th year course ‘Biomedical Toxicology’, Department of Biomedical Science, University of Guelph, ON

- Develop and present lectures on pharmacokinetic concepts
EDUCATION

2015-2016  Certificate, Academic Leadership Fellows Program, American Association of Colleges of Pharmacy

1999-2004  Doctorate of Philosophy (Ph.D.), Environmental Toxicology, Department of Environmental Biology, University of Guelph ON
  • Thesis: “Toxicity and toxicokinetics of forestry-used herbicides in anuran amphibians”


TEACHING ACTIVITIES

2009-2012  Course co-ordinator, PHARM220: Integrated Patient Focused Care 1

2009-present  Instructor, PHARM224: Pharmacokinetic Fundamentals

2009-present  Clinical Pharmacokinetics Instructor, Integrated Patient Focused Care Series 2-8

2011-present  Instructor, PHARM608A: Advanced Pharmacokinetics (graduate course)

2009, 2010  Pharmacokinetics section instructor (2 hours), PHARM 141: Pharmacology

STUDENTS & TRAINEES

Abdullah Hamadeh  Mentor, Visiting Research to University of Waterloo
  2015/8-2017/1  Quantitative systems toxicology - nanoparticles

Paul Malik  PharmD Supervisor, University of Waterloo
  2015/-2016/5  Using population PBPK modelling to explore variability in transtuzumab pharmacokinetics

Alanna McEneny  PhD Advisor, University of Waterloo
2015/9-present  Population based pharmacokinetic modeling of factor 8 and 9 in hemophiliacs.

Kevin Watt  Consultant to Assistant Professor, Duke University
2015/8-2019/8  PBPK Modelling of anti-fungals in children

Colin Phipps  Post-doctoral Fellow Advisor, University of Waterloo, Applied Math PhD.
2014/9-2016/5  Population PBPK modelling

Daniel Gonzalez  Mentor to Assistant Professor Gonzalez for K23 application to National Institute for Child Health and Human Development, USA
2014-2018

Binbing Ling  Post-doctoral Fellow Advisor. shared with Ron Johnson at Biomedical Science, University of Guelph. Development of a drug-drug interaction laboratory focused on food animals
2014/2-2014/6

Ishita Patel  Biology Co-op Supervisor, University of Waterloo
2014/1-2014/5  Literature review of vancomycin pharmacokinetics

Kevin Lee  Biology Co-op Supervisor, University of Waterloo
2014/1-2014/5  Literature review of drug-drug interaction studies in food animals

Alanna McEneny  MSc Advisor, University of Waterloo

Ron Johnson  Mentor to Clinical Pharmacology Professor, Ontario Veterinary College, University of Guelph
2012/2013  Did sabbatical with me for spring semester 2012 and spring semester 2013.

Chetan Rathi  PhD Committee Member, Department of Pharmaceutical Sciences, University of Tennessee College of Pharmacy, USA.
2013/9-2017/8  Evaluation of pharmacokinetic and pharmacodynamic differences between subcutaneous and intra-tracheal administration of Lee 1599 in mice

Chris Cameron  MSc Committee Member, Bioinformatics, University of Guelph
2012/9-2014/8  Tissue to plasma partition coefficient prediction by a multi-channel restricted Boltzmann machine

Roger Chen  MSc Interim Advisor for faculty member (Marianna Foldvari) on sabbatical
2012/9-2014/8  Ocular drug delivery of nanoparticles

Rabiya Chandani  MSc Advisor, University of Waterloo

2012/9-2013/9  The consequences of a lack of adult IV pharmacokinetic data in pediatric equivalent dosing simulations

Currently a Pharmacokineticist at BioPharma in Mississauga

Anil Maharaj  MSc/PhD Advisor, University of Waterloo

2012/1-2016/4  Development of an oral mechanistic absorption model for pediatrics

Caroline Wojick  BSc Pharm Faculty Liaison for Co-op Project, University of Waterloo

2012/9-2013/8  Missed doses in a hospital setting – an assessment of causes

Elliot Offman  Co-advisor for PhD, University of Waterloo

2011/9-2016/5  Design of preclinical toxicokinetic studies for assessment of macromolecule biosimilarity. Part-time student, as he is Director of Clinical Pharmacology at Celerion.

Bhavank Shah  BSc Pharm Work-study Supervisor, University of Waterloo

2011/9-2012/9  Literature review on biosimilars - Joint publication in Clinical Pharmacokinetics.

Tianshi Liu  BSc Pharm Project Supervisor, University of Toronto

2011/9-2012/4  Volunteer learning drug-drug interaction modeling project.

Laura Dunn  BSc Pharm Faculty Liaison for Co-op Project, University of Waterloo


Yejin Yun  MSc Advisor, University of Waterloo

2010/9-2013/4  Decision tree development for accurate prediction of tissue: plasma partition coefficients within physiologically based pharmacokinetic models

Currently a Senior Pharmacokineticist at Hanmi Pharmaceuticals in South Korea

Venita Harris  PharmD Educational Rotation Advisor, University of Waterloo

2009/10-2009/12  Development of a multi-media tool for teaching Clinical Biochemistry to Pharmacy
AWARDED GRANTS AND CONTRACTS

Research Awards

2015-2016  
Ontario Centres of Excellence – VIP I Program, Development of software tools for streamlining human health risk assessment (in collaboration with SafeDose Inc.)

Principal Investigator: Andrea Edginton

2015-2020  
National Institute of Health K23, USA

PBPK model development for antifungals used in children on extracorporeal membrane oxygenation (ECMO).

Principal Investigator: Kevin Watt, Assistant Professor, Duke University

Consultant: Andrea Edginton

2015-2016  
Department of Psychiatry, Queen’s University

Tool development for assessing the risks associated with psychopharmaceutic agents use in children: a pilot study with Atomoxetine.

Principal Investigator: Pappu Reddy, Queen’s University

Co-Investigators: Erica Ling and Andrea Edginton
2014-2018 National Institute of Health R01 HD076676-01
Physiologically-based pharmacokinetic models for optimal drug dosing in children
Principal Investigator: Michael Cohen-Wolkowiez, Duke University
Co-investigators: Andrea Edginton, Edmund Capparelli

2014-2018 Astellas Pharma Inc
Pediatric PBPK modeling to identify pediatric equivalent doses for clinical trial planning
Principal Investigator: Andrea Edginton

2012-2013 Astellas Pharma Inc.
Pediatric PBPK modeling to identify pediatric equivalent doses for clinical trial planning
Principal Investigator: Andrea Edginton

2010 Canadian Institute for Health Research Incentive Fund, University of Waterloo

2009-2011 Learning Fund Initiative Grant, University of Waterloo,
Development of a multi-media teaching tool and activities for engaging students in Clinical Biochemistry within the blended learning course, Integrated Patient Focused Care 1

2008-2009 Department of National Defence, Defence Research and Development Canada,
Modelling the effects of operational stress on pharmacokinetics

2009 - 2016 Natural Sciences and Engineering Research Council of Canada Discovery Grant
Development and validation of predictive permeability and partitioning models for organic contaminants within physiologically-based toxicokinetic models

2009 University of Waterloo Start-up Funds

**FACULTY AWARDS**

2016 **Outstanding Performance Award**, University of Waterloo - Recognizes top few percent of UW faculty. 3.5% increase in salary.

2015 **Excellence in Science Teaching Award**, one of two Science Faculty members for 2015
2013 **Outstanding Performance Award**, University of Waterloo - Recognizes top few percent of UW faculty. 3.5% increase in salary.

**STUDENT AWARDS & SCHOLARSHIPS** – awarded $196,000 CAN from 2000-2004

- **Natural Science and Engineering Research Council Award**, Post-graduate Scholarship-B & Post-Doctoral Fellowship, NSERC
- **Ontario Graduate Scholarship & Ontario Graduate Scholarship in Science and Technology**, Ontario Provincial Government
- **Canadian Forestry Service NSERC Supplement**, Natural Resources Canada
- **Cecil Franklin Scholarship in Soil & Water Conservation**, University Graduate Scholarship, Taffy Davidson, Arthur Latornell Graduate Scholarship & Robinson Travel Scholarship, Board of Graduate Studies, University of Guelph
- **Travel Scholarship** & 1st prize for best poster presentation, Society of Environmental Toxicology and Chemistry
- **Canadian Amphibian and Reptile Conservation Network Graduate Award**

**PUBLICATIONS & PRESENTATIONS**

**Invited Refereed Publications**


**Refereed Publications**


Keating S, Edginton AN, 2016. Pharmacokinetics of a constant rate infusion of fentanyl in dogs during isoflurane anesthesia and following administration of acpromazine or dexametomidine during anesthetic recovery. Veterinary Anaesthesia and Analgesia. 43(1): 35-43


Invited Book Chapters


Patents


Technical Reports


2004-2008 @ Bayer Technology Services GmbH. Numerous project reports as completed under contract for various pharmaceutical companies. Titles and content are confidential.


Invited Platform Presentations

Edginton AN. Physiologically based pharmacokinetic (PBPK) model development and application: a focus on children. School of Pharmacy and Pharmaceutical Sciences, University of Buffalo. December 10, 2015.

Phipps C. Parameter identifiability and sensitivity in large molecule PBPK models. *CMS Winter Meeting*, Montréal, Québec, Dec. 4, 2015. - invited

Phipps C. Parameter identifiability and sensitivity in large molecule and nanoparticle PBPK models. *Indiana CTSI Symposium on Disease and Therapeutic Response Modelling*, Indiana University Purdue University Indianapolis, Indiana, Nov. 4, 2015. - invited


Edginton AN. Hands-on workshop on the development and application of PBPK models (full-day workshop). University of Tennesse –Health Sciences Centre, Memphis, Tennessee, USA. May 11, 2012.


Edginton AN. Physiologically based pharmacokinetic (PBPK) models for prediction of the age-dependence of drug disposition. Food & Drug Administration (FDA), Silver Spring, Maryland. August 24, 2011.


**Platform Presentations**


Maharaj AR, Edginton AN. Importance of experimental determination of factors that reduce uncertainty and allow for identifiability of other parameters. AcoP (American Association of Pharmacometrics) meeting in October 4-7, 2015

McEneny A, Osman W, Edginton AN, Nekkar P. Chemical structure modification of tacrine and its effect on CYP1A2 binding: in vitro and in silico investigations. CANAD 2014 - Canadian Alzheimer’s Disease Research Symposium, Quebec City, Quebec, Canada. October 2-4, 2014.

Edginton AN. Review of current practices in pediatric PBPK modelling. American Conference on Pharmacometrics (ACoP) 4th annual meeting, Fort Lauderdale, FL, USA. May 12-15, 2013. (Session chair and speaker)

Edginton AN, Holbrook J, Power M. Using student feedback to design a more effective Clinical Biochemistry course component. Opportunities and New Directions Conference, University of Waterloo, Waterloo, ON, Canada. April 26, 2012.


Poster Presentations


Malik P won the 2016 GSK / CSPS National Undergraduate Student Research Program Award for this poster


Malik P, Phipps C, Edginton AN. Using population PBPK modelling to explore variability in trastuzumab pharmacokinetics . PHARM401 - Independent Study PharmD course presentations. School of Pharmacy, University of Waterloo, Kitchener, ON. December 11, 2015.


Denomme J, Harris V, Edginton AN, Hajducek D, Salvadori M. Vancomycin assessment of nonlinear kinetics in pediatrics (VANko-P). Canadian Hospital Pharmacy Residency Board Southwestern Ontario Poster Night. July 17, 2014, Windsor, Ontario. (Julia Denomme won first prize for her poster, competition was the other hospital pharmacy residents in Southwestern Ontario)


Keating SCJ, Kerr CL, Valverde A, McDonell WN, Johnson RJ, Edginton AN. Pharmacokinetics of a constant rate infusion of fentanyl in dogs during isoflurane anesthesia and following sedative administration during anesthetic recovery. American College of Veterinary Anesthesia and Analgesia conference, September 8-10, 2013. San Diego, CA, USA.


### PROFESSIONAL ACTIVITIES & COMMITTEES

<table>
<thead>
<tr>
<th>Year</th>
<th>Activity</th>
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<tbody>
<tr>
<td>2016-present</td>
<td>Member, Editorial Advisory Board, Journal of Pharmacokinetics and Pharmacodynamics</td>
</tr>
<tr>
<td>2015-present</td>
<td>Chair, Assessment Committee, School of Pharmacy, University of Waterloo</td>
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<tr>
<td>2010-present</td>
<td>Member, School of Pharmacy Graduate Committee, University of Waterloo</td>
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<tr>
<td>2009-present</td>
<td>Member, Editorial Board, Therapeutic Drug Monitoring Journal</td>
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</tbody>
</table>
2008-present  Member, Science Undergraduate Appeals Committee

2014  Canadian Foundation for Innovation - John R. Evans Leaders Fund - grant reviewer (n=3) for “A drug-related computational platform towards a better understanding and control of therapeutic outcomes.”

2013  NSERC Industrial Chair in Pharmacometrics Award. Role: Committee member (n=5) for review and site visit. DATE

2013  Grant reviewer, Biotechnology and Biological Sciences Research Council (BBSRC), UK. "Mechanistic modeling of biologics" July 2013.

2013  Session Chair and speaker of Pediatric PBPK modeling session, American Conference on Pharmacometrics, Fort Lauderdale, Florida, May 2013.

2013-2016  Chair Elect, Clinical Research Ethics Committee, University of Waterloo

2012-2015  Member, Assessment Committee, School of Pharmacy, University of Waterloo

2012  Member, Academic Excellence Committee, School of Pharmacy, University of Waterloo

2009-2013  Member, Clinical Research Ethics Committee, University of Waterloo

2011  External Ph.D. Reviewer, ‘Caractérisation de la composante toxicocinétique du facteur d’ajustement pour la variabilité interindividuelle utilisé en analyse du risque toxicologique’, Mathieu Valcke, University of Montreal, Montreal, Quebec, November 2011.

2011  Grant reviewer, National Institute of Academic Anaesthesia, UK, "Plasticiser concentrations in children undergoing mechanical ventilation with sedation" April 2011


2010  Learning Initiatives Fund and Program Initiatives Fund (LIF/PIF) grant reviewer, University of Waterloo

2010  English language reviewer for German Ph.D. Thesis, “Comprehensive Analysis of Risk Factors in Offspring of Type 2 Diabetic Patients”, Michaela Vossen at the University of Hamburg, Hamburg, Germany.

2009  Reviewer, NSERC Discovery grant program

2009  Invited member of a BPA workshop in Germany in March 2009 where 25 policy makers and scientist gathered to discuss the science behind BPA for German regulatory purposes.
August 15, 2016

To whom it may concern

I wish to express my interest in continuing to be a member of the Clinical Research Ethics Committee. As a seasoned researcher, who strongly believes in the value of ethically conducted research, I am interested in being part of the process which allows such research to continue at the University of Waterloo. I have experienced the ethics review process from both the researcher’s perspective and that of an ethics review committee. It is a valuable balance to have. While it is a necessary requirement that research be conducted in an ethical and appropriate manner it is also vital that the process does not unnecessarily impede the conduct of research. I will work diligently to the achievement of both goals. I have very much enjoyed working with the members of CREC in the past 3 years. It is the best committee that I have served on at this University. It does important often controversial work in a collegial and productive manner. I for one usually leave the meetings feeling better than when I came in, which in my experience is not a common thing for meetings. I believe that I continue to have insight to offer the committee and would be honoured to be re-appointed. Please find below a short biography.

**Elizabeth L. Irving** received a Doctor of Optometry degree, a M.Sc. degree in Physiological Optics, and a Ph.D. degree in Vision Science from the University of Waterloo in 1983, 1989, and 1994, respectively. She was a Medical Research Council funded post-doctoral fellow in the Department of Ophthalmology at the University of Toronto from 1994-1996. She is currently a Professor in the School of Optometry and Vision Science, University of Waterloo. She is an Adjunct Professor in the Department of Ophthalmology, University of Toronto, and a member of the Center for Vision Research, York University, Toronto. Her current research interests include the development and adaptation of the eye, eye movement systems and patient views on eye care. Dr. Irving has received a Governor General’s Gold Medal, the Royal Society of Canada’s Alice Wilson award, and a Premier’s Research Excellence Award. She held a Canada Research Chair between 2001 and 2011 and currently holds a University Research Chair.

Dr. Irving has been involved in research with human subjects since 1986 and with animal research since 1989 becoming an independent researcher in 1996. She has completed the ethics training courses necessary to conduct human and animal research in Canada and an ethics course required to hold US government research funding. Dr. Irving has conducted a variety of different types of research including basic science, clinical observation, clinical intervention, large file review (including database management), clinical trial, focus groups and qualitative research. She was a member of the University of Waterloo Animal Care Committee 2001-2013 and a member of the Clinical Research Ethics Committee 2013-2016. As well as holding Tri-council funding she has reviewed grants for both NSERC and CIHR. She has published articles in and reviewed for numerous scientific journals. All of these require that the research be conducted in an ethical and humane manner. Dr. Irving has also supervised numerous graduate students and as such has been responsible for ensuring that they have conducted their work in an ethical manner.
CURRICULUM VITAE

August 2016

Elizabeth L Irving

Canadian Citizen

Address

Waterloo  
School of Optometry  
University of Waterloo  
Waterloo, Ontario  
N2L 3G1

Toronto  
Vision Science Research Program  
Toronto Western Research Institute  
399 Bathurst Street  
M5T 2S8

Tel: (519) 888-4567 ext. 35529  
Fax: (519) 725-0784

email: elirving@uwaterloo.ca

Present Position

Professor, School of Optometry and Vision Science, University of Waterloo, Waterloo, Ontario, July 2010–present; cross appointment to Department of Mechanical and Mechatronics Engineering Sept 2008–Aug 2012.

Interim Clinic Director, University of Waterloo, Optometry Clinic, February 2014–April 2016.

Academic Affiliations

Affiliated Scientist of Applied and Interventional Research Division of the Toronto Western Hospital Research Institute (Vision Science Research Program), Toronto, Ontario, January 2000–present

Adjunct Professor, Department of Ophthalmology, University of Toronto, Toronto, Ontario, July 2013–present
Adjunct Associate Professor, Centre for Vision Research, York University, Toronto, April 2008–present

**Education**

Doctor of Philosophy in Vision Science, School of Optometry, University of Waterloo, 1994.

Master of Science in Physiological Optics, School of Optometry, University of Waterloo, 1989.

Doctor of Optometry, School of Optometry, University of Waterloo, 1983.

**Clinical and Academic Experience**

Associate Professor, School of Optometry, University of Waterloo, Waterloo, Ontario, July 2001–June 2010.

Graduate Officer, School of Optometry, University of Waterloo, Waterloo, Ontario, July 1999–July 2003.

Assistant Professor, School of Optometry, University of Waterloo, Waterloo, Ontario, August 1996–July 2001.


Post-doctoral fellow, Department of Ophthalmology, Faculty of Medicine, University of Toronto, Jan. 4, 1994–July 31, 1996 under the supervision of Dr. Martin Steinbach.

Optometric Clinical Supervisor, School of Optometry, University of Waterloo, April 1985–present.

Teaching Assistant for various courses, including ocular motility, strabismus, clinical optometry, case analysis, and ocular pathology, School of Optometry, University of Waterloo, 1987–1993.

Research Assistant to Dr. G.C. Woo, School of Optometry, University of Waterloo, Sept. 1985–April 1986.


**Professional Memberships**

Association for Research in Vision and Ophthalmology 1990–

College of Optometrists of Ontario 1985–
Quality Assurance Committee 1997–2000
Saskatchewan Association of Optometrists 1984

**Academic Awards**

University Research Chair, University of Waterloo, 2012–2019

Canada Research Chair in Vision Science Renewal, 2006–2011


Klaus Stenzil Memorial Research Award, 1992.


University of Waterloo Graduate Scholarship, $1,301. 1990–1992.
Algate Award for outstanding scholastic standing, 1991.


Governor General's Gold Medal for highest academic achievement in a Masters program, 1990.

Dean's Award in Optometry for MSc thesis, 1990.

Mature Student Scholarship, 1990.

Weymouth Student Travel Fellowship to Annual Meeting of the Association for Research in Vision and Ophthalmology, 1990.

Travel Fellowship to Westheimer symposium, 1989.

Canadian Optometric Education Trust Fund MSc thesis support, 1989.

**Grants – applied for**

CHRP (Collaborative Health Research Projects) CIHR-NSERC jointly funded; Development and clinical validation of a wearable eye-tracking microsystem (WET-µS) for use in medical diagnostics and human-computer interaction aimed at eliminating barriers to technology for physically challenged individuals. EL Irving, MC Campbell, RR Mansour, Pls. LOI submitted May 24, 2016. ($765,723)

NSERC (Strategic Partnership Grant for Projects). Fast MEMS-Focusing for Immersive Holographic Vision systems. R Zemp PI, EL Irving CI. Submitted April 1, 2016. ($751,667)

**Grants** (PI = principal investigator; CI = co-investigator, CO = collaborator)
University of Waterloo RIF Grant: Development of form visual acuity in infants measured by gaze tracing. 2014–2016, S Leat, PI, EL Irving CI. $8,000.

NSERC Discovery Grant: Visual function and adaptation across the lifespan, 2015-2020, EL Irving PI. $120,000. ($24,000/year)

College of Optometrists in Vision Research (COVD) Research Grant, Modified CISS to Assess Symptoms in Patients with Accommodative Dysfunction (Treatment Response in Accommodative Insufficiency (TRAIN Study), 2014–2015, L W Christian PI; EL Irving, M Kulp, GL Mitchell, T Oechslin, P Schnell CIs. $8,000. US

NSERC Discovery Grant, Visual functions across the lifespan, 2014–2015, EL Irving PI. $25,000.

COETF. Insuffisance de convergence et maladie de Parkinson. 2013–2014, H. Kergoat PI; EL Irving CI. $4,000.

ORF. Full field vision and spatial orientation. 2013, L. Harris (CVR); R Allison, J Campos, W Gage, A Hogue, EL Irving, M. Jenkins, B Kapralos, L Wilcox, CIs. $790,891

CFI. Full field vision and spatial orientation. 2013, L. Harris (CVR); R Allison, J Campos, W Gage, A Hogue, EL Irving, M. Jenkins, B Kapralos, L Wilcox, CIs. $790,891


COETF. Insuffisance de convergence et maladie de Parkinson. 2012–2013, H. Kergoat PI; EL Irving CI. $4,000.

NSERC Discovery Grant, Visual functions across the lifespan, 2009–2014, EL Irving PI, $32,000/year.

COETF, How informed are patients about the need for eye care? 2011–2016, EL Irving PI, MM Spafford CI $2,000.

Canadian Optometric Education Trust Fund, Near addition lenses as a means to investigate vergence adaptation in myopic children, 2009, V. Sreenivasan PI, W Bobier and EL Irving CI, $3,000.


COETF Canadian Optometric Education Trust Fund, Prevalence of binocular vision anomalies in the elderly, 2008–2010, S. Leat PI, PK Hrynchak and EL Irving COs, $2,000.


Canada Research Chair in Vision Science Renewal, 2006–2011, EL Irving PI, $100,000/year.

RERC on Universal Design and the Built Environment NIDRR, 2005–2010, G. Strong PI, EL Irving CI, $40,000US/year. (This grant is part of a much larger grant involving 3 institutions (University of Buffalo, Toronto Rehabilitation Institute, University of Waterloo), only the portion involving E Irving is included).


Premier’s Research Excellence Award, 2002–2008, EL Irving PI, $100,000.

NSERC Operating Grant entitled Eye and Eye Movement Development, 2002–2004, EL Irving PI, $26,000/year.


Canadian Foundation for Innovation, Infrastructure support for Expansion of Eye Movement Lab, 2001, EL Irving PI, $66,000.

Ontario Innovation Trust, Distinguished Researcher Award, Infrastructure support for Expansion of Eye Movement Lab, 2001, EL Irving PI, $66,000.


Canada Foundation for Innovation Infrastructure support for research activities of the Institute of Vision Science and Technology (IVST), 1999, J Sivak PI, EL Irving and 16 other CIs, $400,000.

Ontario Innovation Trust Infrastructure support for research activities of the Institute of Vision Science and Technology (IVST), 1999, J Sivak PI, EL Irving and 16 other CIs, $400,000.

NSERC Equipment grant entitled Oculomotor Development and Adaptation Equipment, 1998, EL Irving PI, $70,000.

E.A. Baker Foundation grant entitled Oculomotor Development and Adaptation, 1998, EL Irving PI, $20,000.
Canada Foundation for Innovation New Opportunities Program grant entitled Biomedical, Psychophysical and Imaging Aspects of Vision Sciences and Technology, 1998, T Simpson PI, EL Irving and 4 other CIs, $425,156.

Ontario Innovation Trust (matching funds for Canadian Foundation for Innovation New Opportunities Program) grant entitled Biomedical, Psychophysical and Imaging Aspects of Vision Sciences and Technology, 1998, T Simpson PI, EL Irving and 4 other CIs, $425,156.

Canadian Optometric Education Trust Fund to investigate oculomotor adaptations to spectacle wear 1997, EL Irving PI, $3500.

Canadian Optometric Education Trust Fund to investigate the saccadic amplitude/velocity relationship in young children, 1996, EL Irving PI, MJ Steinbach CI, $5000.

Canadian Optometric Education Trust Fund to investigate the range and accuracy of refractive error development in hatchling chicks, 1992, EL Irving PI; JG Sivak, MG Callender, CIs, $1,500.

Canadian Optometric Education Trust Fund to investigate the variation of ocular misalignment during visual pursuits, 1990, EL Irving PI, KM Robertson CI, $3,000.

Canadian Optometric Education Trust Fund to investigate the distribution of the monocular components of the fixation disparity curve in normals, 1986, EL Irving PI, KM Robertson CI, $1500.

Contracts

Canadian Institute for Military and Veteran Health Research (CIMVHR), Task 15- Operational Requirements for Stereopsis and Binocular Visual Processing in Military Aviation. 2015–2018, L Wilcox (PI); R Allison, EL Irving (CIs). $60,000.

Christie Digital Systems Canada Inc. Sensitivity to chromatic aberration in Laser projection systems. 2010, EL Irving PI $71,413


VSP Vision Care for Life, Evidence based eye care in youth and aging, health and disease, 2009, EL Irving PI, with 6 COs, $101,660.

Publications

Submitted Articles (peer-reviewed)


Articles (peer-reviewed)


Smith III EL, Campbell MCW, **Irving EL.** Does peripheral retinal input explain the promising myopia control effects of corneal reshaping therapy (CRT or ortho-K) & multifocal soft contact lenses? *Ophthal Physiol Opt.* 2013;33(3):379–384.


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**Book Chapters**


**Published Conference Proceedings**


**Letters to Editor, Notes**


**Technical Reports**

Irving EL. Use of myopia progression control lens designs to reverse previously induced myopia in chicks. Report to Visioneering, June 30, 2014.

**Presentations at scientific meetings – published abstracts**

Irving EL, Sivak A, Spafford M. What the public knows and doesn’t know about eye care and eye care professionals. American Academy of Optometry, Annual meeting, November 11, 2016, Anaheim, California, USA. (Talk)

Sivak A, Spafford M, Irving EL. Patient views on internet purchasing of eyewear. American Academy of Optometry, Annual meeting, November 11, 2016, Anaheim, California, USA. (Poster)

Campbell MC, Shao Z, Kisilak M, Irving EL. Changes in ocular properties can be predicted from retinal blur due to defocus during emmetropization in the chick eye. 2016 CAP Congress, University of Ottawa, June 13-17, 2016. (Talk)


Shao Z, Kisilak ML, Irving EL, Campbell MCW. Growth and completion of emmetropization in the normally developing chick eye. ARVO Denver, Colorado, USA.


Irving EL, Yakobchuk-Stanger, C. Myopia progression control (MPC) lens design reverses previously induced myopia in chicks. American Academy of Optometry Annual meeting, November 12. 2014, Denver, Colorado, USA


Irving EL, Machan CM, Hrynchak PK. Summary of Waterloo eye study findings: Age and visual function. Canadian Optometry Schools Research Conference (COSRC), December 6-8, 2013, Waterloo, Ontario, Canada.


Irving EL, Machan CM, Hrynchak PK. Associations between refractive error, near phoria and age in a clinic population, American Academy of Optometry Annual meeting, October 2011, Boston, Massachusetts, USA.

Irving EL, Machan CM, Hrynchak PK. Difference between presenting and best corrected visual acuity as a function of age, American Academy of Optometry Annual meeting, October 2011, Boston, Massachusetts, USA.

Machan CM, Hrynchak PK, Irving EL. Statin use, type 2 diabetes and age-related cataract: Waterloo Eye Study, American Academy of Optometry Annual meeting, October 2011, Boston, Massachusetts, USA.

Hrynchak PK, Machan CM, Irving EL. Near phoria and strabismus as a function of age in a clinic population, American Academy of Optometry Annual meeting, October 2011, Boston, Massachusetts, USA.


Irving EL, Harris JD, Hrynchak PK, Leat SJ, Machan CM, Mittelstaedt A, Robinson BE. Optimizing the frequency of routine eye exams. 7th Canadian Optometry Conference on Vision Science, December 2010, Montreal, Quebec, Canada.

Hrynchak PK, Mittelstaedt A, Harris JD, Machan CM, Irving EL. How optometrists modify the subjective refraction when prescribing spectacles. 7th Canadian Optometry Conference on Vision Science, December 2010, Montreal, Quebec, Canada.


Sreenivasan V, Irving EL, Bobier WR. Effect of phoria and refractive type on vergence adaptation to plus and near adds in myopic children. 7th Canadian Optometry Conference on Vision Science, December 2010, Montreal, Quebec, Canada.

Sreenivasan V, Irving EL, Bobier WR. Phoria adaptation to near work in myopic and emmetropic children with different phorias. American Academy of Optometry Annual meeting, November 2010, San Francisco, California, USA.

Hrynchak PK, Mittelstaedt AM, Harris JD, Machan CM, Irving EL. Modifications to the subjective refraction when prescribing spectacles. American Academy of Optometry Annual meeting, November 2010, San Francisco, California, USA.


Sreenivasan V, Irving EL, Bobier WR. Binocular versus monocular accommodation in myopic and emmetropic children with different near phorias. American Academy of Optometry Annual meeting, November 2010, San Francisco, California, USA.

Sreenivasan V, Lakshminarayanan V, Irving EL, Bobier WR. The influence of vergence adaptation on cross-link activity: Experimental data vs. model simulations 2010 Autumn School in Cognitive Neuroscience, Department of Experimental Psychology, South Parks Road, Oxford, UK.


Campbell MCW, Hunter JJ, Kisilak ML, Bunghardt K, Irving EL. Optical changes in the eye during normal development and the development of refractive error. 2009; Physics in Canada 65(2) (supplement), 113, Moncton, NB.


Campbell MCW, Bunghardt K, Kisilak ML, Irving EL. Potential optical signals to the direction of defocus change rapidly following an increase in defocus blur. Annual Meeting of the Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, May 1–May 7 2009, ARVO E-Abstract 3928.


Kisilak ML, Bunghardt K, Ball AK, Irving EL, Campbell MCW, Imaging of photoreceptors during development in the chick in order to test models of eye growth 2008 OSA Fall Vision Meeting, Rochester NY. Abstract in J Vis 8(17), 64.


Ball AK, Kisilak ML, Epps LG, Irving EL, Campbell MCW, Rod density changes inversely correlated with eye size in the chick retina, Annual Meeting of the Association for Research in Vision and


Irving EL, Target Matters in eye Movement control, The 6th Canadian Optometry Conference on Vision Science, December 7–8, 2007 COCVS. Waterloo, Canada.

Sreenivasan V, Irving EL, Bobier WR. Myopic Children Show Reduced Adaptation to Near Addition Lenses. The 6th Canadian Optometry Conference on Vision Science, December 7–8, 2007 COCVS. Waterloo, Canada.


Babu RJ, Leat SJ, **Irving EL**. Do Eye Movement Patterns Predict the Level of Difficulty in Dual Tasks? The 6th Canadian Optometry Conference on Vision Science, December 7–8, 2007 COCVS. Waterloo, Canada.


Hunter JJ, Kisilak ML, Campbell MCW, **Irving EL**, Huang L. The chick’s view during normal growth and lens induction of myopia. Annual Meeting of the Association for Research in Vision and


Sivak JG, Moore SE, Irving EL, Callender MG. Experimental ametropia in chicks: axial vs corneal contributions and response to non-emmetropic initial refractive errors. Annual Meeting of the Association


Irving EL, Callender MG, Sivak JG. Optical deprivation and the developing chick eye. Society for the promotion of the visual sciences Cardiff, Wales 1993.


Other Presentations:


Sreenivasan V, **Irving EL**, Bobier WR. Comparison of phoria adaptation to positive and negative lenses in myopic and emmetropic children. Graduate Student Research Conference, April 2010, University of Waterloo, Ontario, Canada

Almoqbel F, Leat SK, **Irving EL**. Development of visual acuity and contrast sensitivity in older children: sweep VEP and psychophysics. Graduate Student Research Conference, April 2010, University of Waterloo, Ontario, Canada.

KisilakM, Campbell MCW, Bunghardt K, **Irving EL**. In chick, imposed optical blur and abnormal lighting conditions increase components of astigmatism and the amplitude of their diurnal oscillation. Graduate Student Research Conference, April 2010, University of Waterloo, Ontario, Canada.

Genest R, Chandrashekar N, **Irving EL**. The effect of intraocular pressure on the geometry of normal and myopic chick eyes and its application to myopia. Graduate Student Research Conference, April 2010, University of Waterloo, Ontario, Canada.

Sreenivasan V, **Irving EL**, Bobier WR. +2D addition lenses reduces the variability of accommodative response in myopic children. Grad conference University of Waterloo, April 27–30 2009.


Almoqbel FM, Leat SJ, **Irving EL**. Effect of selected stimulus parameters & regression line fitting on visual acuity. Grad conference University of Waterloo, April 27–30 2009.
Invited Lectures

Irving EL. Vision and aging. Journée scientifique CRIUGM CAREC 2015; Gérontechnologies, Modalités sensorielles. 27 may, 2015. Montreal, Quebec.


Irving EL. Highlights from the Waterloo Eye Study. Vision Science Research Seminar, October 2010. University of Waterloo, School of Optometry, Canada.


Media


MedicineNet.com July 13, 2016 (HealthDay News), Author: Mary Elizabeth Dallas,

Routine eye exams see vision problems you miss.


EurekAlert! The global source for Science News, Routine eye exams lead to high rate of change in vision status or care, July 1, 2016. Source: Wolters Kluwer Health

Also in: BioSpace.com July 1, 2016; Science Daily.com, July 1, 2016


Chicks help optometry professor unlock the key to common eye problem. Waterloo Chronicle, February 2, 2005.

Which came first? Dr. Elizabeth Irving’s studies in ocular development with chicks has earned her a Canada Research Chair in biology. By Andrew Vainio, Optical Prism, September 2002. pp. 32–34.

Graduate Student Supervision

Marsha Kisilik PhD May 2005–withdrew 2015 (co-supervised with M Campbell)
Carolyn Machan MSc Jan 2009–July 2012
Vidhyapriya Sreenivasan PhD June 2007–July 2011 (co-supervised with W Bobier)
Fahad Almoqbel PhD Sept 2006–July 2011 (co-supervised with S Leat)
Reno Genest MSc Sept 2008–Sept 2010 (co-supervised with N Chandrashekar)
Clara Patricia Hernandez MSc Jan 2007–June 2010 (co-supervised with G Strong)
Raiju Babu PhD Jan 2004–Jan 2010 (co-supervised with S Leat)
Naveen Kumar Yadav  MSc  Sept 2005–June 2008 (co-supervised with S Leat)
Vidhyapriya Sreenivasan  MSc  Jan 2005–June 2007 (co-supervised with W Bobier)
Tristan Carvelho  MSc  Sept 2005–2007 (co-supervised with R. Allison at York University)
Raj Suryakumar  PhD  Jan 2003–Sept 2005 (co-supervised with W Bobier)
Mina Sehizadeh  MSc  Jan 2003–2005
Preetha Sampat  MSc  Sept 2002–April 2003 (co-supervised with W Bobier, withdrew)
Lan Huang  MSc  Jan 2002–April 2005 (withdrew)
Raiju Babu  MSc  Jan 2002–Jan 2004

**Post-doc Supervision**

Raiju J. Babu  Feb 2010–Feb 2011

**Refereeing**

**Journals**

Biological Psychology
Current Eye Research
European Journal of Applied Physiology
Experimental Brain Research
Experimental Eye Research
Investigative Ophthalmology and Vision Science
Neurobiology of Aging
Neuropsychology
Ophthalmic and Physiological Optics
Optometry and Vision Science
Psychophysics
Vision Research

Grants
Canada Research Chairs
CIHR Operating Grants
Michael Smith Foundation
NSERC Discovery Grants
NSERC Industrial Chair Site Visit Team

Other
Grade 10 Geometric Optics Unit for Ontario Grade 9 & 10 Science textbook, Nelson Science.
Julie Joza, MPH  
Senior Manager, Research Ethics  
Office of Research, 3rd Floor, East Campus 5 Building (EC5)  
University of Waterloo  
Waterloo, Ontario  N2L 3G1

Aug 17, 2016

Dear Julie,

Thank you for continuing to involve me in the UWaterloo Clinical Research Ethics Committee. I have found my time on this committee to be a valuable and important aspect of my service to the university. I look forward to continuing to contribute in a meaningful way.

Sincerely,

Kelly Grindrod  
Assistant Professor  
Phone: 519-888-4567 ext 21358  
Email: kgrindrod@uwaterloo.ca
Dr. Kelly Anne Grindrod  
School of Pharmacy  
University of Waterloo  
University Avenue West  
Waterloo, ON N2L 3G1  
Phone: 519.888.4567 ext 21358  
Email: kgrindrod@uwaterloo.ca  
http://www.kellygrindrod.com

User Profile

Dr. Grindrod is an actively practicing pharmacist and researcher focusing on pharmacist scope of practice and pharmacy technology design. A leader in pharmacy practice based research, her work has been funded by the Canadian Institutes for Health Research, the Ontario Ministry of Health and Longterm Care Health Research Fund, and the Office of the Privacy Commissioner of Canada. She was the co-author of two papers that won the “Best Paper of the Year Award” for the Canadian Pharmacists Journal in 2013 and 2015. She is also an author of the Canadian Pharmacists Journal’s fourth most highly cited article of all time on pharmacist scope of practice, which has informed many of the pharmacist scope of practice changes across Canada since 2009. In 2014, she was awarded a Canadian Foundation for Pharmacy Wellspring Leadership Award.

Education

<table>
<thead>
<tr>
<th>Date of Completion</th>
<th>Training</th>
</tr>
</thead>
</table>
| Sept 2007 to Aug 2009 | **Master of Science**  
Faculty of Pharmaceutical Sciences, University of British Columbia  
*Focus*: Epidemiology, population health, trial design, health economics, statistical analysis.  
*Thesis*: Pharmacists’ preferences for providing patient-centered services. |
| July 2005 to May 2007 | **Doctor of Pharmacy**  
Faculty of Pharmaceutical Sciences, University of British Columbia  
*Focus*: therapeutics, kinetics, pharmacy management, statistical analysis, physical exam.  
*Clinical rotations*: inpatient specialties, primary care, practice-based research. |
| Sept 1998 to May 2003 | **Bachelor of Science in Pharmacy, with Distinction**  
Faculty of Pharmacy and Pharmaceutical Sciences, University of Alberta |
Recognitions

**Best Paper of the Year Award, Canadian Pharmacists Journal (2015).** In 2008, Dr. Grindrod was a co-first author of a paper titled, “A systematic review of remuneration systems for pharmacy clinical care services” in the Canadian Pharmacists Journal. At the time, pharmacy practice was changing rapidly and many public funders and regulatory bodies were working to determine how pharmacists should manage medication therapy. The goal of the paper was to provide policy makers with a summary of all existing payment models in developed countries. The paper quickly became the journal’s most highly accessed paper and informed the development of medication management programs in most Canadian provinces. In 2014, Dr. Grindrod worked with a PhD student (S. Houle) to publish an updated review titled, “Paying pharmacists for patient care: A systematic review of remunerated pharmacy clinical care services.” The Canadian Pharmacists Journal awarded the updated paper the 2015 “Best Paper of the Year” award to recognize the impact both papers had on policy and decision making around expanding pharmacy services.

**Canadian Foundation for Pharmacy Wellspring Leadership Award.** In 2014, Dr. Grindrod was awarded a leadership award for her work in supporting pharmacists in practice change. The award reflected Dr. Grindrod’s work in connecting pharmacists through storytelling and social media, including students and practicing pharmacists. Dr. Grindrod’s work in this area also includes several invited presentations for national and international conferences including the Canadian Pharmacists Association Annual Meeting, the American Hospital Pharmacy Association Midyear Meeting and the upcoming International Pharmaceutical Federation. Her work also includes a published narrative on her experiences with antibiotic overprescribing in the Canadian Pharmacists Journal titled, “How the threat of antibiotic apocalypse helped a pharmacist find her voice” which inspired noted patient advocacy artist Regina Holiday to paint a [Walking Gallery](#) jacket titled “Antibiotic Apocalypse”.

SGRC 12 September 2016, page 164 of 235
### Employment History

<table>
<thead>
<tr>
<th>Dates</th>
<th>Position</th>
</tr>
</thead>
</table>
| 2011-01 to current | **Assistant Professor**  
School of Pharmacy, University of Waterloo                                                        |
| 2015-05 to current | **Clinical Pharmacist**  
Kitchener Downtown Community Health Centre, Kitchener ON                                              |
| 2011-09 to 2014-09 | **Pharmacist**  
Schill’s Remedy Rx Pharmacy, Waterloo ON                                                             |
| 2010-09 to 2010-12 | **Director, Evaluation**  
Drug Use Optimization, Pharmaceutical Services  
British Columbia Ministry of Health, Westminster, BC                                               |
| 2007-09 to 2010-09 | **CIHR and Michael Smith Foundation for Health Research Post-Doctoral Research Fellow**  
Collaboration for Outcomes Research and Evaluation  
Faculty of Pharmaceutical Sciences, University of British Columbia                                  |
| 2005-01 to 2008-06 | **Pharmacist**  
Shoppers Drug Mart, Vancouver BC                                                                        |
| 2005-01 to 2005-09 | **Pharmacist**  
St. Paul’s Hospital, Providence Healthcare, Vancouver BC                                               |
| 2003-07 to 2004-07 | **Pharmacy Resident**  
University Hospital, London Health Sciences Centre  
*Residency project:* Systematic review of the most effective methods to impact prescribing practice.  
*Clinical rotations:* Inpatient specialties, drug information, evidence-based medicine.             |
| 2003-02 to 2003-03 | **Clinical Clerk**  
The Professional Centre Pharmacy, Calgary AB  
*Focus:* Independent pharmacy, interdisciplinary collaboration between allied health professionals, physicians and patients. |
| 2003-01 to 2003-02 | **Clinical Clerk**  
Women’s College Hospital, Sunnybrook Health Sciences Centre, Toronto, ON  
*Focus:* Ambulatory clinic specializing in osteoporosis and women’s health.                          |
| 2002-05 to 2002-08 | **Summer Studentship**                                                                           |
Telstar Drugs, Calgary ON  
*Focus:* Independent pharmacy, natural health products, homeopathy, bioidentical hormone replacement therapy and compounding services.

<table>
<thead>
<tr>
<th>Period</th>
<th>Role</th>
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<th>Focus</th>
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</thead>
<tbody>
<tr>
<td>2002-05 to 2002-08</td>
<td>Summer Studentship</td>
<td>Tom Baker Cancer Center, Alberta Cancer Board, Calgary AB</td>
<td>Literature review of medication error management at the cancer board and a gap analysis of the current error management annual survey.</td>
</tr>
<tr>
<td>2001-05 to 2001-08</td>
<td>Summer Studentship</td>
<td>Tom Baker Cancer Centre, Alberta Cancer Board, Calgary AB</td>
<td>Drug use evaluation of trastuzumab.</td>
</tr>
<tr>
<td>2000-05 to 2001-04</td>
<td>Pharmacy Student</td>
<td>Edmonton &amp; Calgary Safeway Locations, Safeway Canada, Calgary AB</td>
<td>Community pharmacy practice</td>
</tr>
</tbody>
</table>

**Research Funding History**

**2017/1 – 2019/12**  
Principal Investigator  
Project Title: Pharmacy 5 in 5: Changing pharmacy 5 minutes at a time  
PIs: Kelly Grindrod  
Co-Is: Rosemary Killeen, David Edwards  
Institution Paid: University of Waterloo  
Department: School of Pharmacy  
Program: Ontario College of Pharmacists  
Total Funding: $450,000  
Competitive: No

**2016/9 - 2017/8**  
Principal Investigator  
Project Title: Improving chronic disease management five minutes at a time  
PIs: Grindrod K  
Co-Is: Killeen R, Nacke L  
Institution Paid: University of Waterloo  
Department: School of Pharmacy  
Program: University of Waterloo Chronic Disease Prevention Initiative Seed Grant  
Competition: 201607  
Total Funding: $10,000
Competitive: Yes

2015/9 - 2016/8
Principal Investigator
Project Title: Playing telephone: Exploring the potential for interdisciplinary shared decision making for medication therapy in shared electronic health records.
Pls: Grindrod K, Burns C, Abidi S, Dogba MJ.
Collaborators: Mir A, Jenkins L
Patient Partners: Thomas C, McKinnon A, Chabot C, Auerbach A
Institution Paid: University of Waterloo
Department: School of Pharmacy/Systems Design Engineering
Program: CIHR Strategies for Patient Oriented Research Quick Strike Operating Grant
Competition: 201504
Total Funding: $121,237
Competitive: Yes

2015/9 – 2016/8
Principal Investigator
Project Title: Partnering Seniors and Students to Improve Health Literacy and Belonging
Pls: Mercer K, Grindrod K
Institution Paid: University of Waterloo
Department: School of Pharmacy
Program: Kitchener Waterloo Community Foundation
Competition: 2015
Total Funding: $30,000
Competitive: Yes

2015/01 – 2015/07
Principal Investigator
Project Title: Building a mobile knowledge translation website for Ontario pharmacists
Pls: Grindrod, K
Institution Paid: University of Waterloo
Department: School of Pharmacy
Program: Ontario Pharmacy Research Collaboration (OPEN), Ontario Ministry of Health and Long-Term Care, Health System Research Fund
Total Funding: $55,000
Competitive: No

2015/6 - 2018/5
Principal Investigator
Project Title: Value and opportunity in the pharmaceutical space
PIs: Grindrod KA, Burns C
Institution Paid: University of Waterloo
Department: School of Pharmacy/Systems Design Engineering
Program: Telus Health
Total Funding: $450,000
Competitive: No

2014/6 - 2015/5
Principal Investigator
Project Title: Semantic interoperability of exchanged information on a regional
electronic health record that is used by an expanded circle of care
which includes social supports and community services.
PIs: Grindrod KA, Alarakhia M, Burns CM, McMurray DJ
Co-Is: Chilana P, Slonim K, St. Maurice J
Institution Paid: University of Waterloo
Department: School of Pharmacy/Systems Design Engineering
Program: CIHR Research Planning and Dissemination Grant – Health Services Research
Competition: 201402
Total Funding: $10,000
Competitive: Yes

2014/6 - 2016/5
Principal Investigator
Project Title: The reliability of security options for mobile health applications
designed for use with older adults with chronic disease
PIs: Grindrod K, Ong S, Gebotys C
Institution Paid: University of Waterloo
Department: School of Pharmacy/Engineering
Program: Office of the Privacy Commissioner Contributions Fund
Competition: 2013
Total Funding: $50,000
Competitive: Yes

2014/05 – 2015/04
Principal Investigator
Project Title: Improving the accessibility of patient medication profiles through
mobile technology
PIs: Grindrod K, Burns C
Institution Paid: University of Waterloo
Department: School of Pharmacy
Program: University of Waterloo CIHR Research Incentive Fund
Total Funding: $8,000
Competitive: Yes

2013/5 - 2014/6
Principal Investigator
Project Title: Building an interdisciplinary team to research mobile health applications for older adults
PIs: Grindrod K
Co-Is: Baskerville NB, Burns C, Chang F, Giangregorio L, Maxwell CJ, Middleton L, Penny Light T, Tomasson Goodwin T
Institution Paid: University of Waterloo
Department: School of Pharmacy
Program: University of Waterloo Chronic Disease Prevention Initiative Seed Grant
Competition: 201212
Total Funding: $10,000
Competitive: Yes

2013/1 - 2016/3
Co-Investigator
Project Title: Studying knowledge translation and exchange of a multi-centre study of pharmacy services in Ontario
PIs: Waite N, Dolovich L
Co-Is: Conklin, J
Institution Paid: University of Waterloo
Department: School of Pharmacy
Program: 280
Competition: 2013
Total Funding: $280,609
Competitive: Yes

2013/5 - 2014/6
Co-Investigator
Project Title: Moving knowledge into primary care MOVE!/BOUGE!
CIs: Grad, RM, Grindrod KA, Menear M, Rosenberg EE
Institution Paid: Université Laval
Program: CIHR Planning Grant - Community-based Primary Healthcare
Competition: 201106
Total Funding: $25,000
Competitive: Yes

2013/5 - 2014/6
Co-Investigator
Project Title: InfoLinCS: Informed and Linked Care for Seniors
PIs: Stolee, P
Cols: Berg KO, Berta WB, Byrne K, Chen H, Chesworth BM, Conklin J, Forbes DA, Grindrod KA, Heckman FA, Hirdes JA, Mcainey CA, Mcgilton KS, Orchard CA
Institution Paid: University of Waterloo
Program: CIHR Planning Grant - Community-based Primary Healthcare
Competition: 201106
Total Funding: $23,923
Competitive: Yes

2009/06-2011/05
Co-Investigator
Project Title: Evaluation of Pharmacy Adaptation Services in British Columbia
PIs: Marra C, Lynd L
Co-Is: Grindrod K
Institution Paid: University of British Columbia
Funder: BC Pharmacy Association/BC Ministry of Health Services
Total Funding: $228,660
Competitive: No

2009/6 - 2010/5
Co-Investigator
Project Title: Falling through the cracks: using a multidisciplinary strategy to improve DMARD use in rheumatoid arthritis
PIs: Marra C, Lacaille D
Institution Paid: University of British Columbia
Program: Canadian Initiative for Outcomes in Rheumatology
Competition: 2009
Total Funding: $57,342
Competitive: Yes

2009/6 - 2010/5
Co-Investigator
Project Title: Falling through the cracks: using a multidisciplinary strategy to improve DMARD use in rheumatoid arthritis
PIs: Marra C, Lacaille D
Institution Paid: University of British Columbia
Program: Canadian Arthritis Network
Competition: 2009
Total Funding: $119,963
Competitive: Yes

Activities

Registered Pharmacist, Ontario College of Pharmacists (2011-current)
Registered Pharmacist, British Columbia College of Pharmacists (2004-2011)
On the Register of Pharmacists, Pharmacy Examining Board of Canada

**Current Graduate Students**

<table>
<thead>
<tr>
<th>Dates</th>
<th>Type</th>
<th>Name</th>
<th>Project</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015-09 to 2019-8</td>
<td>PhD</td>
<td>Kathryn Mercer</td>
<td>Playing telephone: exploring how patients, pharmacists and physicians communicate about medication decision making</td>
<td>Ongoing</td>
</tr>
<tr>
<td>2013-09 to 2015-8</td>
<td>MSc</td>
<td>Huda Wali</td>
<td>Developing a strategy to help low health literacy populations understand complex medication information</td>
<td>Complete. Employed as a Pharmacy Project Coordinator at Pharmacy Access Solutions</td>
</tr>
<tr>
<td>2015-05 to 2015-08</td>
<td>MSc</td>
<td>Zain Hudani</td>
<td>Exploring adherence measures for older adults with cognitive impairment</td>
<td>Complete. Employed at Shoppers Drug Mart</td>
</tr>
</tbody>
</table>

**Undergraduate Thesis Students**

<table>
<thead>
<tr>
<th>Project Dates</th>
<th>Type</th>
<th>Name</th>
<th>Project</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016-01 to 2017-08</td>
<td>BSc Biology (Honours)</td>
<td>Colin Whaley</td>
<td>Evaluating the ideal keyboard style for older adults who are using computers for the first time.</td>
<td>Ongoing.</td>
</tr>
<tr>
<td>2015-01 to 2015-08</td>
<td>BSc Health Studies (Honours)</td>
<td>Tina Chan</td>
<td>Developing the mental health “PASS Kit” for undergraduate students living in UWaterloo residences.</td>
<td>Graduated May 2016. CEO of startup up “PASS Kit” to help undergraduate students with Panic, Anxiety and Stress</td>
</tr>
</tbody>
</table>
Support currently housed at the Communitech Accelerator Centre.

**Co-op & Independent Study Students**

<table>
<thead>
<tr>
<th>Project Dates</th>
<th>Type</th>
<th>Name</th>
<th>Project</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016-01 to 2016-04</td>
<td>PharmD</td>
<td>Khrystine Waked</td>
<td>Playing Telephone</td>
<td>Anticipated Graduation: Aug 2018</td>
</tr>
<tr>
<td>2016-01 to 2016-04</td>
<td>PharmD</td>
<td>Jonathan Boersema</td>
<td>Playing Telephone</td>
<td>Anticipated Graduation: Aug 2018</td>
</tr>
<tr>
<td>2015-01 to 2015-05</td>
<td>PharmD</td>
<td>Carli Gurney</td>
<td>Improving the readability of health information on Wikipedia</td>
<td>Anticipated Graduation: Aug 2016</td>
</tr>
<tr>
<td>2014-05 to 2014-08</td>
<td>BSc Health Studies</td>
<td>Poanna Tran</td>
<td>Cognitive work analysis of medication reconciliation</td>
<td>Anticipated Graduation: June 2016</td>
</tr>
<tr>
<td>2014-01 to 2014-08</td>
<td>BScPharm</td>
<td>Melissa Li</td>
<td>Evaluating medication apps with older adults</td>
<td>Graduated: Aug 2014 Employed: Pharmacist, Trillium Health Partners</td>
</tr>
<tr>
<td>2014-01 to 2014-05</td>
<td>BScPharm</td>
<td>Soha Ahari</td>
<td>Designing a cancer adherence app</td>
<td>Graduated: Aug 2014 Enrolled: MSc, University of Toronto</td>
</tr>
<tr>
<td>2014-01 to 2014-05</td>
<td>BScPharm</td>
<td>Danielle Paes</td>
<td>Designing a cancer adherence app</td>
<td>Graduated: Aug 2014 Employment:</td>
</tr>
<tr>
<td>Year</td>
<td>Degree</td>
<td>Name</td>
<td>Project Title</td>
<td>Graduation Date</td>
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<td>-----------</td>
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<td>---------------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>2014-01 to 2014-05</td>
<td>BScPharm</td>
<td>Christina Mychaskiw</td>
<td>Designing a cancer adherence app</td>
<td>Aug 2014</td>
</tr>
<tr>
<td>2013-01 to 2013-05</td>
<td>BScPharm</td>
<td>Derek Lam</td>
<td>Exploring the use of Twitter in the classroom</td>
<td>Aug 2013</td>
</tr>
<tr>
<td>2013-01 to 2013-05</td>
<td>BScPharm</td>
<td>Andrea Forgione</td>
<td>A systematic review of social media use in pharmacy</td>
<td>Aug 2013</td>
</tr>
<tr>
<td>2012-01 to 2012-05</td>
<td>BScPharm</td>
<td>Calvin Poon</td>
<td>Exploring social media use in pharmacy</td>
<td>Aug 2012</td>
</tr>
<tr>
<td>2011-01 to 2011-05</td>
<td>BScPharm</td>
<td>Niki Sanghera</td>
<td>Identifying strategies to implement MedsCheck in community pharmacies</td>
<td>Aug 2011</td>
</tr>
<tr>
<td>2011-01 to 2011-05</td>
<td>BScPharm</td>
<td>Michael Tritt</td>
<td>Identifying strategies to implement MedsCheck in community pharmacies</td>
<td>Aug 2011</td>
</tr>
<tr>
<td>Year</td>
<td>Degree</td>
<td>Name</td>
<td>Research Title</td>
<td>Graduated</td>
</tr>
<tr>
<td>------------</td>
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<td>-----------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>2011-01 to</td>
<td>BScPharm</td>
<td>Israa Rahmaan</td>
<td>Identifying strategies to implement MedsCheck in community pharmacies</td>
<td>Aug 2011</td>
</tr>
<tr>
<td>2011-05</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011-01 to</td>
<td>BScPharm</td>
<td>Meghna Roy</td>
<td>Identifying strategies to implement MedsCheck in community pharmacies</td>
<td>Aug 2011</td>
</tr>
<tr>
<td>2011-05</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011-01 to</td>
<td>BScPharm</td>
<td>Jesse McKinnon</td>
<td>Understanding the influence of formularies on adherence</td>
<td>Aug 2011</td>
</tr>
<tr>
<td>2011-05</td>
<td></td>
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</table>

**Thesis Committee Membership**

<table>
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<tr>
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<th>End</th>
<th>Type</th>
<th>Name</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td>2015-09</td>
<td></td>
<td>MSc</td>
<td>Haya Fernandez</td>
<td>Ongoing</td>
</tr>
<tr>
<td>2015-09</td>
<td></td>
<td>MSc</td>
<td>Gokul Raj</td>
<td>Ongoing</td>
</tr>
<tr>
<td>2015-09</td>
<td>2017-09</td>
<td>PhD</td>
<td>Heather McNeil</td>
<td>Ongoing</td>
</tr>
<tr>
<td>2013-09</td>
<td>2016-5</td>
<td>PhD</td>
<td>Jessica Leiffers</td>
<td>Completed</td>
</tr>
<tr>
<td>2009-09</td>
<td>2011-09</td>
<td>MSc (Part time)</td>
<td>Margarette Jin</td>
<td>Employed: Clinical pharmacist at Hamilton Family Health Team</td>
</tr>
<tr>
<td>2007-09</td>
<td>2011-04</td>
<td>MSc (Part time)</td>
<td>Felicia Pantazi</td>
<td>Employed: Online Learning Consultant, University of Waterloo</td>
</tr>
</tbody>
</table>

**Peer Review**

- Preventing Chronic Disease (Dec 2014 to present)
  - 1 article
- J Med Internet Research (June 2014 to current)
  - 4 articles
- Systematic Review (Dec 2013)
  - 2 article
• Research in Social and Administrative Pharmacy (Oct 2013)
  o 2 articles
• Journal of the American Pharmacy Association (Oct 2013)
  o 1 article
• Health Policy and Technology (Oct 2013)
  o 1 article
• Implementation Science (July 2013)
  o 1 article
• Currents in Pharmacy Teaching and Learning (August 2013 to current)
  o 2 articles
• International Journal of Pharmacy Practice (August 2013 to current)
  o 1 article
• Health Policy (Nov 2010 to present)
  o 1 article
• Annals of Pharmacotherapy (Jul 2007 to present)
  o 3 articles
• Canadian Pharmacists Letter (Jul 2007 to present)
• Canadian Pharmacy Journal (Jul 2007 to present)
  o 5 Articles
  o Vaccine Special Edition
  o Respiratory Special Edition

Professional Affiliations
• Canadian Pharmacists Association (2003 to current)
• Canadian Society of Hospital Pharmacists (2003 to current)
• Ontario Pharmacy Association (2011 to current)
• Association of Faculties of Pharmacy of Canada (2011 to current)
• Association for Computing Machinery (2013 to current)
• American Medical Informatics Association (2015 to current)

Youth Outreach & Community Work
• Youth-seniors workshop for online health information (8 sessions)
• Engineering Science Quest Camp, July-Aug 2011 (8 sessions)
  o Project: Hand cream compounding with ages 6-7 years
• Loran/Canada Merit Scholarship Committee
  o Interviewer 2008 (Vancouver)
  o Reviewer 2010 (Vancouver)
  o Reviewer 2011 (Kitchener-Waterloo)
  o Reviewer 2013 (Kitchener-Waterloo)

Consulting & Contract Work

2014 eHealth Centre of Excellent
  Role: Evaluation of Adoption
2013 Ontario College of Pharmacists
   Role: Expert Witness
2013 Evaluating an eHealth implementation plan for ClinicalConnect in the Waterloo-Wellington LHIN
   Role: Consultant
2010 Evaluation of over-the-counter nonsteroidal anti-inflammatory medications for the National Association of Pharmacy Regulatory Authorities.
   Role: Consultant
Publications

*Students are bolded
**Previous graduate and post-doctoral supervisors are underlined
***Dr. Grindrod is listed as the last author in papers written by trainees

Submitted Papers Under Peer-Review


Peer-Reviewed Journal Publications

<table>
<thead>
<tr>
<th>Publication Type</th>
<th>Total Publications</th>
<th>Total Citations</th>
</tr>
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<tbody>
<tr>
<td>Independent Publications</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Publications During Training</td>
<td>16</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>107</td>
</tr>
</tbody>
</table>

1. McMurray J, Grindrod K. How appropriate is all this data sharing? Building consensus around what we need to know about shared electronic health records in extended circles of care. In press. Accepted to Healthcare Quarterly June 16, 2016.


9. ClereMed: Lessons learned from a pilot study of a mobile screening tool to identify and support adults who have difficulty with medication labels. *JMIR mHealth uHealth* 2014; 2(3):e35. Citations: 1


   a. *Awarded “2015 Paper of the Year” by Can Pharm J for the paper most likely to influence practice that year*


   a. *Awarded “2013 Paper of the Year” award by Can Pharm J for the paper most likely to influence practice that year*


   
a. *Co-first authors (with a student)
   
b. **Top 10 most highly cited papers ever for the Can Pharm J**


**Website Design**

1. Grindrod KA (Lead), Dolovich L, Killeen R. Pharmacy 5-In-5. Available at: [www.pharmacy5in5.com](http://www.pharmacy5in5.com). This website was designed to translate clinical research and scope of practice changes into pharmacy practice. Expected launch date: Nov 2015.

**Book Chapters**


Invited Presentations


14. Grindrod KA. Pharmacists’ preferences for providing new services. Presented at:
Association of Faculties of Pharmacy Annual General Meeting. Vancouver, BC. June 1, 2010.


Research Podium Presentations


4. Grindrod. Pharmacy 2.0. Association of Faculties of Pharmacy Canadian


Research Posters


hypertensive individuals in the Canadian Community Health Survey. Presented at: Vancouver Coastal Health Research Institute, Celebrate Research Week, Vancouver, BC. (March, 2009).


**Conference Proceedings**


**Conference Abstracts**


**Other Publications**


Newspaper Opinion Editorials


**Media Interviews**


CBC Radio Drive (22 June 2013). Topic: Health Canada’s plain language changes


Moulton D. Roll out the online welcome mat: time to build virtual relationships with real benefits. *Pharmacy Business* 2012 (July): 15.

**Activities**

**Awards & Recognitions**

<table>
<thead>
<tr>
<th>Year</th>
<th>Award</th>
</tr>
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<tbody>
<tr>
<td>2014</td>
<td>Canadian Foundation for Pharmacy Wellspring Leadership Award</td>
</tr>
<tr>
<td>2011</td>
<td>CIHR Institute of Health Services and Policy Research Travel Award</td>
</tr>
<tr>
<td>2010</td>
<td>CIHR Institute of Health Services and Policy Research: Summer Institute on Primary Care</td>
</tr>
<tr>
<td>2008</td>
<td>Post-doctoral Fellow Trainee, Canadian Institutes for Health Research</td>
</tr>
<tr>
<td>2008</td>
<td>Association of Faculties of Pharmacy of Canada Future Academic Leader Award</td>
</tr>
<tr>
<td>2007</td>
<td>Post-doctoral Fellow Trainee, Michael Smith Foundation for Health</td>
</tr>
</tbody>
</table>
Research
2007  UBC Graduate Entrance Scholarship
2005, 2006  Apotex Doctor of Pharmacy Fellowship
2003  Jason Lang Memorial Scholarship for academic standing
2002, 2003  Dean’s Honour List, Faculty of Pharmacy
2002, 2003  Golden Key Honour Society
1998  Pembina Pipeline Scholarship for academic achievement
1998  Wascana Energy Scholarship for academic achievement
1998  Alexander Rutherford Scholarship for academic achievement

Committee Memberships

<table>
<thead>
<tr>
<th>Dates</th>
<th>Role</th>
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<tr>
<td>2015-current</td>
<td>Member</td>
<td>Editorial Board for <em>Research in Social and Administrative Pharmacy</em></td>
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<td>Member</td>
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<td>2015-current</td>
<td>Chair</td>
<td>University of Waterloo School of Pharmacy Graduate Student Professional Development Committee</td>
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<td>University of Waterloo School of Pharmacy Undergraduate Appeals Committee</td>
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<td>University of Waterloo School of Pharmacy Clinical Masters Committee</td>
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<td>Member</td>
<td>University of Waterloo School of Pharmacy Undergraduate Petitions Committee</td>
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Teaching

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<td>Fall 2015</td>
<td>UW BScPharm</td>
<td>Coordinator</td>
<td>Pharm 490: Seminars in Pharmacy 4</td>
<td>Future of pharmacy practice, Canadian health system</td>
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<td>Fall 2014</td>
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<td>Pharm 428: Professional Practice 4</td>
<td>Professional practice, scope, jurisprudence</td>
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<td>Pharm 490: Seminars in Pharmacy 4</td>
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<td>Pharm 490: Seminars in Pharmacy 4</td>
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<td>Coordinator, Lecturer</td>
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<td>Menopause, osteoporosis</td>
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<td>Pharm 221: Integrated Patient-Focused Care 2</td>
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<td>Feb 2009</td>
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<td>Lecturer (2 lectures/term)</td>
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<td>Lecturer (5 lectures/year)</td>
<td>Clinical Therapeutics</td>
<td>Rheumatology, Clinical Process</td>
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</table>
Memorandum

To:   Members  
Senate Graduate and Research Council

From:   Jannet Ann Leggett  
Chief Ethics Officer  
Office of Research Ethics

Date:   September 6, 2016

Subject:   Revisions to Clinical Research Ethics Committee Terms of Reference

The following information is a proposed revision to the Clinical Research Ethics Committee terms of reference for approval by Senate via Senate Graduate and Research Council at its September 2016 meeting:

Clinical Research Ethics Committee

On behalf of the Committee, we propose to make two changes to the terms of reference:

1. **Minor editorial changes**: To more accurately reflect the title of the Office of Research Ethics department head we would like to revise “Director, Office of Research Ethics” to “Chief Ethics Officer” throughout the terms of reference.

2. **Add Research Ethics Advisor positions as delegated reviewers**: The Office of Research Ethics has revised the position descriptions for our coordinator/officer roles to Research Ethics Advisors. These Advisor positions will assist the committees with the ethics reviews of research conducted by uWaterloo students, faculty, or staff by fulfilling the role as delegated reviewers. The delegated reviews conduct the ethics review of research on behalf of the Committee but only for research that has been identified as minimal risk according to the Tri-Council Policy Statement 2. Minimal risk research are studies that involve surveys, questionnaires, and student projects, to name a few. The Office of Research has established Standard Operating Procedures that clearly outline research that can be reviewed by a delegated reviewer and research that must be reviewed by the Committee. We have added the Advisor positions to the terms of reference to reflect this change. Please refer to the attached document.
A. Statement of Institutional Authority for Research Ethics Boards

The University of Waterloo has two Research Ethics Boards (REBs): the Clinical Research Ethics Committee and the Human Research Ethics Committee. As constituted sub-committees of the University of Waterloo’s Senate Graduate and Research Council, both of the University of Waterloo’s REBs are established and empowered under the authority of the University of Waterloo Senate.

B. Mandate and Accountability of the Research Ethics Boards

The REBs’ mandate, on behalf of the University, is to protect the rights and welfare of human participants who take part in research conducted under the auspices of the University. The University of Waterloo’s REBs review such research to ensure that it meets ethical principles and that it complies with all applicable regulations, guidelines and standards pertaining to human participant protection. These include but are not limited to the University of Waterloo’s Statement on Human Research; its Guidelines for Research with Human Participants (Guidelines) and the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans, 2nd edition (TCPS 2). For clinical trials, the REBs follow Health Canada’s Food and Drugs Act, the International Conference on Harmonization (ICH) Good Clinical Practice: Consolidated Guideline, and where applicable, U.S. federal regulations. The University of Waterloo’s REBs also operate under applicable laws and regulations of the Province of Ontario and of Canada.

The University of Waterloo requires that all research involving humans or human biological materials conducted in its jurisdiction or under its auspices, undergo ethics review and clearance by one of its two REBs prior to initiation of any research related activities, including recruitment and screening activities.

The Clinical Research Ethics Committee (CREC) has jurisdiction over clinical trials research (i.e., involving a drug or natural health product or is medical device testing) conducted under the auspices of the University of Waterloo and any research involving a "controlled act" as defined under the Regulated Health Professionals Act of Ontario, 1991. The Human Research Ethics Committee (HREC) has jurisdiction over all other research involving humans with which the University is affiliated.

C. Membership of the CREC

Membership shall be consistent with the requirements for REB composition specified in Article 6.4. of the TCPS 2 and ICH Good Clinical Practice: Consolidated Guideline. All Committee members shall be competent to judge the ethical acceptability of research ethics applications they review. In accordance with Article 6.3 and Chapter 8 of the TCPS 2, in the interest of fostering a collaborative spirit and appropriate levels of information sharing between both committees, and to facilitate timely and effective reviews for researchers, members of CREC may be required to serve as reviewers, in either a delegated or ad-hoc sub-committee capacity,
for applications made to HREC if, in the judgment of the Chair of HREC and Director, ORE, the application requires expertise which the CREC member has been judged to possess.

The CREC shall consist of a minimum of 9 voting members including both men and women:

- one faculty member from each of Optometry, Pharmacy, and Kinesiology (see also D3)
- one member knowledgeable about clinical trials research from any of: clinician, a Pharmacologist or an Immunologist/Toxicologist
- two clinical physicians knowledgeable about clinical trials research
- one lawyer preferably knowledgeable about clinical trials research
- one member knowledgeable in ethics
- one community member who has no affiliation with the institution

The following additional members are ex-officio (non-voting):
- Chief Ethics Officer/Director, Office of Research Ethics
- Senior Manager/Manager, Office of Research Ethics
- Research Ethics Advisor, Office of Research Ethics

D. Terms of Office for the CREC

1. Members of the CREC shall be nominated by the Director, Chief Ethics Officer, Office of Research Ethics (hereafter, the Director) following consultation with the respective Faculty Deans and Department Chairs/School Directors and Chair, CREC.

2. Members of the CREC shall be appointed by Senate Graduate and Research Council.

3. The Chair and Vice Chair will be selected from among the membership of CREC by the Vice-President University Research. The Chair will have a minimum of one term’s prior experience as a member of the CREC. In the event the Chair is either the member from Optometry, Pharmacy, or Kinesiology, an additional member may be appointed from the same area as the Chair. The Vice Chair may discharge the responsibilities of the Chair when the Chair is unable to do so, discharge responsibilities assigned by the Chair and assist in the overall operation of the REB, as requested.

4. Members of the CREC, except the ex-officio members, will serve for a three-year term, normally renewable once. Terms will be overlapping to preserve experience and continuity of function.

E. Meetings of the CREC

1. The CREC normally will meet face to face eleven times per year. In the absence of any business, meetings may be cancelled by the Director, Chief Ethics Officer (or delegate) in consultation with the Chair.

2. Additional meetings of the CREC, or of a sub-committee of its members, may be called by the Director, Chief Ethics Officer (or delegate) and/or Chair, as necessary.

3. Each meeting will require the involvement of a quorum defined as half the total voting membership plus one. Quorum must also meet membership criteria specified by
relevant research ethics guidelines and regulations. Every effort will be made to ensure
that each meeting includes the community member.

4. Members shall normally attend CREC meetings with at least 70% attendance per year.
When unexpected circumstances arise that prevent a regular member from attending an
CREC meeting in person, arrangements will be made where feasible with the member to
participate through use of technology (e.g., telephone or video link). In cases where a
regular member cannot attend CREC meetings for a protracted period (e.g., during a 6
month’s sabbatical), a substitute member from the same discipline may be appointed to
serve during the regular member’s absence.

5. Members shall notify the ORE of an anticipated absence at least one day prior to a
meeting. Members who cannot attend a meeting are expected to provide written
comments to the ORE for each of the protocols under review at the respective meeting.
This information is provided to other members of the CREC and becomes part of the
discussion and meeting minutes.

6. Any real, perceived or potential conflict(s) of interest related to the applications under
review at a specific meeting shall be declared by the member(s) at the outset of the
meeting. Examples of conflicts of interest include but are not limited to applications on
which they are listed as principal investigator or co-investigator; current or past research
collaborations with investigators listed on the application; applications on which students
they supervise are listed. Other members of the CREC will decide whether the
member with the conflict of interest should recuse him/herself from related discussions.

7. The CREC will reach its decisions concerning the ethical acceptability of research that is
undergoing ethics review through a process of open discussion and consensus. Where
consensus cannot be reached, a vote of the quorum present may be taken and
recorded.

8. The CREC’s deliberations and decisions will be documented in comprehensive,
confidential minutes that are securely maintained in the ORE. The Research Ethics
OfficerAdvisor, ORE, shall serve as Secretary to the CREC.

9. Detailed written feedback from the CREC including its decision on the ethical
acceptability of the research shall be communicated to the researcher(s) by the
DirectorSenior Manager/Manager or Research Ethics Advisor, ORE, following
consultation with the Chair, CREC, in an efficient and timely manner according to ORE
standard operating procedures. Feedback is based on minutes of discussion of the
research project.

10. The CREC may, where appropriate, request that the Principal Investigator (PI) or his/her
designate attend a meeting to provide further information about and/or to discuss his/her
research. The CREC will also accommodate reasonable requests from a PI to attend a
meeting to participate in discussions about his/her research.

11. The CREC may seek the confidential opinion or advice of an ad hoc advisor/reviewer
from among UW faculty or from a confidential external consultant on a particular
application to ensure it has the necessary background information and knowledge to
review the ethical acceptability of the application.
F. Responsibilities and Mandates of the CREC

1. To ensure that all research under CREC jurisdiction, involving human participants conducted by students, staff and faculty affiliated with the University of Waterloo, and all clinical trials research conducted at Waterloo by unaffiliated students, staff and faculty researchers, undergo ethics review and clearance prior to being conducted. This research may be conducted on- or off-campus and may be funded or unfunded.

2. To review the ethical acceptability of all research projects, under CREC jurisdiction, (involving human participants on behalf of the institution including, but not limited to, those that):
   - may pose greater than minimal risk to participants (i.e., physiological, psychological, economic, social, or other);
   - involve recruitment of persons who may be vulnerable as research participants in the context of a specific study, and/or cannot legally give free and informed consent
   - include ethically sensitive issues, topics and/or procedures; and
   - represent applications to certain granting agencies that stipulate full REB review.

In so doing, the CREC may:

- Grant ethics clearance to
- Propose modifications to
- Disapprove
- Terminate

proposed or ongoing research conducted within the jurisdiction of the University or under its auspices to ensure that a proportionate review of risks and benefits has occurred in accordance with the ethical framework proposed under the TCPS 2 (Chapter 1).

Delegation of CREC Authority Related to Ethics Review and Clearance

The CREC delegates to the Director Chief Ethics Officer, Senior Manager/Manager, and Research Ethics Advisor(s), ORE, by virtue of the Director’s membership on the CREC, and according to ORE Standard Operating Procedures, authority to conduct:

3. Initial ethics review and clearance of research under its jurisdiction that poses minimal risk to research participants, and includes provision of comprehensive and timely written feedback.

4. Ethics review and clearance of modifications to ongoing research under its jurisdiction that poses minimal risk to research participants, and includes provision of comprehensive and timely written feedback.

5. Annual ethics review and clearance of all research under its jurisdiction that continues beyond one year.

6. Ethics review and clearance of all revised materials and related documents associated with the ethics review feedback process involving minimal and greater than minimal risk research.

Delegation of CREC Responsibility for Record Keeping and Research Ethics Education
The CREC ensures through the ORE, that:

7. CREC members are provided with opportunities for research ethics education during their tenure on the CREC beginning with a new member orientation session.

8. Comprehensive, accurate records (i.e., paper and electronic) of the initial and continuing (i.e., modifications, annual) ethics review and clearance processes are securely maintained in the ORE for all research under its jurisdiction. This includes all revised materials associated with initial and continuing ethics review.

9. CREC meeting dates and submission deadlines are easily accessible by researchers through information posted on the ORE website.

10. A monthly report is received on minimal risk research that has undergone ethics review and clearance through the delegated ethics review process by the Chief Ethics Officer, Senior Manager/Manager, and Research Ethics Advisor(s). Director, ORE.

11. Timely information and regular reports are received on any unanticipated issues (events) that have occurred in association with research under its jurisdiction.

12. UW guidelines, procedures and sample materials related to the conduct of research with humans are reviewed and updated on a regular basis (e.g., annually) to ensure that they remain current in an evolving research ethics environment.

13. Educational activities (e.g., in-class presentations, seminars and workshops) are provided to UW students, faculty and staff involved in research with human participants.

14. Legal or other advice is sought by the Director Chief Ethics Officer, as required, on matters related to the protection of human participants in research.

15. Timely information on guidelines, procedures, and other matters related to the conduct of research with human participants is provided to the CREC as well as student, staff and faculty researchers who conduct research with humans.

* In Section F, it is understood that the Director Chief Ethics Officer has overall responsibility for the mandates and operation of the ORE.

G. **Reconsideration and Appeal of CREC Decisions**

1. Reconsideration Process

   A Principal Investigator may make a written request for reconsideration of an CREC decision when ethics clearance is not granted, or when ethics clearance is conditional on revisions that the Principal Investigator (PI) believes may jeopardize the feasibility or integrity of the research. The Director Chief Ethics Officer, ORE, will refer such a request, including documentation and supporting materials received for reconsideration from the PI, to other members of the CREC for discussion at its next meeting. The CREC will review the written documents, and where appropriate, will request an informal meeting with the PI (or his/her designate). Following consideration of all additional information (verbal and written), the CREC will reach a final decision with respect to its
position on the original decision. Every attempt will be made by the Director-Chief Ethics Officer and CREC, in consultation with the PI to reach a resolution by this informal route.

2. Appeal Process

In the event the matter cannot be resolved through a reconsideration or informal process, the institution shall provide the PI with prompt access to an established appeal process through which the PI may appeal the CREC’s decision. An appeal can be requested for procedural or substantive reasons. An appeal committee shall be appointed through the same authority that established the REB, ensuring that members of the appeal committee will have expertise and knowledge to be able to competently judge the ethical acceptability of the research ethics application under review. Members of the CREC whose decision is under appeal shall not serve on the appeal committee. The appeal committee will act impartially in its review of documentation provided by the CREC and the PI (or designate), and will consult with others as required, including but not limited to, members of the CREC and the PI (or designate). The appeal committee will issue a written report with its decision on the matter with copies to the PI and CREC. It may approve, reject or request modifications to the research proposal. The appeal committee’s decision will be final.

Approved Senate Graduate & Research Council, February 2009;
Revised CREC August 2012, approved Senate Graduate & Research Council, Sept. 10, 2012
Revised ORE August 2013; Approved Senate Graduate & Research Council, September 9, 2013;
Revised ORE August 2016; Approved Senate Graduate & Research Council, pending decision at September 12, 2016 meetingJanuary 2014
Handling of Final Assessment Reports related to academic program reviews and follow-up Two-Year Progress Reports.

Introduction
Waterloo’s Senate Undergraduate Council (SUC) and Senate Graduate and Research Council (SGRC) have among other responsibilities, a fiduciary duty is to consider all aspects relating to the academic quality of undergraduate studies and graduate studies, respectively, within the university. As described in Waterloo’s Institutional Quality Assurance Process (IQAP), documentation emerging from the cyclical program review process includes: (1) a Final Assessment Report, which summarizes the self-study, external reviewers’ report, program response and implementation plan, and (2) a Two-Year Progress Report, which reports on progress related to the implementation plan. This document outlines a process for vetting these reports through SUC and SGRC.

Process
All undergraduate program reports are handled by SUC. Likewise, all graduate program reports are handled by SGRC. For augmented reports (combined undergraduate and graduate), in any given year, half will go through SUC and the other half through SGRC to share the workload.

For Final Assessment Reports two SUC or SGRC members will be asked to review the report. For Two-Year Progress Reports, one SUC or SGRC member will be asked to review the report, although at the SUC/SGRC Chair’s discretion, a second reviewer may be sought.

Reviewers of FAR and Two-year reports will consider a series of guiding questions (see below) in coming to their recommendation to SUC or SGRC. Furthermore, before reporting to SUC or SGRC, reviewers are encouraged to ask questions and share their observations as well as any concerns they have identified with the program under review (usually through the chair of the program). Any revisions should be completed by the chair of the program prior to bringing the report for approval at a SUC or SGRC meeting.

Guiding questions for Final Assessment Reports
Does the Final Assessment Report:

1) Identify the significant strengths and weaknesses of the program as described by either the program and/or the visiting team?

2) Include a credible implementation plan that not only addresses the substantive issues identified from the program review process but also identifies clearly:

- What actions will follow from specific recommendations?
- Who will be responsible for acting on those recommendations?
- Who will be responsible for providing resources?
- Priorities for implementation and realistic timelines for initiating and monitoring actions?
Guiding questions for Two-Year Progress Reports

Does the Two-Year Progress Report:

1) Clearly describe progress achieved on the various action items in the implementation plan?

2) Explain convincingly any circumstances that would have altered the original implementation plan?

3) For items that are behind schedule, propose an amended implementation schedule that is reasonable and credible?

4) Does the report address significant developments or initiatives that have arisen since the program review process, or that were not contemplated by the program review process?

Reviewers, should they request it, will be provided access to the confidential documents informing the reports (e.g. self study, reviewers’ report, program response), but consulting these documents is not expected unless there is a need to clarify some aspect of a Final Assessment Report or Two-Year Progress Report. All members of SUC and SGRC will have the opportunity to review the Final Assessment Report or Two-Year Progress Report ahead of the meeting in which the report will be considered and so will have the necessary information to engage in discussion.

To promote transparency and foster integrity in the review process, whenever possible, reviewers should not be members of the faculty/ Affiliated and Federated Institutions of Waterloo (AFIW) from which the reports originate.

Normally, the associate dean (undergraduate studies or graduate studies) in the faculty (or equivalent in an AFIW institution) where the program resides would be asked questions during an SUC or SGRC meeting when then report is being discussed. However, responses from any member of SUC or SGRC who can offer insight, are welcome. The department chair or school Director (or their chosen delegate) of the program being considered could be invited to attend the SUC or SGRC meeting by the associate dean to act as a resource person.

SUC’s and SGRC’s responsibility will be to focus on the overall credibility and feasibility of the report and the proposed plan of action – seeking to uncover, for example, unexplained disjunctions between the reviewers’ recommendations and the department’s response – as opposed to the minutiae of course content and curriculum structure.
Meaning of Approval at SUC or SGRC

For both Final Assessment Reports and Two-Year Progress Reports, SUC or SGRC should ultimately be able to assess whether the report is (a) satisfactory; (b) satisfactory but with minor concerns; or (c) unsatisfactory due to major concerns.

In considering whether to approve a Final Assessment Report, SUC or SGRC will focus on the above guiding questions for FARs or Two-Year Progress Reports.

For a Two-Year Progress Report, endorsement of the report by SUC or SGRC indicates that SUC/SGRC is satisfied with the progress to date on the implementation plan based on the answers to the guiding questions, and that SUC or SGRC has confidence that remaining action items will be appropriately addressed on the established timelines.

A Final Assessment Report or Two-Year Progress Report that is deemed “satisfactory” by a majority vote of SUC/SGRC will be submitted to Senate for information, normally without additional comment. Should the discussion at SUC or SGRC reveal issues of minor or major concern (as indicated by vote), SUC/SGRC shall forward the pertinent minutes of the meeting to the head of the program in question (and their resource person if one acted as their delegate) to advise of the concerns identified at SUC or SGRC and to invite a response which may include amendments to the original report, along with the appropriate endorsement by the faculty dean or AFIW head. The report then comes back to SUC or SGRC for reconsideration and a final vote. A report considered unsatisfactory is not forwarded to Senate, but is instead returned to the head of the program with a request for further work. A program chair at this stage may request an unsatisfactory report be provided to Senate, in which case Senate shall be provided the report with a description of the areas of concern identified.
Final Assessment Report  
Environment and Resource Studies (BES, MES)  
Social and Ecological Sustainability (PhD)  
May 2016

Summary of the Program Review:
The Environment and Resource Studies programs were last reviewed in 2008. In keeping with the Institutional Quality Assurance Process (IQAP), this final assessment report provides a synthesis of the external evaluation and the internal response of the BES, MES, PhD programs delivered by the School of Environment, Resources and Sustainability (SERS), formerly known as the Department of Environment and Resource Studies (ERS)¹.

The final version of this augmented self-study (Volume I) was submitted to the associate provost, graduate studies in February 2015. This volume presented the program descriptions and learning outcomes, an analytical assessment of the three programs, and program data prepared by the Office of Institutional Analysis and Planning (IAP) as well as the Department formerly known as Environment & Resource Studies, Scott Davis of the Co-Op Office, surveys of alumni and data from GSO. Appended were the CVs (Volume II) for each full-time faculty member in the program.

Two arm’s-length external reviewers - Dr. John Volpe, associate professor, School of Environmental Studies, University of Victoria, and Dr. Brian Cumming, director and professor, School of Environmental Studies from Queen’s University – were ranked and selected by the associate provost, graduate studies, in addition to one internal reviewer, Dr. Jonathan Kofman, from Systems Design Engineering.

Reviewers received the self-study documentation and conducted a site visit on April 20-21, 2015. Their itinerary included interviews with the vice-president, academic and provost; associate provost, graduate studies; associate vice-president, academic; dean of the faculty of environment; the associate dean, graduate studies; associate dean, undergraduate studies; SERS director; associate chair undergraduate studies; associate chair, graduate studies; faculty; a librarian; staff; and a group of students. The reviewers also toured the following facilities: SERS Biogeochemistry Lab; Soil Ecosystem Dynamics (SED Lab), Conservation and Restoration

¹ SERS members were pleased that the reviewers agreed that the unit should be called the School of Environment, Resources, and Sustainability. The Board of Governors approved the name change as of November 2015, and the change became official January 4, 2016.
Ecology (CaRE Lab), SERS Ecology teaching lab; Interdisciplinary Centre on Climate Change; the three environment buildings; and the Library.

This final assessment report is based on information extracted, in many cases verbatim, from the self-study, the external reviewers’ report and the program response.

**Program characteristics:**

*Bachelor of Environmental Studies (BES)*

Since 2008, the focus of the bachelor program has been to educate students by using a transdisciplinary framework that intermixes the social, natural, and physical sciences and the arts. Faculty and students examine environmental policy and governance theories and how these translate into the areas of water, energy, and food. The more ecosystem science-based courses also focus on areas where the human-nature intersection occurs and often clashes.

*Masters of Environmental Studies (MES)*

SERS provides advanced education guided by the long-established concept of "sustainability". Three conceptual themes guide much of the teaching, learning, and scholarly enquiry fostered through the MES: 1) assessing the theoretical foundations and practical implications of progress toward a sustainable society, and application of this analysis as a broad context for specific work; 2) understanding socio-ecological systems as self-organizing systems exhibiting the phenomenon of surprise, especially when over-stressed by human activities; and 3) examining conventional and alternative social arrangements, including institutions and tools of governance, as means of improving human wellbeing and environmental responsibility. The Masters program now has two facets: 1) the traditional thesis-based, two-year version; and 2) the Major Research Paper (MRP) version. The former is geared more towards earlier-career students interested in scholarly careers or a scholarly approach to problem-solving. The MRP tends to be geared toward later-career students who still value scholarship, but are more interested in a career-based project, often related to their current employment or desired future employment.

*Social and Ecological Sustainability (PhD)*

The PhD program expands upon the MES, and is based upon the three broad conceptual themes mentioned above. The PhD program emphasizes work in three overlapping fields: 1) resource analysis and stewardship - this field focusses on the analysis of existing resource systems as well as creative and innovative ways of utilizing the earth’s resources in a sustainable fashion; 2) socio-ecosystem function and renewal - this field critically examines ways to apply our knowledge of ecological systems towards renewing human relationships with the broader environment; and 3) sustainability policy and governance - this field considers
existing and new forms of governance and policy with respect to sustaining healthy and resilient human communities and biophysical systems.

**Summary of strengths, challenges and weaknesses based on self-study:**

**Strengths**

- Strong support from current students, alumni, and employers on the skills and learning achievements and preparation as outcomes of the programs
- Unique program at the University in terms of combining social, natural and physical sciences in a transdisciplinary and problem-centered approach to learning and skills building; that ties into post-graduation success in the job market and academia (as per the 1st point)
- Unique focus on the interrelationship of how the sciences (especially those related to ecology, policy, and governance) can be analyzed to create actions that produce measurable outcomes, especially with respect to sustainability
- Course evaluations specifically indicate high levels of satisfaction, even given high standards across ENV and the University as a whole
- Despite some challenges below, there is a strong sense of community and interaction amongst students and especially between students and professors that (again) is very strong even give this is a strength in many units across the University;

**Challenges**

- To expand experiential learning and skill building for undergraduate and graduate students yet minimize overload on professors
- To provide more SERS core courses, especially in first year
- To decrease the practice of scheduling tests worth a large percentage of the final grade
- To establish a consistent assignment of FTE to teach ERS 215, ERS 315, ENVS 200 and ENVS 444
- To reduce administrative loads to allow for more time for research including grant applications
- To provide more opportunities for short courses or other legally protected certifications (e.g. Ecological Land Classification)
- Establish a more stable social network to better engage alumni and leverage high profile opportunities; the current network is quite active and viable but the issue is that it depends too much on personal contacts – while extensive, this means there can be inefficiencies and threats if a professor retires or passes away and they were the main or only point of contact for many alumni
Weaknesses

- Some SERS undergraduate elective courses have too much redundancy; others take too much of a didactic approach - students suggested re-focusing, re-ordering, and incorporating more experiential learning
- Lack of common space for SERS undergraduate and graduate students
Summary of key findings from the external reviewers:

SERS’ interdisciplinary and transdisciplinary research on environmental issues is clearly recognized at the national level. Students can have either a Science or Arts focus - thereby diversifying the students in the program. The flexibility of the SERS program is one of its most defining and attractive features. This diversity is positive for the program, moreover, the co-op option, strong faculty, and a unique hands-on program results in high-quality applicants.

Program response to external reviewer recommendations:

Recommendations

1. A review of the undergraduate program by SERS faculty should be undertaken to identify core courses, as well as identification of courses in areas of specialization to SERS. Advice to students regarding taking courses within these specializations should be discussed.

Response
This action has been completed as of the date of this report by the Director and Undergraduate Studies Committee (Dr. McCarthy, Dr. Quilley, Dr. Larson, Dr. Wolfe, a SERS major as the Undergraduate Student Representative, Patti Bester - undergraduate staff administrator). All of SERS (all voting faculty members, cross-listed adjuncts who have voting rights, staff members, undergraduate student representatives on the School Council, and graduate student representatives) vetted four iterations of the course review.

During a day-long retreat in April 2016, there was a unanimous vote to adopt course changes, backed with a summary and action plan relevant to the cyclical seven year review.

2. Propose a name change to School of Environment, Resources and Sustainability (SERS) – as it better reflects the mandate, transdisciplinary approaches, and aspirations of the program. The SERS website should also be updated with advice and options to SERS undergraduate students with possible options of joint degrees, as well as to options of certificates.

Response
The revisions are visible on the SERS website: https://uwaterloo.ca/environment-resources-and-sustainability/. The site was revised by the three staff members and the SERS director and associate directors. The Director reallocated staff tasks and time. This
reduced basic clerical functions in favour of increased media communications via the University of Waterloo web space, Twitter, and Facebook.

The impact of these changes is expected to result in an additional 10% of undergraduate students by fall 2018; however, the numbers of graduate students will be harder to increase as they are currently at a historical high. Hence, graduate (as well as undergraduate) numbers will continue to be monitored to measure the effect over time.

The Director and Associate Directors, with the help of staff, will also monitor all changes and outcomes that might be related to the name change. It is estimated that only ~5% of University of Waterloo webpages still refer to the old ERS name. It will be harder to assign any increase in undergraduate enrolments to the name change itself; what will be monitored is whether there is a rise in these enrolments over the next three years, being cautious of ascribing correlation to causation.

3. Establish an informal academic advisors event in the first-term of the fall that would allow students to ask a variety of questions concerning degree options. Consider inviting your Departmental Student Council to organize such an event.

**Response**
SERS requires an increased allocation of staff and professor time so that there are more academic advisors for students (especially first year) to answer questions about options and paths. At present, the challenge is that two-thirds of the personnel allocated to academic advising also have research-related faculty appointments and associated teaching and administrative relief, and therefore little time for advising. The Director and Associate Directors will be reviewing which non-essential tasks might be reduced and/or eliminated in favour of providing more time for student advising.

4. Consider alternative options for mounting field-based courses such as collaboration with other environmental programs.

**Response**
The Director intends to bring a package of collaborative initiatives on experiential learning to SERS for consideration. If approved, the Director will seek approval from the Dean, Faculty Council, and Senate for an approximate launch in fall 2018. The outcome will be more offerings of certification courses in ecology against reduced resource needs on an annual basis because these will be spread over several institutions; this saves a projected $20,000 per year (most of these costs are in terms of sessionals).
5. Investigate a number of modes to provide a sense of community among the graduate students, particularly additional student space. Reviewers suggested that SERS strengthen student and faculty engagement and a unit-wide culture by building their own traditions such as weekly seminar series, creating a graduate student society, hosting special events (e.g., Iron Chef Competition at UVic).

**Response**
SERS feels that a broader sense of community can best be achieved by having more core courses at the undergraduate level and a firmer set of elective course choices that appeal to more of the unit at the graduate level. If students are grouped together - early and often - then a sense of community is easier to promote. Some of the initiatives indicated would have to come from the graduate students; the problem there is that many are ambitious and do research overseas once they finish year 1 – that limits opportunities. Similarly, two-thirds of the professors have major research or administrative positions that limit time spent unit-wide (though the supervisors are generally very good at ensuring cohesion and activities within their research groups).

The reviewers and students indicated that much of this issue is actually about space; for example, SERS does not have proper space for students to congregate, save for a very busy small foyer near the director’s office. Moreover, there have been over a dozen separate graduate student complaints over the past three years about the amount and quality of space. At last word, there were indications that the University was about to send instructions about space for Master’s students campus-wide. The SERS Director, Associate Directors, and delegates to the Faculty of Environment Space Committee will to continue to raise this pressing need with the Faculty of Environment Space Committee. SERS does not control space decisions, hence solutions are limited.

6. The faculty should seek additional lab space for equipment and storage needs for the SERS program.

**Response**
Similar to the student space issues mentioned above, SERS and other Faculty of Environment (ENV) personnel share labs and these small spaces are getting overcrowded (e.g. an extreme example is where one 750 ft² research lab serves four professors, 26 graduate students, 18 undergraduate students, one post-doctoral fellow and one professor emeritus). These additional space challenges will be added to the discussions with the Faculty of Environment Space Committee as indicated in item 5.
SERS identified many of the same issues that were highlighted by the external reviewers, in addition to the aforementioned items SERS would like to address the following:

• The messaging of SERS needs to be clearer and consistent not only in social media and the web, but it must also permeate recruitment and course content.

• The departure of a key faculty instructor created a gap in some teaching areas around community (city/town/neighbourhood) scale sustainability but is also an opportunity to explore possible alternatives for this position with the dean such as local governance/community based sustainability with a focus on teaching experiential education.

• SERS took on the delivery of ENVS 200 and is considering offering to do the same for ENVS 195, as SERS already delivers ENVS 444. There may be some room to consider how to deliver other ecologically based courses as a better package, in consultation across the Faculty of Environment and outside ENV. SERS is also a key developer of an online course in Sustainability, open to students outside of ENV.

• SERS continues to fine tune its social media use, especially when it comes to alumni relations, but also with its current and potential students. With increased competition for students - internal and external - SERS has increased work with the recruitment group on strategies to get more applications to their undergraduate and graduate programs.
**Implementation Plan:**

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Proposed Actions</th>
<th>Responsibility for Leading and Resourcing (if applicable) the Actions</th>
<th>Timeline for addressing Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A review of the undergraduate program by SERS faculty should be undertaken to identify core courses, as well as identification of courses in areas of specialization to SERS. Advice to students regarding taking courses within these specializations should be discussed.</td>
<td>During a day-long retreat in April 2016, SERS members reviewed and discussed the undergraduate courses and courses related to specializations, etc.</td>
<td>The Director and Undergraduate Studies Committee (Dr. McCarthy, Dr. Quilley, Dr. Larson, Dr. Wolfe, a SERS major as the Undergraduate Student Representative, Patti Bester - undergraduate staff administrator)</td>
<td>This action has been completed as of the date of this report. There was a unanimous vote in April 2016 to adopt the course changes backed with a summary and action plan.</td>
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<tr>
<td>2. Proposed name change to School of Environment, Resources and Sustainability better reflects the mandate, transdisciplinary approaches, and aspirations of SERS.</td>
<td>School of Environment, Resources and Sustainability (SERS), formerly known as the Department of Environment and Resource Studies (ERS) Update SERS website.</td>
<td>Director and Associate Directors Revised by the three SERS staff members and the SERS Director</td>
<td>The Board of Governors approved the name change as of November 2015, and the change became official January 4, 2016. Completed. The updated SERS website: <a href="https://uwaterloo.ca/environment-resources-and-sustainability/">https://uwaterloo.ca/environment-resources-and-sustainability/</a></td>
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<tr>
<td>3.</td>
<td>Establish an informal academic advisors event in the first-term of the fall term that would allow students to ask a variety of questions concerning degree options. This will be organized in conjunction with ERSSA (the School’s undergraduate student association)</td>
<td>Requires an increased allocation of staff and professor time so that there are more academic advisors for students (especially 1st year) to answer questions about options and paths. Will solicit feedback from undergraduate students (key informants and a system wide survey)</td>
<td>By Fall 2016 will have reviewed which non-essential tasks might be reduced or eliminated in favour of providing such advisors. By fall 2016, SERS will take action and construct and advise on 'guided pathways' as per the reviewers' recommendation. Complete feedback survey by 2018.</td>
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<td>4.</td>
<td>Consider alternative options for mounting field-based courses such as collaboration with other environmental programs.</td>
<td>There is some existing collaboration external to University of Waterloo, but more can be done. Discussions</td>
<td>In progress - specific collaborations are being vetted by all stakeholders. By fall 2017, director intends to bring a package of collaborative initiatives on</td>
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<td>5.</td>
<td>Investigate a number of modes to provide a sense of community among the graduate students, particularly additional student space.</td>
<td>Will to continue to raise this pressing need with the Faculty of Environment Space Committee</td>
<td>Director, Associate Directors, and delegate to the Faculty of Environment Space Committee</td>
</tr>
<tr>
<td>6.</td>
<td>The faculty should seek additional lab space for equipment and storage needs for the SERS program.</td>
<td>Will to continue to raise this pressing need with the Faculty of Environment Space Committee</td>
<td>Director, Associate Directors, and delegate to the Faculty of Environment Space Committee</td>
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<td>7.</td>
<td>The unit shall clarify and provide consistent messaging across communications platforms.</td>
<td>Clearer and consistent messaging in social media, the web, and recruitment materials and course content</td>
<td>Director and SERS Communications Team</td>
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<td><strong>8.</strong></td>
<td>Increase FTE to compensate for loss of 1 FTE in teaching and research capacity in a specific area (community scale sustainability)</td>
<td>Loss of a FTE created an opportunity to explore possible alternatives for this position with the Dean such as local governance/community based sustainability with a focus on teaching experiential education.</td>
<td>Director</td>
</tr>
<tr>
<td><strong>9.</strong></td>
<td>Increase participation in ENV courses.</td>
<td>Considering offering ENVS 195 (SERS already delivers ENVS 200 and ENVS 444). Consider how to deliver other ecologically based courses as a better package, in consultation across ENV and outside ENV.</td>
<td>Director</td>
</tr>
<tr>
<td><strong>10.</strong></td>
<td>Increase recruitment of 1st year students in all SERS programs</td>
<td>Work with recruitment group on strategies to get more applications</td>
<td>Director</td>
</tr>
</tbody>
</table>
The Director, in consultation with the Dean of the Faculty shall be responsible for monitoring the Implementation Plan.
Summary of the Program Review:

In accordance with the University Institutional Quality Assurance Process (IQAP), this final assessment report provides a synthesis of the external evaluation and the internal response of the graduate programs (MEng, MASc, PhD) in Systems Design Engineering (SDE). A self-study report (Volume I) was submitted to the Associate Provost, Graduate Studies Office in April 2015. The self-study presented the program descriptions and learning outcomes, an analytical assessment of the three graduate programs, and program data including the data collected from a student survey along with the standard data package prepared by the Office of Institutional Analysis & Planning (IAP). Appended were the course outlines for all courses in the program and the CVs (Volume II) for each full-time faculty member in the Department.

Two arm’s-length external reviewers, Dr. Kamran Behdinan, Professor, Department of Mechanical & Industrial Engineering, University of Toronto and Dr. Kamal Gupta, Professor, Department of Engineering Science, Simon Fraser University, were selected by the Associate Provost, Graduate Studies, from a list of arm’s length reviewers provided by the department (Volume III). The Associate Provost, Graduate Studies, also selected the internal member of the review team, Dr. Brent Doberstein, Associate Professor, Department of Geography & Environmental Management.

This final assessment report is based on information extracted, in many cases verbatim, from the self-study, the external reviewers’ report and the program response.

The review team examined the self-study documentation and conducted a site visit at the University of Waterloo on June 11-12, 2015. The visit included interviews with the Vice President & Provost, Associate Provost, Graduate Studies, the Dean and Associate Dean, Graduate Studies, of the Faculty of Engineering, Chair and Associate Chair, Graduate Studies, of the department, faculty members, administrative and technical staff and a group of six current graduate students and support staff. The reviewers also had an opportunity to visit three research laboratories.
Program characteristics:

The Systems Design graduate programs last were reviewed under the OCGS system in 2008 and were classified as “Good Quality”. The Department of Systems Design Engineering (SDE) is unique in Canada. The goal of SDE is to integrate knowledge in mathematics, basic science, social science and engineering sciences to design optimal solutions to problems at the interface of technology, the environment and society. The department continues to focus research efforts around seven major fields: 1) Human & Biomedical Engineering, 2) Mechatronic & Physical Systems, 3) Societal & Environmental Systems, 4) Modeling, Simulation & Systems Theory, 5) Signal & Image Processing, 6) Intelligent Systems & Software and 7) Optimization & Decision Making.

The Systems Design Department offers MEng, MASc, and PhD programs and participates in the collaborative PhD and MASc programs in Nanotechnology, along with other departments in the Faculties of Engineering and Science.

MEng.

The MEng program aims to provide greater breadth of understanding of engineering principles and recent technology arising from engineering research to solve problems in industry. This objective is achieved through courses only; a thesis is not required.

MASc.

The MASc program aims to provide a deeper understanding of the theoretical principles and analytical methods necessary to permit effective cutting edge research and development. The MASc provides a foundation in advanced engineering research for those who wish to pursue a PhD. This objective is achieved mainly through courses and a thesis requirement. The MASc also prepares graduates to function as highly-skilled engineers in industry, giving them the capability to effectively use the literature, to conduct complex long term projects and to direct large engineering projects that have a significant research component.

PhD.

The PhD program aims to provide the required theoretical and experimental knowledge and research methodology to conduct cutting-edge independent and original research. This objective is achieved through courses, a comprehensive examination and a thesis requirement. The PhD prepares graduates for careers in academia, industrial and government research centres, and entrepreneurship.
Summary of strengths, challenges and weaknesses based on self-study:

Strengths

- Systems Design Engineering is unique in Canada, providing an engineering program that focuses on both design as well as systems analysis, 2 areas that are typically in separate programs.
- The program boasts leading edge research in emerging areas, such as Biomedical engineering, intelligent systems & signals, human factors engineering as well as societal & environmental engineering.

Challenges

- SDE is a diverse department, which is reflected in the diverse areas of research topics and they continually question what can unify their program. In the undergraduate program the unification is via design & system modelling which is not as explicit in the graduate program.
- Difficulty attracting excellent domestic students to their graduate programs, especially their own undergraduates who are highly desirable in the work force. This problem is also shared by other engineering departments at Waterloo and in Canada in general. A working group at the faculty level is addressing this issue.
- Struggled with their graduate course offerings chiefly due to the lack of teaching resources available, i.e., lack of faculty.

Weaknesses

- Many of the faculty collaborate with other departments and faculties, but few collaborate with each other. Collaboration is an opportunity to unify the program and attract more domestic graduate students. A group of 10 faculty with research in intelligent systems and human factors have moved to new space in an old Blackberry building with common research space. We anticipate that this will partially address this weakness.

Summary of key findings from the external reviewers:

The external reviewers report was positive and noted “The general environment in the department is open, receptive, inclusive and collaborative.” It also reported that the graduate students “value the interdisciplinarity, collaboration and freedom that the SDE philosophy
facilitates and see it as allowing them to see the big picture and transcend traditional engineering boundaries”.

Faculty members are seen as supportive, personable and compassionate and ‘very special’ people who go beyond what is expected by graduates. In addition, the program’s retention rates and times to completion are good, and overall student numbers are reasonably healthy and growing.

Reviewers identified a few challenges which included a shortage of graduate courses to serve the broad interests of graduate students and a continuing shortage of lab space.

Program response to external reviewer recommendations:

1. A “systems level philosophy to problem solving” is implicitly found in the general environment in the department, but has not been developed and articulated at the graduate level in a formal manner.

The program agreed that the Systems Design philosophy is not explicit at the graduate level; indeed, this has been an ongoing discussion within the department. There has, so far, been a lack of consensus on how such a philosophy might be realized at the graduate level. Under the direction of the Associate Graduate chair in direct consultation with the Departmental chair and with departmental feedback at monthly meetings different initiatives will move forward. The proposed ideas to be discussed, moving forward, include the following:

   (1) Developing a core, mandatory graduate course, such as a course in systems theory, design, and/or research methods;

   (2) Requiring students without a undergraduate degree in Systems Design (or equivalent) to take some undergraduate design course before commencing their graduate studies;

   (3) Introducing monthly or biweekly outreach events, which include some number of seminars having an explicit purpose (i.e., addressing design, systems thinking or research), possibly further integrated with social events (e.g., lunch, coffee).

It should be noted that these ideas have already been discussed at departmental meetings and generally the response has been favorable.

2a. Graduate students in the course based MEng program will benefit greatly from guidance to navigate their course selections.
The program concurred with this recommendation. The increase in the number of MEng students is a relatively recent phenomenon, and a more formal guidance process is required. We would propose to introduce guidance for MEng students by having a professor mentor assigned to each student, meeting with them at least once a term, and/or introducing core graduate courses or seminar events, as discussed above under point 1 above.

2b. The mechanism for graduate student body feedback and involvement in matters related to the graduate program should be more formalized.

There has, at times, been an active GSA (Graduate Student Association) which ensured/enabled such feedback, but at other times less so.

SDE proposes to simplify graduate student feedback by appointing a chosen graduate student to solicit input from graduate students and pass it onto the Associated Graduate chair. This student would also be invited to department meetings. If the workload for the chosen graduate student is burdensome, this will be revisited and possibly addressed with a graduate student committee.

2c. The average graduate student funding in the department seems good, however, the minimum funding levels could be improved.

The reviewers report suggested looking into offering funded TA-ships at the time of admission; this could certainly make an offer letter more attractive, but carries a risk of offering a TA position to a student with unknown pedagogical skills.

Systems Design pointed out that their average income for funded graduate students is $31,857, compared to the faculty of Engineering’s average income of $30,295. Similarly 27.5% of SDE graduate students have external scholarship support, compared to 20.3% across the faculty of Engineering. These two statistics are evidence that Systems Design Engineering funding support is competitive relative to the rest of the faculty. The lack of funding is more of a faculty issue and will be addressed at the faculty level.

2d. There is a general sense among the graduate students that the hours put in by the teaching assistants are significantly above the expected norms.

The program has, and will continue, to articulate to professors the expectation of 130 hours of total work for teaching assistants. This information has been and will continue to be annotated in the TA appointment letter.

To the extent that this expectation is not met in certain courses, we would propose that the graduate student feedback representative, discussed in point 2b, should allow such cases to be
communicated anonymously to the graduate chair and ensure that discrepancies are dealt with promptly.

3. The number of annual graduate course offerings seems low relative to the wide span of areas in the department.

The limited number of graduate courses has been a matter of concern within the Systems Design Engineering for years, and several sincere attempts have been made to try to address it. The recent introduction of the undergraduate Biomedical Engineering program, largely housed in SDE, temporarily exacerbates this problem, since undergraduate teaching obligations are increasing more rapidly than newly hired faculty teaching tasks. However, once hiring is complete (currently 2 full time faculty have been hired for the biomedical program, 11 new hired are expected in the next 5 years) and the program is in steady state they anticipate being able to offer more graduate courses. Furthermore, given the critical mass of faculty who do research in Biomedical Engineering, there will be an opportunity to create a graduate Biomedical program, for which there has been interest among applicants. Systems Design would benefit from housing such a program.

Nevertheless, a restructuring is required of graduate course offerings and the mechanism by which people are selected to teach graduate courses. Currently graduate courses are scheduled and assigned based on faculty resources available after undergraduate course scheduling. We have offered on average 2-3 graduate courses per semester. Ideally we should offer 1 core and at least a graduate course per research area (4 dominant areas) per semester. To address the lack of faculty resources, we might have to resort to sessionals until our faculty numbers are sufficient to support this minimal steady state offering of graduate courses.

4. Current research space is fragmented and insufficient for the needs of the department.

Systems Design Engineering concurs with this finding. It is evident when the measures of space requirements per student etc. are accounted for, Systems Design is the furthest behind of any other department in Engineering at the University of Waterloo.

There are, however, two space projects in the planning stages, which could significantly improve the department’s space limitations: 1) East Campus 4 (EC4), a former Blackberry building close to Engineering Building 5 (E5) is expected to be available in late 2015, and 2) Engineering Building 7 (E7) is a new building next to E5, anticipated to be ready sometime around 2017 / 2018.
Recommendations that were not selected for implementation:

2c. The average graduate student funding in the department seems good, however, the minimum funding levels could be improved. Refer to response to 2c in section above.
Final Assessment Report of:
Geography and Environmental Management (Bachelor of Environmental Studies)
Geomatics (Bachelor of Environmental Studies)
Tourism (Master of Environmental Studies) and
Climate Change (Master of Climate Change)

December 2015

Introduction
In accordance with Waterloo’s Institutional Quality Assurance Process (IQAP), this final assessment report provides a summary and synthesis of (i) the external review of two Bachelor of Environmental Studies programs (Geography and Environmental Management and Geomatics), the Master of Environmental Studies program in Tourism and the Master of Climate Change program in Climate Change; (ii) the program (department) response to the external review; and (iii) an implementation plan for improvements that lists specific actions, timelines, required resources and responsibility.

The Department of Geography and Environmental Management offers the following undergraduate programs leading to a Bachelor of Environmental Studies:

- Geography and Environmental Management - Three-Year General
- Geography and Environmental Management - Four-Year Honours (Regular and Co-op)
- Honours Geomatics (Regular and Co-op)
- Honours Geography and Aviation (Regular)

The Geography and Aviation program has been recently reviewed separately, together with the Science and Aviation program.

The graduate Geography programs administered jointly with Wilfrid Laurier University (MA, MSc, MES, PhD) through the Waterloo-Laurier Graduate Program in Geography (W-LGPIG) are being reviewed separately. Graduate programs included in the current review are:

- Master in Climate Change (MCC), a coursework based degree that began with its first class in the fall term of 2013
- Master in Tourism (MES) degree, offered in cooperation with the Department of
Recreation and Leisure Studies in the Faculty of Applied Health Sciences. The department moving is to phase out this program due to persistently weak enrollments. No new Tourism students are being admitted in Fall 2015, although the Department of Recreation and Leisure Studies intends to admit a few students this fall and review the future of the program from their end. The reviewers evidently also determined this program was in trouble in their comment “we do not understand why the Master is Tourism is still an option. It does not seem to be a viable program”.

This report is one of three academic program reviews that have been prepared this year by GEM. In addition to the current report, GEM programs being reviewed include:

- the graduate programs offered by the Waterloo – Laurier Graduate Program in Geography; and
- the aviation degrees (Geography and Aviation, and Science and Aviation)

The last review of undergraduate and graduate programs administered by the department (including W-LGPIG) was undertaken in 2007. Eighteen recommendations were made, resulting in numerous improvements to curriculum (undergraduate and graduate), departmental web pages, student orientation, student recruiting, research and experiential learning opportunities for senior undergraduate students, oversight of space issues and computing resources.

**Department of Geography and Environmental Management**

From its 2013 strategic plan, the Department of Geography and Environmental Management is “committed to the discovery, innovation, dissemination, and application of geographic knowledge focused on the complex interactions within and between the human and natural environments. The Department embraces the goals of excellence in geographic research and excellence in geographic research-led teaching in undergraduate and graduate degree programs. It also seeks to stimulate and engage the sharing of geographic knowledge across the Faculty, University, and the wider global community.”

As of January 2014, the Department had 10 full professors, 12 associate professors, four assistant professors, and one continuing lecturer. There are currently 22 cross-appointed faculty to the Department. The cross-appointment is used primarily to allow these faculty to sit on graduate student committees.

The Department’s research and teaching activities fall into three broad areas: Earth System Science, Environment and Development, and Geomatics. Several cross-cutting research and teaching themes, such as climate change, are woven through all three of the theme areas. The Department’s reputation in Geomatics, GIS, Remote Sensing, Environmental Management, Economic Development, Tourism and International Studies distinguishes it from most other Geography programs. Unique to Geography at Waterloo are two new academic plans (Geomatics; Geography and Aviation) as well as two joint academic programs with Nanjing
University). Compared with other universities, the program at Waterloo provides breadth equal to other large undergraduate programs in Geography in Canada. Approximately 700 undergraduate students are enrolled in the various programs offered by the department, the second highest in the province, with over half of the undergraduate students in Geography in the co-op program. For graduate programs – including those that are part of W-LGPIG – Waterloo also has the second largest Geography graduate program in the province (39 at WLU, 70 at Waterloo).

The department’s QS rankings indicate that it has moved up through the past four years. Ranked in the 151-200 range in 2011, the department moved into the 101-150 range 2012, the 51-100 range for the years 2013 and 2014 and the top 50 in 2015.

Self-Study Process and Site Visit
The self-study was prepared by faculty and staff members of the Department of Geography and Environmental Management, with the chair of the department assuming primary responsibility for guiding the process. Statistical data related to faculty and student numbers, and finances were provided by IAP. In addition, departmental data on students were used to generate some of the tables, particularly in the sections on graduate students. An alumni survey was completed in 2013, by 111 individuals who graduated during the 2007-2014 period. Other information was obtained from publications of the Ontario Universities' Application Centre, the Canadian Association of Geographers, the Association of American Geographers and from web sites at UW and other universities.

The Department of Geography and Environmental Management submitted their self-study to offices of the Associate Vice President, Academic and Associate Provost, Graduate Studies on June 12, 2014. The site visit was conducted April 13-14, 2015. The external members of the review team were Professor Nigel Roulet, Chair and Professor of Biosciences, Department of Geography, McGill University and Professor Scott Lamoureux, Professor, Queen’s University, Department of Geography. The internal member was Professor Anindya Sen, Associate Chair, Graduate Studies, Department of Economics.

The review team met with program administrators and departmental faculty and staff, graduate and undergraduate students, the Faculty Dean and Associate Dean (Undergraduate Studies), the Associate Provost, Graduate Studies, the Associate Vice-President, Academic and representatives from the library and co-operative education. The reviewers also toured the Faculty of Environment buildings and the main map library.

The external reviewers’ report was received on June 10, 2015 and the department’s response and implementation strategy, with timelines, responsibilities and resource needs assessment was received on August 20, 2015 and approved by the Dean of Environment on August 19, 2015.
This final assessment report is based on information extracted, verbatim in many cases, from the self-study, the reviewers’ report and the program response.

**Programs**

The external reviewers noted that the learning outcomes for the programs under review were clearly laid out, and also commented on the “stronger emphasis at the University of Waterloo’s Geography on educating graduates for employment.... and the programs associated with the co-ops seems to be very well developed and successful.”

**Undergraduate:**

The objectives of the Geography and Environmental Management and Geomatics programs are well expressed through UW’s eight Undergraduate Degree Level Expectations (UDLES). The overarching programmatic objective is best captured in the first of the UDLES, namely to “have knowledge and critical understanding of the key concepts, current advances, theoretical approaches and assumptions in the field of Geography and Environmental Management and its various specializations (Earth System’s Science; Development and Environment and Geomatics).” From the alumni survey, the majority of students agree that the Department’s undergraduate program learning outcomes are being realized. However, results suggest that the Department needs to consider implementing strategies to enhance student awareness of cultural diversity; to provide specific transferable skills and to provide additional field work opportunities.

**Graduate:**

The self-study articulates the six Graduate Degree Level Expectations (GDLEs) for both graduate programs.

The overarching programmatic objective of the Master of Climate Change (MCC) Program is to provide an academic environment that promotes open critical interdisciplinary inquiry of the scientific and socio-political complexities of climate change, and prepares highly qualified graduates for ethical, innovative and professional practice in diverse climate change careers in government, civil society, business and local/international development.

The overarching objective of the Master of Environmental Studies in Tourism is to provide a constructive, critical, and interdisciplinary education that prepares graduates in careers in government, business, tourism and recreation planning, and consulting.

**Programs Under Review – Strengths and Challenges**

**Undergraduate programs - general**

**Strengths:**

- Students have a broad diversity of courses to support their programs and interests. GEM offered 66 undergraduate courses in 2013-14.
• Students report a consistently high level of satisfaction with courses that they take in the Department as well as overall high level of satisfaction with the teaching performance of instructors. Furthermore, a high percentage of the courses are taught by tenured or tenure track professors.
• The Department encourages a vibrant learning community via seminars and conference opportunities, and opportunities to interact with graduate students as well.
• Students continue to show strong interest in the co-op programs.
• The Department’s honours programs are becoming increasingly attractive to foreign applicants.
• Both the co-op GEM and co-op Geomatics programs have higher retention rates than the regular versions of these programs, and numbers are increasing over time.
• Co-op employers give GEM and Geomatics students a rating of at least very good, with approaching half, in each case, assigning an excellent rating.
• Co-op students are largely satisfied with their co-op experiences. During the reporting period, three-quarters of the Department’s co-op students (75.9%) rated their employees at least 8, on a 10-point scale.
• Post-graduation outcomes are favourable for both GEM and Geomatics students – the majority of graduates continued their academic career following graduation, with 89% attending either a graduate or professional school. Most indicate working in an occupation that is closely related to their undergraduate program.
• Specific to Geography and Environmental Management:
  ➢ There is growing interest in the GEM program by international students (5.3% were of international origin in 2007/2008, 10.7% in 2013/2014)
  ➢ Genders are evenly represented

Challenges:
• Both the regular GEM and regular Geomatics programs have retention issues. Part of this could be explained by the transfer of students to other programs within Geography and Environmental Management.
• Specific to Geography and Environmental Management:
  ➢ Interest from high school students has become flat in recent years.
• Specific to Geomatics:
  ➢ Females are not well represented in Geomatics enrollments, although the proportion of females has increased slightly over time (from 10.5% to 14.7%);
  ➢ Total applications to Geomatics have declined over the seven years (from 80 in 2007/2008 to 70 in 2013/2014), although annual fluctuations are observed. However, despite declining applications to the Geomatics program, first-year enrollment has increased, due to admission of students deflected from Computer Science.
  ➢ From their meeting with Geomatics students, the reviewers heard that there was little guidance for course selection.
Graduate programs – general

Strengths:

- Graduate students are supervised by top-ranked, successful faculty, as measured by awards from various academic, research, or other organizations; significant funding from a variety of sources; peer-reviewed publications and other indicators of productivity; memberships in various editorial boards; executive roles and memberships in professional associations; etc.
- Programs attract international students, who enrich the program.
- The Department encourages a vibrant learning community for graduate students with numerous opportunities for graduate students to participate in conferences (including international), seminars, workshops, various public events and exposure to international scholars as visiting faculty.
- specific to Master of Environmental Studies - Tourism
  - Quality of students coming into program has been very good
  - A number of students in the program have gone on to pursue doctoral studies, either at Waterloo or at other institutions.
  - The reviewers commented that “Plans for growth appear particularly timely given the recent announcement of major climate-policy initiatives in central Canada.”
- specific to Master of Climate Change – Climate Change
  - The professional internship option provides an opportunity for experiential learning
  - The MCC student cohort exhibits extraordinarily great diversity in any metric which can be used to assess diversity. It includes a large proportion of internationally trained students (6/13) and gender balance (6 males, 7 females).
  - While the MCC Program has yet to graduate a student, initial employment prospects appear promising. Of the 13 students in the program, 10 have secured internships

Challenges:

- specific to Master of Environmental Studies - Tourism
  - Enrollments are weak – program will be phased out in Faculty of Environment
- specific to Master of Climate Change – Climate Change
  - International students have difficulties identifying and securing internship opportunities in Canada.

External Reviewers’ Report

The reviewers were generally favourably impressed with the programs under review but there were several areas that were specifically mentioned in their report as being problematical.

“Since almost all professors in the program are traditional teacher-scholars, we were unable to assess at least fifty percent of their activities. We were not able to form any opinions of the great undergraduate experience that often comes from being an
undergraduate in a strong research department. ... We had little opportunity to form much of an impressions of the strengths in human geography. This puts the reviewers at a bit of a loss on what to suggest may be fruitful avenues to explore.

The final general aspect of our review that was unexpected was the almost complete lack of representation from the Geography Tourism Masters program. ... the general lack of details in the written report in comparison to the other graduate programs we reviewed, and the complete lack of any discussion during our two day visit, indicates to us that this program exists in name only. Without champions and supporting faculty we see little value of continuing with this program.”

The latter issue noted by the reviewers concerning the Tourism Masters program stems largely from plans to discontinue the program due to low enrollment. Even though the Department has not admitted any new students to this program for the fall of 2015, Applied Health Science’s Department of Recreation and Leisure Studies is still admitting Tourism Masters students. The final fate of the Tourism masters program will be determined following discussions with the Department of Recreation and Leisure Studies in the coming year.

Regarding admission criteria, the reviewers indicated those for the undergraduate programs were “fine” but “were very confused by the graduate admissions and the criteria for admitting students. ... the report and our discussions did not lead us to have a lot of confidence that GEM was striving to get the top students”.

The reviewers’ comments on the undergraduate curriculum led them to state that it reflects “to a large extent the current state of the discipline of Geography, or at least several thematic areas of Geography quite well. Clearly, to us the Geomatics program is probably the most complete and rigorous program in Canada.” With reference to physical geography, they observed that students graduating from the GEM programs earned a BES rather than a BSc and wondered as a result whether the lack of mandatory basic science courses in the curriculum (calculus, algebra, chemistry, physics, biology) put these students at a disadvantage in applying for graduate positions at other institutions where physical geography was more strongly underpinned by basic science at the undergraduate level.

The human geography theme area also prompted comment on several issues. “First, there was no coherent presentation of a program through curriculum mapping. It was not clear what the goals and objectives of the human geography offering were, or what a human geographer graduating from the University of Waterloo looks like.”

Regarding the theme of the geospatial analysis of public health, the reviewers noted that with the exception of one recent addition to the Faculty, “[N]one of the existing human geographers seem to have a particular strong emphasis in health geography”. They further commented that “Waterloo uniquely has an emphasis on many dimensions of public health, which should have a
very strong geographical component. Given the strength in Geomatics at Waterloo this might be an area worth exploring.”

Concerning resources, the reviewers paid a significant compliment to the Department’s staff and faculty in that the reviewers “were very surprised to not hear a long list of complaints about how under-resourced the GEM was”, which was not a reflection of having all the desired resources, but learning to do an excellent job with the resources at hand. Minor space concerns were raised, which the reviewers noted was a common complaint in universities in general.

The reviewers indicated that the “additional criteria” for graduate programs as described in the guidelines for reviewer “seem to be fine” and their comments regarding the Tourism program and Climate Change program have been articulated earlier in this report. The reviewers noted that, with respect to a possible Master in Geomatics program, “GEM has the faculty and the expertise to mount a high-end graduate program that we believe few other institutions could match” and they recommended this initiative be approached as a “co-op graduate program because we believe these students would be very attractive in industry and could, given the emergence of this field in the main stream economy, could be business innovators.”

The reviewers concluded their report with a series of 11 recommendations that provided the basis for the program response.
Program response and implementation plan

**Recommendation 1:** We recommend that GEM consider a strategic visioning of the Department as a whole, to define future plans and identify priorities for faculty positions, undergraduate and graduate teaching programs, and resources.

**Response:** We agree with this recommendation. Discussions around the future of the department are ongoing. Currently, we are reviewing our experiential learning activities, our undergraduate recruitment activities, and the overall research and teaching focus of the department, with a particular emphasis on human geography. These activities will continue over the next year with the specific goals of: reviewing and revising the undergraduate and graduate curriculum, clarifying and improving our experiential learning activities, and arriving at a plan for future hiring, with a focus on human geography. These activities will be led by the department chair and associate chairs.

**Recommendation 2:** Undergraduate student advising and mentorship should be broadened within the department to include a wider range of faculty and on a more frequent basis.

**Response:** We will take this recommendation under advisement. The department has two associate chairs and two staff who are available to advise students on academic and curriculum matters. We are not aware of any complaints from students regarding a lack of access to academic advising. Further, we are concerned that other faculty in the department do not have sufficient knowledge of policies, procedures, and curriculum requirements to provide accurate and uniform advice. Over the next year, we will review and discuss our current academic advising activities with student representatives to determine if adjustments are required to improve the service we provide. This activity will be led by the department chair and associate chairs.

**Recommendation 3:** We strongly recommend the Department seek to improve communication with undergraduate students related to course enrollment. Determining Department course offerings prior to student registration would eliminate many challenges faced by students in meeting their program requirements. Additionally, given the complexity on offering courses due to the co-op programs, we recommend the Department consider multi-year course planning to improve student access to courses.

**Response:** We agree with this recommendation. We currently advise students of our term-by-term course offerings one year ahead of time. However, the specific scheduling of these courses in each term is handled by the Registrar’s Office, with notice of the schedule given about two months prior to the start of that term. This scheduling of classes and times is beyond the control of the department. We will review our communication of course offerings to students to improve the availability of this information and lengthen advance notice of course offerings. This activity will be led by the chair and associate chairs over the next year.
Recommendation 4: The program in Human Geography is in a transition period and we recommend initiating a review and visioning for the program to reflect the current faculty complement. We anticipate elements of the geography of health would be well supported by the expertise in the group, and natural linkages could be developed to the Geomatics and other units in the Faculty and across campus.

Response: We agree that the Department is in transition with respect to its strengths in Human Geography. We would note, however, that the Department’s combined strengths in the human and physical dimensions of climate change place are noteworthy, and the ways in which social science and natural science are integrated around this theme reflect an important aspect of Waterloo’s Geography programming, and that is Human and Physical Geography do not exist as two silos. That said, we agree that a review and visioning exercise it needed, with a particular focus on human geography, and this has been underway for the past year. These will continue with a view to outlining a vision for the Department that will guide future hiring. This activity will be led by the department chair and associate chairs.

Recommendation 5: The program in Geomatics has rapidly developed and appears poised for further growth. Increased promotion to incoming undergraduate students with interests in computing may further increase enrollments.

Response: We agree with this recommendation. We have recently struck a committee for undergraduate recruiting. This committee will develop a strategy that will include raising awareness of geomatics amongst high school students. Additional resources from the Dean’s Office may be required for promotional activities, such as the revival of the “Geomatics Roadshow” or the preparation of promotional materials. This activity will be led by the department chair, working with the undergraduate recruitment committee.

Recommendation 6: Development of a Masters program in Geomatics appears to hold strong potential. The existing faculty complement could support an advanced program that would be uniquely positioned to train students for research and development aspects of Geomatics. A co-op offering would be a logical consideration given the university strengths.

Response: We agree with this recommendation. Discussions regarding the development of a masters in geomatics have taken place in the past. The department will consult with the Dean of Environment to explore the feasibility of developing a co-op masters in geomatics.

Recommendation 7: The new Masters of Climate Change program has already built a strong international attraction and had positive feedback from students. Maintaining the “lead” of this program in a rapidly developing sector in Ontario and globally will require continuing to innovate in order to attract high quality students. We recommend considering the development of co-op and research program streams to better meet student career goals and to make sure that student expectations are being matched effectively.
Response: We agree with this recommendation. Over the next year, we will explore and discuss the possibility of adding a co-op stream to the MCC program. This initiative will be led by the Director of the MCC program, working with the department chair and associate chairs.

Recommendation 8: The Masters of Tourism appears to be at a crossroads, with declining enrollments and a change in the faculty complement that makes the viability of this program questionable.

Response: We agree with this observation. GEM has already decided to discontinue offering the Masters in Tourism. The Department of Recreation and Leisure Studies has decided to admit students to the Tourism program for the fall of 2015. However, they will review their commitment to the program over the next year. We will coordinate with them as they make that decision.

Recommendation 9: Based on feedback, we feel that the Department needs to invest in expanding cultural and related support for the programs that attract a sizable international cohort (2+2, Masters of Climate Change).

Response: We will take this recommendation under advisement. The Faculty of Environment has a full-time Coordinator of International Education who works with international students, and especially the 2+2 students, to support their adjustment to the Canadian academic environment. We will work with the Dean of Environment to review the activities of the coordinator and address any perceived needs.

Recommendation 10: Graduate student application review and acceptance practice in the Department appears to be heavily weighted towards support staff with limited academic oversight. The volume of applicants and the screening process should be reviewed to increase faculty involvement.

Response: We disagree with this assertion and recommendation. Support staff facilitate the review of graduate applications, but they do not make decisions with respect to the admission of graduate students. The final decision regarding the admission of each applicant is made by the potential faculty advisor of that student and the Associate Chair – Graduate Studies, under the supervision of the Associate Dean – Graduate Studies.

Recommendation 11: Support staff in the Department are in the process of developing documentation for best practices and procedures to enhance the continuity of staff support. We recommend continuing to support this positive initiative.

Response: We agree with this recommendation. This activity will be ongoing, under the supervision of the department chair.
MEMORANDUM

August 29, 2016

TO: Mike Grivicic, Assistant University Secretary, Senate Graduate and Research Council

FROM: Heidi Mussar, Assistant Director, Graduate Financial Aid & Awards

RE: Agenda items for Senate Graduate & Research Council – September 2016

Items for Approval
a) Faculty of Arts Graduate Enhancement Scholarship – Faculty trust funds
A scholarship, valued at a minimum of $5,000, will be provided annually to a full-time graduate student enrolled in the Faculty of Arts who holds a tri-council scholarship, Ontario Graduate Scholarship (OGS) or Queen Elizabeth II Graduate Scholarship in Science and Technology (QEII-GSST). Selection will be made automatically by the Faculty of Arts on the basis of academic achievement (minimum cumulative average of 80%). Preference will be given to students holding an Ontario Graduate Scholarship. Recipients will normally be selected each Spring term.

The fund will provide support to the President’s Graduate Scholarship program by providing matching funds or an enhancement component. If the match or enhancement becomes unavailable, is not possible or a suitable candidate cannot be found, the funds will be paid out as a regular graduate scholarship.

The fund (originally referred to as Ontario Grad Scholarships Faculty of Arts, AR112) was established in March 2001 by the Faculty of Arts, however, no formal terms were developed, therefore this award is being created to formalize the use of the funds.

The individual value of the scholarship will be $5,000; to be matched 1:1 by the UW President’s Graduate Scholarship (the portion that is paid centrally by the Graduate Studies Office).

b) School of Pharmacy Annual Graduate Awards – operating funds (School of Pharmacy)
School of Pharmacy Annual Graduate Awards recognize and celebrate excellence by School of Pharmacy master’s and/or doctoral students during one calendar year of study (winter, spring, fall). Graduate students are automatically considered by the School of Pharmacy without the need for a specific award application. Awards are valued at $200 with up to five (5) awarded in any year based on any of the following criteria:

- Highest final grade in the course topics in drug development
- Best student presentation in the research seminar series
- Best thesis defence in the Pharmacy graduate program
- Best mentor as a graduate student teaching assistant
- Special merit award for substantial impact on Pharmacy’s overall research mission

Students will be automatically selected based on the criteria associated with each of the above eligibility guidelines. Specifically, the following will be considered:

- Marks
- Participation in the seminar series
- Nomination for a Dean of Science award for best thesis defence
• TA evaluations
• Feedback received by the School during the course of the year with respect to student contributions to the overall research mission of the departments

Selection will be made annually in March by a committee comprised of faculty members in the School of Pharmacy and charied by the Associate Director, Graduate Studies & Research.

**Items for Information**

c) **Millennium Graduate Bursary – operating funds**

The Millennium Graduate Bursary is available to University of Waterloo full-time graduate students who are experiencing unexpected financial need. The funding provided is to temporarily bridge the financial gap a student may experience due to extenuating circumstances. The majority of the funding is distributed to international students as they are not eligible to apply for OSAP/provincial student loans or the University of Waterloo Student Awards & Financial Aid (SAFA) Bursary program. In special cases, a Millennium bursary may be awarded to a graduate student who is a Canadian Citizen or Permanent Resident of Canada, provided that they have applied for a SAFA bursary and been denied or received a SAFA bursary and still have unmet financial need.

In the past, the millennium bursary did not have a restriction on the number of times a student could receive it or a cap on the value.

After conducting research on the usage of this program, it was found that there has been a major increase in the expenditures as a result of an increase in the number of bursaries being awarded to “repeat customers” and an increase in the value for these bursaries as a result of not having a maximum cap. The intent of the program was always to assist with short term need and to assist with educational and living costs, not completely cover them.

As a result of the research, and with the approval of the Faculty Associate Deans, Graduate Studies, Associate Dean, Graduate Studies and Associate Provost, Graduate Studies, a decision has been made to limit the number of times a student can apply for the bursary throughout their entire program and implement a cap on the value awarded. The changes were also discussed and approved at Graduate Student Relations Committee on June 21st, 2016.

Below are the highlighted changes effective beginning with applications for Fall 2016:

- For students in Master’s programs (professional or non-professional), students can receive a maximum of one bursary throughout their entire program
- For students in Doctoral programs, students can receive a maximum of two bursaries throughout their entire program (these can be given in two consecutive terms); the bursaries would normally be given near the end of the program after their department/Faculty funding has come to an end

* Students who have already received the maximum bursaries will no longer be eligible to apply.

- Going forward, the values of the bursaries are normally not to exceed $5,000 (for single students). If there is an exceptional case it must be discussed with the appropriate Faculty Associate Dean to determine if a higher value can be provided.
- For graduate students with a family, additional funding will be provided (currently this amount is $850 for each additional dependent). The bursary values will be re-evaluated annually to ensure we are still reasonably meeting the needs of our students.
Motion: That Senate approve amendments to the constitution of the Survey Research Centre as described.
(underline = new text; strikethrough = deleted text)

Centre Name: Survey Research Centre, University of Waterloo

Constitution

Objectives of the Survey Research Centre

In brief, the objectives of the Centre include:

- contributing to research in survey methodology, and encouraging cross-disciplinary collaboration
- helping to communicate research findings and activity, and making survey methods resources and expertise visible and easily accessible, at the University of Waterloo and externally
- contributing to education and training
- providing advice and support to researchers and students in the application of survey methods
- assisting in carrying out studies for researchers and administration at the University of Waterloo
- providing survey research services to external (public and private sector) clients

Organizational structure

The Centre may have up to two Directors who hold University of Waterloo faculty appointments. The Director(s) are appointed for a determinate term, normally three or four years, renewable. A Director oversees the management and activities of the Centre, and chairs meetings of the board, and is responsible for seeing that the academic objectives and constitutional requirements for the Centre are being met.

To share in the Director’s responsibilities, an Associate Director may be appointed. The position is limited to a three or four year term, renewable.

The Centre also has several staff members. The staffing structure may be revised by the Director and the Board, in accordance with University policy, as circumstances require. The appendix outlines the current staffing structure of the Centre.

Reporting

The Survey Research Centre is overseen by the Dean of the Faculty of Mathematics.

When a new Director is to be appointed, the Dean of the Faculty of Mathematics forms a nominating committee of four people with representation from the Board and the regular membership. The nominating committee is formed at least nine months before the expiry of the current Director’s term. The committee consults with the membership and makes a recommendation to be acted upon by the appropriate University authorities. The term of the Director will run for three or four years.
In case the Directorship becomes vacant, it is possible for an Interim Director to be appointed by the Dean of the Faculty Mathematics, in consultation with the Interim Director’s Department, to serve until a new Director has been named.

The procedure for removing a Director will be consistent with the University’s recommended practice at the time, and in accordance with policy.

To share in the Director’s responsibilities, an Associate Director may be appointed by the Dean of the Faculty of Mathematics, in consultation with the Director and with the Associate Director’s Department.

Reporting to Senate Graduate and Research Council

The Centre provides an annual report to Board members. Additionally, a report is presented in connection with the review by Senate Graduate and Research Council every five years, documenting projects worked on, student involvement at the Centre and contribution to research at the University of Waterloo and farther afield.

The Board

The Board of the Survey Research Centre includes (ex officio) the Vice-President, University Research or a delegate; the Dean of the Faculty of Mathematics or a delegate; the Chairs of Statistics and Actuarial Science, Sociology and Legal Studies and the Director’s department; and the Director(s) and Associate Director of the Survey Research Centre. The Board includes in addition three regular members of the Survey Research Centre from different Faculties, and two students nominated by the Director(s), one of which may be a current employee of the Survey Research Centre. It is desirable to have the Faculties of Applied Health Sciences and Environment represented on the Board. The Board is chaired by the Dean of the Faculty of Mathematics, who may appoint a delegate to chair a meeting. The Senior Manager of the Survey Research Centre serves as Secretary to the Board. The Board meets at least annually to review the management, the activities, the financial statement and the budget of the Survey Research Centre.

Centre Membership

The regular members of the Survey Research Centre are University of Waterloo faculty members who are current or recent clients, collaborators or otherwise active stakeholders. Regular membership is for a term of three years, renewable. The benefits of membership include eligibility to serve on the Board, and to provide input into scientific and strategic directions of the Survey Research Centre.

Research Network

The Survey Research Centre maintains a contact list of former and possible future research partners from within the University of Waterloo and other university communities. This network of researchers receives the annual Survey Research Centre newsletter, notification of seminars and workshops and invitations to participate in surveys when appropriate (e.g. the Waterloo Region Area Survey).

Rationale: These changes will ensure that the constitution of the centres adheres more closely to the requirements of Policy 44, specifically that (1) a director have a University of Waterloo faculty appointment, (2) a majority of voting members of the board have regular faculty appointments, and (3) that the responsible dean or delegate serve as chair of the board. The proposed changes were recommended for approval by the board of the Survey Research Centre on 8 August 2016.