

University of Waterloo
SENATE

Notice of Meeting

Date: Monday, October 16, 2006

Time: 4:30 p.m.

Place: Needles Hall, Room 3001

	<i>OPEN SESSION</i>	<i>Page</i>	<i>Action</i>
4:30	<u>Consent Agenda</u> Motion: That Senate approve or receive for information by consent items 1-5 [below].		
	1. Approval of the September 18, 2006 Minutes [enclosed]		Decision
	2. Report of the Chair a. Recognition and Commendation	2, A1	Information
	3. Report of the Vice-President, Academic & Provost a. Call for 'University Professor' Nominations	2, A2	Information
	4. Reports from the Faculties and St. Jerome's University	2, A3-A17	information
	5. Other Business a. Approval of Degrees, Diplomas and Certificates [lists of graduands available at Senate] b. University Committee on Student Appeals Appointments	2, A18 2, A19	Decision Decision
	<u>Regular Agenda</u>		
4:35	6. Business Arising from the Minutes a. CERT University in Abu Dhabi	2	Information
4:45	b. Sino-Canadian College in Nanjing	2	Information
4:55	7. CECS Review Update	2, A20-A24	Information
5:10	8. Report of the Chair a. Environmental Scan	2	Information
5:25	9. Report of the Vice-President, Academic & Provost	2	Information
5:35	10. Report of the Vice-President, University Research	2	Information
5:45	11. Reports from Councils a. Graduate & Research	2, A25-A37	Decision / Information
5:50	b. Undergraduate [report from Council's Oct. 10 meeting to be distributed by email]	2, A38-A43	Decision / Information
5:55	12. Other Business		
	<i>CONFIDENTIAL SESSION</i>		
6:00	13. Approval of the September 18, 2006 Minutes [enclosed]		Decision

The Executive Committee met on October 2, 2006 and wishes to report as follows:

OPEN SESSION

Consent Agenda

2. REPORT OF THE CHAIR

Recognition and Commendation. The Committee agreed to forward this report to Senate for information.

3. REPORT OF THE VICE-PRESIDENT, ACADEMIC & PROVOST

Call for 'University Professor' Nominations. The Committee agreed to forward this report to Senate for information.

4. REPORTS FROM THE FACULTIES AND ST. JEROME'S UNIVERSITY

The Committee agreed to forward these reports to Senate for information.

5. OTHER BUSINESS

Approval of Degrees, Diplomas and Certificates. The standard motion will be put before Senate.

University Committee on Student Appeals Appointments. The Committee agreed to recommend these appointments to Senate for approval.

Regular Agenda

6. BUSINESS ARISING FROM THE MINUTES

CERT University in Abu Dhabi. The Provost will provide an update.

Sino-Canadian College in Nanjing. The Associate Vice-President, Academic and the Associate Provost, Academic & Student Affairs will report jointly.

7. CECS REVIEW UPDATE

The Associate Provost, Academic & Student Affairs and the Executive Director of CECS will provide this update.

8. REPORT OF THE CHAIR

The Chair will provide a brief "Environmental Scan."

9. REPORT OF THE VICE-PRESIDENT, ACADEMIC & PROVOST

The Vice-President will report as appropriate.

10. REPORT OF THE VICE-PRESIDENT, UNIVERSITY RESEARCH

The Vice-President will report as appropriate.

11. REPORTS FROM COUNCILS

Graduate & Research. The Committee agreed to forward this report to Senate for approval and information as indicated.

Undergraduate. The Committee agreed to forward this report to Senate for approval and information as indicated and understood that a second report, from Council's October 10 meeting, would be emailed to Senate for consideration at its October 16 meeting.

University of Waterloo

SENATE

October 16, 2006

Report of the Chair

For Information

RECOGNITION AND COMMENDATION

The UW **School of Architecture building** has been chosen to receive an Award of Excellence in the City of Cambridge Urban Design Awards program. “The purpose of the program is to honour work of high calibre that is undertaken by the development community, with the goal of encouraging excellence in future developments.” These awards are presented once during each term of Council.

Memorandum

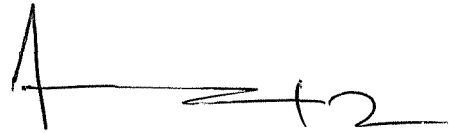
September 25, 2006

To: Members of Senate
Chairs of Departments and Directors of Schools

Copy: Chris Redmond

From: Amit Chakma, Vice-President, Academic & Provost

re: **Call for 'University Professor' Nominations**



To date, UW has awarded this distinction to eight individuals: Garry Rempel, Mary Thompson and Mark Zanna in 2004; Terry McMahon, Cam Stewart and Robert Jan van Pelt in 2005; Phelim Boyle and Ian Munro in 2006.

This memo is to remind you of the process [described below] which was established in 2003 when Senate approved the introduction of the 'University Professor' designation. You should also be aware that the University Tenure and Promotion Committee [i.e. the selection committee] decided when it considered the first round of nominations that the dossiers of unsuccessful nominees would remain in the pool for two additional years, with the understanding that the appropriate Dean would provide updated information each year.

Please ensure that nomination material is in my hands before Christmas.

UNIVERSITY PROFESSOR

The University of Waterloo owes much of its reputation and stature to the quality of its eminent professors. UW recognizes exceptional scholarly achievement and international pre-eminence through the designation 'University Professor'. Once appointed, a faculty member retains the designation for life.

Not counting retirees, it is anticipated there will be 14 University Professorships at steady state, with at most two appointments each year. Such appointments are reported to Senate and to the Board of Governors in March and April respectively, and are recognized at Convocation.

Selection Process

1. Annually, nominations will be sought from Deans, Directors and Chairs, as well as from the University community generally. A nominee shall have demonstrated exceptional scholarly achievement and international pre-eminence in a particular field or fields of knowledge. The individual who nominates a colleague is responsible for gathering the documentation and submitting it to the Vice-President, Academic & Provost. The University Tenure and Promotion Committee will act as the selection committee; its decisions are final.
2. A nomination must be supported by at least six signatures from at least two UW departments and must be accompanied by a curriculum vitae and a short, non-technical description of the nominee's contributions. A nomination must also be accompanied by letters from the nominee's Dean, and from at least two and no more than five scholars of international standing in the nominee's field from outside the University. The letter of nomination should explain why these particular scholars were chosen as referees. The referees should be asked to comment on the impact and specific nature of the nominee's most influential contributions, addressing their responses directly to the Vice-President, Academic & Provost.

**UNIVERSITY OF WATERLOO
REPORT OF THE DEAN OF APPLIED HEALTH SCIENCES TO SENATE**

Monday, October 16, 2006

For Information:

A. *APPOINTMENTS*

Adjunct- Appointments

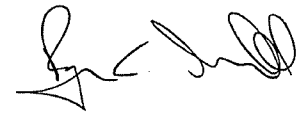
DESMARAIS, Genevieve, Post Doctoral Fellow, Department of Kinesiology, September 1, 2006 to June 30, 2009.

Adjunct- Re-appointments

GASTALDI, Brian and FLYNN, Janice (S.O.S. Physiotherapy), Lecturers, Department of Kinesiology, September 1, 2006 to December 31, 2006.

B. *RESIGNATIONS*

CARNAHAN, Heather, Professor, Department of Kinesiology, August 31, 2006.



Roger C. Mannell, Dean
Applied Health Sciences

UNIVERSITY OF WATERLOO
REPORT OF THE DEAN OF THE FACULTY OF ARTS TO SENATE
OCTOBER 16, 2006

For information:

A. APPOINTMENTS

Adjunct Appointments

CALDERÓN DE CALLEJAS, Betty, Lecturer, Department of Spanish and Latin American Studies, September 1, 2006 to December 31, 2006.

CARTER, Nashifa, Lecturer, Department of Psychology, September 1, 2006 to April 30, 2007.

DUCHARME, Robert, Lecturer, School of Accountancy, September 1, 2006 to December 31, 2006.

EARLE, David, Artist-in-Residence, Dance Presence, Co-op and Arts Special Programs, September 1, 2006 to April 30, 2007.

HEIMPEL, Sara, Assistant Professor, Department of Psychology, September 1, 2006 to April 30, 2007.

PYNE, Derek, Assistant Professor, Department of Economics, September 1, 2006 to April 30, 2007.

ROCKX, Barb, Lecturer, School of Accountancy, September 1, 2006 to April 30, 2007.

STEAD, John, Lecturer, Department of Drama and Speech Communication, September 1, 2006 to December 31, 2006.

STEVENS, Elizabeth, Assistant Professor, Department of Psychology, September 1, 2006 to August 31, 2007.

TROTTER, Kristin, Assistant Professor, Department of Psychology, September 1, 2006 to December 31, 2006.

WALTON, Gregory, Assistant Professor, Department of Psychology, September 1, 2006 to December 31, 2006.

Adjunct Reappointments

BROWN, Graham, Assistant Professor, Department of Philosophy, September 1, 2006 to December 31, 2006.

CARSON, Linda, Lecturer, Department of Fine Arts, September 1, 2006 to December 31, 2006.

CHAPUT, Louise, Lecturer, Department of French Studies, September 1, 2006 to December 31, 2006.

GINGRICH, Nadine, Assistant Professor, Department of English Language and Literature, September 1, 2006 to December 31, 2006.

MCCAULEY, Eva, Lecturer, Department of Fine Arts, September 1, 2006 to December 31, 2006.

MITTLESTAEDT, Walter, Assistant Professor, Department of Psychology, September 1, 2006 to April 30, 2007.

SEIM, Robert (Professor Emeritus), Associate Professor, Department of Psychology, September 1, 2006 to December 31, 2006.

SHERK, Juliana, Guest Artist, Dance Residence, Co-op and Arts Special Programs, September 1, 2006 to April 30, 2007.

SMITH, Cheryl, Assistant Professor, Department of History, September 1, 2006 to December 31, 2006.

SMITH, Larry, Associate Professor, Department of Economics, September 1, 2006 to August 31, 2007.

STEFFY, Richard, (Professor Emeritus), Professor, Department of Psychology, September 1, 2006 to April 30, 2007.

TOMAN, Philip, Assistant Professor, Department of Psychology, September 1, 2006 to August 31, 2007.

WARREN, Shawn, Assistant Professor, Department of Philosophy, September 1, 2006 to December 31, 2006.

Cross Reappointments

CAMERON, A.J.R., Professor, Department of Health Studies and Gerontology to Department of Psychology, July 1, 2006 to August 31, 2008.

GUILD, Paul, Professor, Department of Management Sciences to Department of Psychology, July 1, 2006 to August 31, 2009.

ROY, Eric, Professor, Department of Kinesiology to Department of Psychology, September 1, 2006 to August 31, 2009.

THAGARD, Paul, Professor, Department of Philosophy to Department of Psychology, July 1, 2006 to August 31, 2008.

Staff Appointment to Faculty

PRADA, Laura, Guest Artist, Dance Residence, Co-op and Arts Special Programs, September 1, 2006 to April 30, 2007.

Staff Reappointments to Faculty

SYKES, Susan (Office of Research), Assistant Professor, Department of Psychology, September 1, 2006 to August 31, 2007.

Graduate Students Appointed as Adjunct Lecturers

BALJINDER, Sahdra, Lecturer, Department of Psychology, September 1, 2006 to December 31, 2006.

FINN, Tracey, Department of Philosophy, September 1, 2006 to December 31, 2006.

LEE, Sharon, Department of Philosophy, September 1, 2006 to December 31, 2006.

PANSERA, Carolina, Department of Psychology, September 1, 2006 to December 31, 2006.

Graduate Student Reappointed as Adjunct Lecturer

POWER, Anne-Marie, Department of Philosophy, September 1, 2006 to December 31, 2006.

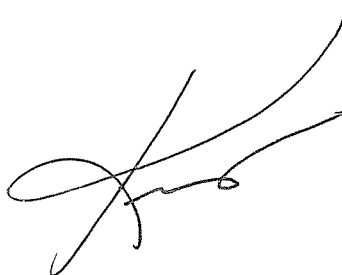
B. ADMINISTRATIVE APPOINTMENT

KOEHLER, Derek, Associate Chair, Graduate Studies, Department of Psychology, September 28, 2006 to April 30, 2007.

FOR APPROVAL BY THE BOARD OF GOVERNORS:

C. SABBATICAL

DENTON, Diana, Associate Professor, Department of Drama and Speech Communication **from** January 1, 2007 to June 30, 2007, six months at 85% salary **to** January 1, 2008 to June 30, 2008, six months at 85% salary.



Ken S. Coates
Dean, Faculty of Arts

UNIVERSITY OF WATERLOO
REPORT OF THE DEAN OF ENGINEERING TO SENATE
October 16, 2006

For information:

A. APPOINTMENTS

Probationary Term

CHOU, Perry, Associate Professor, Department of Chemical Engineering, July 1, 2007 – June 30, 2010. PhD Rice University, Texas 1995; MSc National Taiwan University 1987; BSc National Taiwan University 1984.

FOWLER, Michael., Assistant Professor, Department of Chemical Engineering, July 1, 2007 – June 30, 2010. PhD Royal Military College of Canada 2003; MSc Queen's University 1988; BEng Royal Military College of Canada 1986.

Continuing Appointments

DOHERTY, Paul, Lecturer, Centre for Business, Entrepreneurship & Technology, September 1, 2006. MBA Wilfrid Laurier University 2000; PhD University of Manchester, England 1982; MSc University of Manchester 1979; BSc University of Manchester 1978.

Visiting Appointments

ABDEL RAHMAN, Noha Yoursri, Scholar, Department of Electrical & Computer Engineering July 1, 2006 – June 30, 2007.

ADIKANE, Harshvardhan Vishvanath, Scholar, Department of Chemical Engineering, October 10, 2006 – March 31, 2007.

GUO, Hang, Scholar, Department of Mechanical & Mechatronics Engineering, August 29, 2006 – August 28, 2007.

ISARANUWATCHAI, Phimphan, Scholar, Department of Chemical Engineering, August 25, 2006 – August 24, 2007.

LUAN, Xiuzhen, Scholar, Department of Electrical & Computer Engineering, August 16, 2006 – January 31, 2007.

NORIEGA, Julio, Scholar, Department of Management Sciences, September 1, 2006 - August 31, 2007.

PAREDES, Beatriz, Scholar, Department of Chemical Engineering, September 1, 2006 – December 1, 2006.

RASHID, Mohd A., Researcher, Department of Electrical & Computer Engineering, September 1, 2006 – December 31, 2006.

Adjunct Appointments

ARZANPOUR, Siamak, Lecturer, Department of Mechanical & Mechatronics Engineering, September 1, 2006 – December 31, 2006

GASTMEIER, William, Assistant Professor, School of Architecture, September 1, 2006 – December 31, 2006.

KILCOYNE, Catherine, Assistant Professor, School of Architecture, September 1, 2006 – December 31, 2006.

LAU, Michael, Professor, Department of Civil & Environmental Engineering, May 1, 2006 – April 30, 2008.

LEDERER, Jeff, Assistant Professor, School of Architecture, May 1, 2006 – December 31, 2006.

NATHAN, Arokia, Professor, Department of Electrical & Computer Engineering, September 1, 2006 – August 31, 2009.

NONNECKE, Blair, Associate Professor, Department of Management Sciences, September 1, 2006 – August 31, 2008.

ROSE, Teresa, Lecturer, Department of Management Sciences, September 1, 2006 – December 31, 2006.

SCHMITKE, Chad, Assistant Professor, Department of Systems Design Engineering, September 1, 2006 – August 31, 2009.

SETH, Deepyaman, Lecturer, Department of Chemical Engineering, September 1, 2006 – April 30, 2007.

Adjunct Reappointments

ASTEBRO, Thomas, Associate Professor, Department of Management Sciences, September 1, 2006 – August 31, 2008.

MARK, Jon, Professor, Professor Emeritus, Department of Electrical & Computer Engineering, September 1, 2006 – August 31, 2008.

VAN DEN BERGHE, Larry, Associate Professor, Department of Management Sciences, September 1, 2006 – August 31, 2008.

Cross Appointments

FADER, Christina, Associate Professor, Department of Economics to Department of Management Sciences, Faculty of Engineering, September 1, 2006 – August 31, 2008.

Changes in Appointments

SAHIN, Salim, Visiting Research Assistant Professor, Department of Mechanical & Mechatronics Engineering, was June 15, 2006 – June 14, 2007 changed to July 17, 2006 – July 16, 2007.

Graduate Students appointed as Part-time Lecturers

ADEDAPO, Dami, Department of Civil and Environmental Engineering, September 1, 2006 – December 31, 2006.

RAN, Bing, Department of Management Sciences, September 1, 2006 – December 31, 2006.

B. ADMINISTRATIVE APPOINTMENTS

MEYER-BOAKE, Terri, Associate Director/UGAC Officer, School of Architecture, January 1, 2006 – December 31, 2006.

WECKMAN, Elizabeth, Professor, Associate Chair, Research Mechanical and Mechatronics Engineering, September 1, 2006 – June 30, 2009.

WORSWICK, Michael, Professor, Associate Dean, Research and External Partnerships, January 1, 2007 – December 31, 2009.

ADMINISTRATIVE REAPPOINTMENTS

WILSON, William, Professor, Director, Software Engineering Program, July 1, 2006 – June 30, 2007.

C. RESIGNATIONS

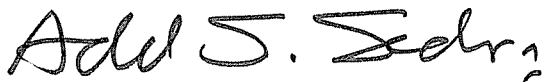
NATHAN, Arokia, Professor, Department of Electrical & Computer Engineering, August 31, 2006.

ALREADY APPROVED BY THE BOARD OF GOVERNORS

D. SPECIAL LEAVE

GOLNARAGHI, Farid, Professor, Department of Mechanical and Mechatronics Engineering, September 1, 2006 – August 31, 2007, twelve months, unpaid leave of absence.

KONTOGIANNIS, Kostas, Associate Professor, Department of Electrical and Computer Engineering, October 1, 2006 – September 30, 2007, twelve months, unpaid leave of absence.



Adel S. Sedra
Dean, Faculty of Engineering

UNIVERSITY OF WATERLOO
REPORT OF THE DEAN OF ENVIRONMENTAL STUDIES TO SENATE
October 16, 2006

For Information:

A. APPOINTMENTS

Adjunct Appointments

HALL, Peter, Assistant Professor, Department of Geography, July 1, 2006 to June 30, 2009.

Adjunct Reappointments

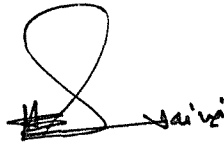
GARROD, Stephen, Associate Professor, Faculty of Environmental Studies, September 1, 2006 to April 30, 2007.

LAZAROWICH, Michael, School of Planning, January 1, 2007 to December 31, 2007.

Graduate Students Reappointed as Part-time Lecturers

NEWMAN, Candace, Department of Geography, January 1, 2007 to April 30, 2007.

PAWLOWSKI, Dianne, Department of Geography, September 1, 2006 to December 31, 2006.



Deep Saini
Dean

/aew

UNIVERSITY OF WATERLOO
REPORT OF THE DEAN OF MATHEMATICS TO SENATE
October 16, 2006

For information:

A. APPOINTMENTS

Probationary Term

HARE, Kevin (BMath, 1997, Univ. of Waterloo; MSc, 1999; PhD, 2002 both from Simon Fraser Univ.), Assistant Professor, Dept. of Pure Mathematics, July 1, 2007 – June 30, 2010.

MOOSA, Rahim (BArtsSc, 1996, McMaster Univ.; PhD, 2001, Univ. of Illinois at Urbana-Champaign), Assistant Professor, Dept. of Pure Mathematics, July 1, 2007 – June 30, 2010.

SPRONK, Nicolaas (BSc (Hons), 1995, Univ. of Alberta; MMath, 1997; PhD, 2002 both from the Univ. of Waterloo), Assistant Professor, Dept. of Pure Mathematics, July 1, 2007 – June 30, 2010.

Visiting Appointments

KOU, Yefu (Central University of Finance and Economics), Scholar, Dept. of Statistics and Actuarial Science, September 1, 2006 – August 31, 2007.

Adjunct Appointments

ANDREWS, Doug, Lecturer, Dept. of Statistics and Actuarial Science, January 1, 2007 – April 30, 2007.

DJOKOVIC, Dragomir (Professor Emeritus), Adjunct, Dept. of Pure Mathematics, September 1, 2006 – August 31, 2009.

MARONEY, Owen, Lecturer, Dept. of Applied Mathematics, September 1, 2006 – December 31, 2006.

NEAGU, Mihail, Lecturer, Dept. of Pure Mathematics, September 1, 2006 – December 31, 2006.

Adjunct Reappointments

ALLISON, Anne-Marie, Lecturer, Office of the Dean, September 1, 2006 – December 31, 2006.

FORREST, Barbara, Lecturer, Office of the Dean, September 1, 2006 – December 31, 2006.

GREEN, Ron, Lecturer, Office of the Dean, September 1, 2006 – December 31, 2006.

MERCER, Robert (University of Western Ontario), Professor, the David R. Chertion School of Computer Science, August 1, 2006 – July 31, 2008.

RADOCCHIA, Joseph, Lecturer, Office of the Dean, September 1, 2006 – December 31, 2006.

SANTIN, Anita, Lecturer, Dept. of Pure Mathematics, September 1, 2006 – December 31, 2006.

SPIELMACHER, Mark, Lecturer, Office of the Dean, September 1, 2006 – August 31, 2007.

WINKLER, Oliver, Lecturer, Dept. of Applied Mathematics, September 1, 2006 – December 31, 2006.

Cross Appointments

CZARNECKI, Krzysztof (Assistant Professor, Dept. of Electrical and Computer Engineering), in the David R. Cheriton School of Computer Science, July 1, 2006 – June 30, 2009.

WIRJANTO, Tony (Professor, Dept. of Economics), in the Dept. of Statistical and Actuarial Science, July 1, 2006 – June 30, 2009.

Cross Reappointments

THAGARD, Paul (Professor, Dept. of Philosophy), in the David R. Cheriton School of Computer Science, August 1, 2006 – July 31, 2008.

Graduate Students appointed as Part-time Lecturers

CHEN, Kai, Dept. of Statistics and Actuarial Science, September 1, 2006 – December 31, 2006.

FENG, Runhuan, Dept. of Statistics and Actuarial Science, September 1, 2006 – December 31, 2006.

LI, Siu-Hang, Dept. of Statistics and Actuarial Science, September 1, 2006 – December 31, 2006.

Graduate Students reappointed as Part-time Lecturers

BUETTCHER, Stefan, the David R. Cheriton School of Computer Science, September 1, 2006 – December 31, 2006.

DAUDJEE, Khuzaima, the David R. Cheriton School of Computer Science, September 1, 2006 – December 31, 2006.

METZLER, Adam, Dept. of Statistics and Actuarial Science, September 1, 2006 – December 31, 2006.

RAMIREZ RAMIREZ, Lilia Leticia, Dept. of Statistics and Actuarial Science, September 1, 2006 – December 31, 2006.

B. ADMINISTRATIVE APPOINTMENTS

DYCK, Arnie, Professor, Associate Dean for Co-Operative Studies, Office of the Dean, September 1, 2006 – August 31, 2007.

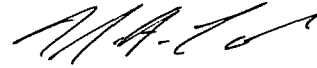
FORSYTH, Peter, Professor, Scientific Director, Institute for Quantitative Finance and Insurance, July 1, 2006 – June 30, 2008.

TAN, Ken Seng, Professor, Associate Scientific Director, Institute for Quantitative Finance and Insurance, July 1, 2006 – June 30, 2008.

F. SABBATICAL

FOR APPROVAL BY THE BOARD OF GOVERNORS

BARANOSKI, Gladimir, Associate Professor, the David R. Cheriton School of Computer Science, January 1, 2007 – June 30, 2007, with 100% salary.



Thomas Coleman
Dean

UNIVERSITY OF WATERLOO
REPORT OF THE DEAN OF SCIENCE TO SENATE
October 16, 2006

For information:

A. APPOINTMENTS

Visiting Appointments

COSTA QUEIROZ, Maria Eugenia, Scientist, Department of Chemistry, August 1, 2006 to December 31, 2006.

DOBIESZ, Norine E., Scientist, Department of Biology, September 1, 2006 to March 31, 2007.

HUANG, Huiping, Scientist, Department of Earth Sciences, August 1, 2006 to August 31, 2007.

Adjunct Appointments

SENCZYNA, D. Michelle, Associate Professor, School of Optometry, September 1, 2006 to August 31, 2009.

TURNOUR, Murray J., Professor, School of Optometry, September 1, 2006 to August 31, 2009.

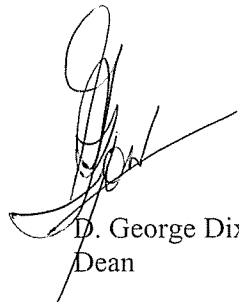
Adjunct Reappointment

GRAHAM, Katherine D., Lecturer, Department of Biology, January 1, 2007 to April 30, 2007.

Changes in Appointments

PROUZET, Eric, Associate Professor, Department of Chemistry, start date changed from July 1, 2006 to September 1, 2006.

RADOVANOVIC, Pavle, Assistant Professor, Department of Chemistry, start date changed from July 1, 2006 to August 1, 2006.


D. George Dixon
Dean

DGD/lw



UNIVERSITY OF WATERLOO
REPORT OF ST. JEROME'S UNIVERSITY TO SENATE

OCTOBER 16, 2006

For Information:

A. Definite Term Contracts - Part time:

Catherine Briggs, Assistant Professor of History and Sexuality, Marriage and Family Studies, September 1, 2006 to December 31, 2006.

Andrew Deman, Lecturer in English, September 1, 2006 to December 31, 2006.

Nadine Gingrich, Lecturer in English, September 1, 2006 to December 31, 2006.

Carmela De Santis, Lecturer in Sexuality, Marriage and Family Studies, September 1, 2006 to April 30, 2007.

Dorothy Hadfield, Associate Professor of English, September 1, 2006 to December 31, 2006.

Sara Humphreys, Lecturer in English, September 1, 2006 to December 31, 2006.

Dan Hutter, Lecturer in History, September 1, 2006 to December 31, 2006.

John Greenwood, Assistant Professor in Human Sciences, September 1, 2006 to April 30, 2007.

Consuelo Griggio, Lecturer in Italian Studies, September 1, 2006 to April 30, 2007.

Tinamarie Jones, Lecturer in Religious Studies, September 1, 2006 to December 31, 2006.

Nathalie Lanson, Lecturer in Mathematics, September 1, 2006 to December 31, 2006.

Kerry Lappin-Fortin, Assistant Professor of French, September 1, 2006 to April 30, 2007.

Paul Lavigne, Lecturer in History, September 1, 2006 to December 31, 2006.

Adam Metzler, Lecturer in Mathematics, September 1, 2006 to December 31, 2006.

Timothy Paci, Lecturer in English, September 1, 2006 to December 31, 2006.

Marlene Pfaff, Lecturer in Sexuality, Marriage and Family Studies, September 1, 2006 to December 31, 2006.

Bruce Richter, Lecturer in Mathematics, September 1, 2006 to December 31, 2006.

Fred Scinto, C.R., Lecturer in Religious Studies, September 1, 2006 to December 31, 2006.

Toni Serafini, Lecturer in Sexuality, Marriage and Family Studies, September 1, 2006 to December 31, 2006.

Meena Sharify-Funk, Assistant Professor of Religious Studies, September 1, 2006 to December 31, 2006.

Richard Shields, Assistant Professor of Religious Studies, September 1, 2006, to December 31, 2006.

Margaret Sweatman, Lecturer in English, September 1, 2006 to December 31, 2006.

Kelley Teahen, Lecturer in English, September 1, 2006 to December 31, 2006.

Andrew Thompson, Lecturer in History, September 1, 2006 to December 31, 2006.

Jim Wahl, C.R., Associate Professor of History, September 1, 2006 to December 31, 2006.

Carolyn Whitney-Brown, Assistant Professor of Religious Studies, September 1, 2006 to December 31, 2006.

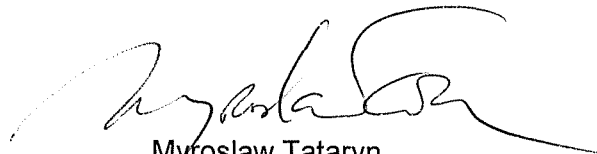
Pat Zettel, Assistant Professor of English, September 1, 2006 to April 30, 2007.

B. Tenure Appointments:

Carol Acton, Associate Professor of English, effective July 1, 2007.

Maureen Drysdale, Associate Professor of Psychology, effective July 1, 2007.

MIT:rt



Myroslaw Tataryn
Acting President and Academic Dean

University of Waterloo

SENATE

October 16, 2006

For Approval

APPROVAL OF DEGREES, DIPLOMAS AND CERTIFICATES

Motion:

That Senate approve the lists of candidates for degrees, diplomas and certificates as recommended by the Faculty Councils and the Dean of Graduate Studies and that Senate authorize the Chair, the Registrar and the Dean of Graduate Studies to add to or change the lists of candidates for degrees, diplomas and certificates as approved at the meeting on October 16, 2006.

University of Waterloo

SENATE

October 16, 2006

For Approval

UNIVERSITY COMMITTEE ON STUDENT APPEALS APPOINTMENTS

Motion:

That Senate approve the following undergraduate student representative appointments:

Eric Logan (Combinatorics & Optimization), term to December 31, 2006, and

Victoria Hilborn (Environmental Engineering), replacing Eric Logan, term from January 1, 2007 to April 30, 2007.

Progress report on implementation of CECS Review Recommendations

The following charts summarize the status of the 48* recommendations in the review of Co-operative Education and Career Services at UW. The recommendations have been grouped into 6 areas:

- Significance of co-operative education
- Career Services
- Co-operative education as an education experience
- Enough quality co-op jobs
- CECS operations
- Other

The symbols in the Status column provide a visual summary of the state of implementation of each recommendation, as follows:

○ Not started ◐ ◑ ◒ ● Complete

Summary of progress since last status (Feb/06)

	○	◐	◑	◒	●	Total*
2006, September	10	10	13	1	17	51
2006, February	15	9	12	4	11	51

* Progress is reported on 51 items, as a few recommendations are split into multiple items for reporting purposes.















Significance of Co-operative Education

Rec#	Description	Status	Comments
2	Faculty leads for co-op	●	Associate Deans Co-op or equivalent identified in all Faculties
3	Co-operative Education Council (CEC)	●	Council has been meeting regularly since winter term '06
4	New faculty orientation	◐	Workshop in place New faculty participation continues to be a challenge
5	50 th anniversary co-op event	◑	Preparation for 2017: the Workplace well underway.
6	Emphasis on co-op	●	
7	Encourage other experiential learning	●	Several new initiatives related to service learning.








Career Services

Rec#	Description	Status	Comments
33	Focus CS on students and alumni	●	
34	Continue fees to alumni as current	●	
37	CS and Co-op to stay together	●	
38	Raise the profile of CS	◑	Continuing initiatives to improve profile
39	CS and Counselling Services strategy	●	Strategy and implementation in place; Counselling staff now have office hours in Tatham Ctr.
40	Review CS Assistant Director role	●	Level increased and title changed to Director, Career Services
47	Determine budget	●	Complete






Co-operative Education as an Educational Experience








Rec#	Description	Status	Comments
14	1 volunteer work term eligible as co-op		Policy in place; numbers low as we learn
15	Propose that CAFCE credit volunteer work terms		UW's programs allow for 1 work term within CAFCE criteria; not pursuing further at this time.
16	Determine extra activities required for academic credit for work term		5 Faculties (excl. Engineering) have determined PD courses to be developed. Staff member hired. First course offered Fall 2006 for Arts and Math students.
17	Courses under oversight of Assoc. Provost, Academic and Student Affairs		
18	Clear guidelines for work term reports, including critical reflection		To be addressed by CEC
19	Replace work term reports with academic credit courses		To consider after PD courses have been offered for 3+ years
20	Determine future funding for Enterprise Co-op		Proposal for CBET program into which Enterprise Co-op would fit is under consideration
21	Faculty Co-op Reps to be responsible for ensuring evaluation of Enterprise Co-op work terms		Pending outcome of CBET proposal
22	Governance structure for Enterprise Co-op to be developed		Pending outcome of CBET proposal
24	International visa students working in "third countries"		Visa and work permit processes remain onerous.
25	Ensure risks of work or study in other countries are understood and communicated.		Work underway, and highlighted by events in August 2006 re: co-op work terms in Sri Lanka
26	Encourage grad co-op with appropriate work opportunities and faculty involvement		Discussions to be initiated with Senate Grad Research Council
27	Grad students develop co-op plans where faculty support is assured.		See above.
28	Assess grad co-op during OCGS reviews and discontinue where not sustainable.		Part of OCGS review process to consider grad co-op

Enough Quality Co-op Jobs






Rec#	Description	Status	Comments
8	<ul style="list-style-type: none"> Assess availability of work opportunities before introducing or continuing co-op plans Consider co-op opportunities for international visa students Monitor existing co-op plans for sustainable work opportunities 	  	<ul style="list-style-type: none"> Collaboration between CECS and Faculties strengthening; CEC to address Criteria and process to be developed Not started
10	Increase first-term jobs on campus and with partner employers		Ongoing; specific strategies to be investigated.
11	<ul style="list-style-type: none"> Ensure students understand their accountability in job search and employment Require preparation through mandatory course 		<ul style="list-style-type: none"> Student accountability is clearly documented; publicizing this being enhanced. Mandatory course in place in Fall 2006
12	Faculties and CECS to partner to ensure adequate jobs available		Currently ad hoc; assessment and reporting processes being developed; some Faculties developing systematically
13	Flexibility in length of work terms		More background data to be supplied from CECS Employment Process Review

CECS Operations

Rec#	Description	Status	Comments
1	Define CECS mission, roles, relationships with partners		To follow Employment Process Review
9	Define and report on indicators		Preliminary proposal in place; significant work ahead in data collection and reporting
46	<ul style="list-style-type: none"> Determine service levels and report annually Develop costing model Determine appropriate fee-setting approach 		Initial analysis completed with 2006/7 budget process; further development to follow business process reviews (see below)
23	Determine resources required to support international experiences		Work has begun; budget implications to be determined
29	Determine grad co-op fee		Implemented

42	Assess role of co-ordinators and determine means of measuring performance		To start following review of 2 major co-op business processes: employment (matching) and job development
41	Assess organizational structure of CECS		To follow business process reviews (see above)
32	<ul style="list-style-type: none"> Establish employer group to advise on recruitment and work opportunity needs Develop knowledge base in labour trends and market analysis 	 	<ul style="list-style-type: none"> To be developed out of Employment Process review Project on market analysis underway with Economics faculty; data capture enhanced
35	Continue to improve JobMine		Ongoing.
36	Train co-ordinators in JobMine		Ongoing; approach and resource requirements to provide sustainable adequate training to be determined.
43	Develop integrated marketing plan for co-op, including setting realistic expectations for prospective students and their parents.		Work underway on ad hoc basis; systematic approach to be developed.

Other

Rec#	Description	Status	Comments
30	Determine feasibility of helping students on work terms find housing in other communities		Housing started investigations in selected key cities
31	WatCACE conduct research on challenges in delivering co-op at UW		WatCACE consulting with Faculties to establish needs and priorities.
44	Lobby Government of Ontario to have co-op costs reflected in funding		ongoing
45	Continue to lobby government for increased tax credits to co-op employers		ongoing
48	Schedule a review of co-operative education and career services every 7 years		Review is an ongoing process, with major review to be done on 7 year cycle, with external reviewers included

University of Waterloo
SENATE GRADUATE & RESEARCH COUNCIL
REPORT TO SENATE
October 16, 2006

Council met on September 18, 2006 and agreed to forward the following items to Senate for approval and information, as indicated [*further details may be obtained from the Secretary, ext. 5924*]

FOR APPROVAL

1. ESTABLISHMENT OF CENTRE

Centre for Theoretical Neuroscience at the University of Waterloo (Chris Eliasmith, Director Designate)

Motion: To recommend that Senate approve the establishment of this Centre for five years (October 2006 - October 2011), as outlined in Attachment #1.

2. PROGRAM CHANGES

Faculty of Engineering
Systems Design Engineering
MEng Program

Motion: That the seminar requirement be removed from the MEng program in Systems Design Engineering.

Rationale: While important for research-based degrees, requiring a Seminar for course-work degrees is not necessary; there are research components in the other required courses.

Faculty of Mathematics
Applied Mathematics
PhD Program

Motion: That the number of required courses for the PhD program in Applied Mathematics be changed to eight courses from a Bachelors degree and four courses from a Master's degree.

Rationale: This change will reduce the number of courses in the PhD program from 10 to eight, harmonizing with the rest of the Mathematics Faculty (eight is the number of required courses for most other units) and with the Physics PhD program in the Faculty of Science. The reduction will make it easier for students to complete their degree within four years.

FOR INFORMATION

On behalf of Senate, Council approved several new courses and course changes for the Faculties of Engineering (Civil Engineering) and Mathematics (Statistics), and two new scholarships: Master of Public Health (MPH) Graduate Award and the Science Graduate Studies Scholarships.

/tlc

Ranjana Bird
Dean of Graduate Studies

Alan George
Interim Vice-President, University Research

A Proposal for the Establishment of the

Centre for Theoretical Neuroscience

at the



Prepared by

Chris Eliasmith, Philosophy, Systems Design Engineering

Sue Ann Campbell, Applied Math

Paul Thagard, Philosophy, Computer Science, Psychology

James Danckert, Psychology

Brian Ingalls, Applied Math

Mike Dixon, Psychology

June 1, 2006

Revised: September 5, 2006

1. Executive summary

Theoretical neuroscience is the quantitative study of neurobiological systems using the tools of information theory, signal processing, control theory, machine learning, and dynamic systems theory. It is concerned with issues of neural representation, neural architecture, learning, nonlinear systems, and complexity as they relate to understanding the uniquely flexible and effective behaviours of humans and animals.

There currently exists an opportunity for Waterloo to establish a unique-in-Canada, and world-class research institute in this area. Building on current expertise, we propose to establish a Centre for Theoretical Neuroscience that would boost graduate enrolment, attract health-related and private funding, and connect directly with a number of other health-related (RIA, CMHR, Pharmacy) and computational (ICQ) research initiatives.

To take advantage of this opportunity, we propose the hiring of three faculty (open/intermediate/junior), the designation of graduate student space, and some administrative support.

2. Background

The emerging field of theoretical neuroscience is uniquely focused on developing new ways of understanding the unrivaled complexity and flexibility of the behaviour of biological systems. Researchers in theoretical neuroscience use quantitative tools to study neural systems, which include single neural cells as well as small and large networks of cells (including the whole brain). The main methods used in such studies are mathematical analyses and computational simulations, which employ dynamic systems theory, information theory, signal analysis, control theory, complexity theory and so on. Historically, theoretical neuroscience (also often referred to as computational neuroscience) has its roots in artificial neural networks (ANNs). However, the focus of theoretical neuroscience has become more biological, and hence more concerned with reverse-engineering actual biological systems. This focus contrasts with that of the ANN community, which applies ANNs in an attempt to solve various engineering or artificial intelligence problems, or uses ANNs as abstract models of cognition.

As a result, theoretical neuroscientists are centrally interested in understanding the computational and mathematical principles behind brain function. This theoretical focus has important practical implications for the development of future technologies. It has been clearly established that we do not have appropriate tools for engineering large, complex systems (for instance, only 30% of large software projects are successful; Humphery, 2005). However, nature has solved such problems in ways we do not currently understand. The study of theoretical neuroscience provides new insights into nature's solutions. In some areas (e.g., face recognition), neurally inspired algorithms are the state-of-the-art (e.g. Messer et al. 2004). However, there is much more we can learn regarding complex control, pattern recognition, learning, and dynamical systems from reverse-engineering the brain.

Furthermore, a better understanding of neural systems has led to important breakthroughs in treating brain-related illnesses. For instance, theoretical models

allow us to understand and tailor medical interventions, such as the treatment of Parkinsonian tremor with deep-brain stimulation (McIntyre et al., 2004). Similarly, theoretical neuroscientists model the effects of various pharmacological interventions, improving our understanding of their precise effects (e.g., serotonin reuptake inhibitors used to treat depression and other anxiety disorders; Stoltenberg, 2003; Meeter et al., in press). Other health-related applications include brain-machine interface development, resulting in the construction of more effective prosthetics. New theoretical insights into neural coding have recently allowed monkeys to control robotic arms through direct neural implants (Andersen et al., 2004).

In recognition of the importance of theoretical neuroscience, significant international commitments of research funding have recently been announced, including programs from the European Union (Cognitive Systems Program, \$72 mil/5 years), the United States (DARPA (Biologically Inspired Cognitive Architecture Program), NSF/NIH (Collaborative Research in Computational Neuroscience, \$6 mil/yr)), and Japan (RIKEN Institute, Creating the Brain Division \$9 mil/yr). Unfortunately, Canada does not have similarly targeted funds, although NSERC, CIHR, and CFI fund research in the area through their general programs (see section 4.1 for a description of research at Waterloo in this area funded by these programs). As a result, there are currently no institutionalized organizations for theoretical neuroscience in Canada.

We believe that the slow response of Canadian institutes to this area of growing importance presents a unique opportunity for the University of Waterloo to establish a best-in-Canada, and world-class Centre for Theoretical Neuroscience. This Centre will take advantage of Waterloo's already well-established reputation as an excellent technical and research university and help build the University's health-related research base. The benefits of establishing this Centre, current support for the Centre, and the requested resources are detailed in the remainder of this document.

3. Benefits

3.1. Research Benefits

3.1.1. Uniqueness in Canada and Abroad

There are currently no insitutional organizations in Canada focused on theoretical neuroscience research. Currently, the University of Toronto is best known among Canadian universities for work in this area because of the reputations of individual labs. As well, within the last few months, the University of Ottawa has established the Center for Neural Dynamics in Health and Disease, with a related but distinct research focus. Waterloo's focus on theoretical neuroscience with a clear institutional commitment and explicit research organization will take advantage of the University's strengths and be unique in Canada.

Furthermore, the faculty members involved in establishing the Centre boast international reputations in their fields of research. Professor Thagard holds a University Research Chair and is a member of the Royal Society in recognition of his work developing psychological theories of analogy, decision making, and reasoning. Professor Campbell is an internationally recognized expert on hippocampal dynamics, and the application of delayed differential equations to modeling networks of neural

cells. Dr. Danckert holds a Canada Research Chair (CRC) in cognitive neuroscience, and has recently been collaborating with Dr. Eliasmith (CRC-nominated) to develop state-of-the-art models of hemi-neglect. Dr. Eliasmith has been invited to present methods he developed for neural modeling across three continents, and his group was recently featured in an article by Science. Professor Ingalls' work on sensitivity analysis applied to cellular systems has been featured in top journals and is funded by NSERC and CIHR. Professor Dixon heads the Synaesthesia Research Group, arguably the world's premiere research group focusing on this condition. Together, these faculty form a potent core for establishing the Centre. Furthermore, they represent a wide variety of Faculties and world-class departments within those Faculties.

With these combined strengths, the proposed resources (see section 5), and a clear institutional organization, we expect the Centre for Theoretical Neuroscience at Waterloo to quickly become the premier Canadian research institute in this area. Furthermore, this complement of faculty is sufficient to establish Waterloo as a world-class research centre in theoretical neuroscience. Currently, the top institutes include the Salk Institute (University of California, San Diego; 8 faculty), Caltech (Computation and Neural Systems; 8 faculty), Boston University (Computational Neuroscience Lab; 9 faculty), and the Gatsby Institute (University College London, 5 faculty). The establishment of the Centre will provide a sufficient concentration of faculty members, building on the already strong research in theoretical neuroscience at Waterloo (see section 4.1 for further description of current research), to result in a world-class research centre.

3.1.2. Related Initiatives at Waterloo

The University of Waterloo has recently launched a number of research initiatives with which the Centre is expected to integrate extremely well. These include the School of Pharmacy, the Centre for Mental Health Research (CMHR), the Institute for Quantum Computing (ICQ), and the Research Institute for Aging (RIA).

This wide variety of related initiatives is a result of the fact that theoretical neuroscience represents a convergence of biological and mathematical problems and methods. For instance, work in the Computational Neuroscience Research Group (CNRG) here at Waterloo includes detailed modeling of the basal ganglia (a sub-cortical region of the brain), and its age-related degeneration which results in Parkinson's disease. This work should help us better understand the root cause of Parkinsonian tremor, a central interest for those in the RIA and members of the Collaborative Program in Behavioural Neuroscience. The experimental focus of the proposed CMHR and the current program in Collaborative Behavioural Neuroscience ideally compliment the theoretical focus of the Centre. Researchers in these initiatives share research interests in motor behaviour, application and modeling of neuropharmacology, and object perception. Similarly, much has been made of the importance of computational modeling for understanding and testing theories of pain, a research focus of the School of Pharmacy (Britton and Skevington, 1996).

On the more mathematical side, theoretical explorations of neural computation use many of the same formalisms as those employed by physicists attempting to understand physical/quantum computation (Eliasmith and Anderson, 2003). As well, both are

explorations of non-standard computational regimes. These shared methodologies and related interests stand to support the cross-fertilization of ideas regarding novel approaches to computation. Nevertheless, theoretical neuroscience more strongly focuses on the organization and function of complex computational systems, whereas research in quantum computation is largely focused on constructing novel basic computational units. These complimentary approaches to computational systems will strengthen Waterloo's reputation as a top institute for research into all varieties and aspects of computation.

3.2. Graduate Studies Benefits

The Centre will present a unique opportunity to graduate students interested in computational neuroscience because it will be the only such research centre in Canada. In addition to hosting a lecture series, housing top researchers, and attracting other graduate students with similar interest, the Centre will provide a unique graduate diploma in theoretical neuroscience, patterned after the Diploma in Cognitive Science currently on offer. It will not demand the creation of extra courses, but rather rely on approving four courses directly connected to theoretical neuroscience already on offer (see Table 1 for a partial list). Additional courses are periodically available that would also be approved on a case-by-case basis (e.g. PSYCH 707, 714, 727, 747 Behavioural Neuroscience Research Seminars). A separate proposal for the graduate program will be developed over the coming months and will be presented to Senate when complete. Plans are for this program to be in place within the next three years.

Table 1: Selected, currently available courses for a graduate program in theoretical neuroscience

SYDE 758 Simulating Neurobiological Systems	PSYCH 677A Fundamentals of Behavioural Neuroscience
CS 786 Probabilistic Inference and Machine Learning	KIN 616 Neural Control of Human Movement
PSYCH 779A Selected Topics in Cognitive Neuropsychology	AMATH 851 Stability Theory and Applications
CS 787 Computational Vision	AMATH 655 Control Theory
PSYCH 784 Human Neuroanatomy and Neuropathology	KIN 611 Biomechanics of Human Motion
AMATH 751 Advanced Ordinary Differential Equations	

The unique research atmosphere and graduate program will result in an invaluable tool for graduate recruiting in Canada and abroad. Currently, Canadian graduate students, who often express a desire to stay in the country, must go abroad to study theoretical neuroscience. Similarly, for many international students who face increasing

difficulties in entering the United States, the Centre will provide an attractive, world-class research institute in theoretical neuroscience. In addition, an identifiable research commitment and organized centre will be highly visible to those advising undergraduates where to pursue studies in theoretical neuroscience. We believe that these factors, coupled with Waterloo's strong reputation as a technical university will greatly boost the University's ability to reach its goal of doubling graduate student enrolment.

Furthermore, the training that graduate students will receive from faculty members is highly desirable both within and outside academia. Within academia, the wide variety of international funding previously mentioned (section 2) bodes well for the continued growth of the area. As well, there have been more than 24 postdoc and tenure-track positions advertised in 2005 in the area (on the comp-neuro mailing list alone). External to academia, the experience with complex simulation problems, the related computing environments (e.g., high-performance computing, mathematical simulation packages, and parallel algorithms), and the application of a wide variety of mathematical tools (e.g., dynamical systems theory, algebra, control theory, signal processing, information theory) that graduate students will gain are highly valued in both research and development and applications-oriented industries.

3.3. Undergraduate Studies Benefits

While the initial primary focus of the Centre will be on research excellence, the undergraduate population will greatly benefit from its creation. The colloquia, courses, and research opportunities offered by the Centre faculty members will present Waterloo undergraduates with a unique and early exposure to theoretical neuroscience. The Centre will be in a position to strengthen and unify the many neuroscience and biomathematical undergraduate courses currently on offer (including SYDE 556, AM/BIO 382, KIN 201; PSYCH 261, PSYCH 307). As well, it will support the stated goal of the Cognitive Science Diploma to better represent the neurosciences and neural modeling. Once established, the Centre will be in an excellent position to offer options and minors related to theoretical neuroscience for undergraduate students.

4. Current Support for Theoretical Neuroscience at Waterloo

4.1. Faculty

Consistent with the fourth recommendation for the development of the University (CIP, 1997), and as demonstrated by the variety of disciplines represented by the authors of this report, the Centre will be highly interdisciplinary – as is essential for successful work in theoretical neuroscience. At a minimum, faculty members in psychology, mathematics, philosophy, computer science, and engineering are supportive of the establishment of this Centre. A variety of existing research will be brought together within the Centre. As described earlier (section 3.1.1), these departments and faculty members embody internationally recognized excellence at Waterloo on which the Centre will draw. We feel that these researchers will both help seed the Centre, and attract additional excellent faculty to the University to participate in the Centre. A brief description of some of this research follows.

Core Faculty

Sue Ann Campbell, Professor

Dr. Campbell is a member of Dynamical Systems and Mathematical Biology Research Groups of the Department of Applied Mathematics. Her main research interest is in the mathematical modelling of neural systems at the single cell and small network level. Recent work includes using such models to help understand the generation of rhythms in the hippocampus, in collaboration with Professor Frances Skinner of the Toronto Western Research Institute. This work has appeared in highly respected publications including the *Journal of Computational Neuroscience* and the *Journal of Neurophysiology*. Other research focuses on determining the limitations of phase oscillator models and determining the role of time delays in neural models.

Paul Thagard, Professor

Professor Thagard holds a University Research Chair, is a fellow of the Royal Society of Canada, and is cross-appointed to the Departments of Psychology and Computer Science. He has written seven books in philosophy and cognitive science and has numerous articles in top journals including *Cognitive Science*, the *Philosophy of Science*, *Psychological Review* and *Artificial Intelligence*. His recent work has focused on developing biologically realistic computational models of high-level cognition, including decision making, analogy, and explanatory inference. For instance, he has developed a theory of cognitive affective integration in decision making that was implemented in a fully spiking network model. More recently, he has developed an anatomically detailed, large-scale network model which has been applied to understanding human behaviour in economic decision making.

Chris Eliasmith, Associate Professor (Canada Research Chair Nominee)

Professor Eliasmith is the director of the Computational Neuroscience Research Group (CNRG) at Waterloo. This group has numerous publications in top neuroscience journals, including *Neural Computation*, the *Journal of Neuroscience*, *Biological Cybernetics*, and the *Journal of Computational Neuroscience*. The CNRG has constructed uniquely effective and biologically realistic models of the neural systems underlying rat navigation, fish locomotion, and context sensitive human linguistic inference. Currently, the CNRG is also developing models of the dynamics of working memory, and of learning in patients with parietal lobe brain damage resulting in hemineglect. This latter research is being conducted in collaboration with Canada Research Chair (CRC) holder James Danckert. Dr. Eliasmith is co-author of the book *Neural Engineering* for MIT Press. Notably, the wide variety of models produced by the CNRG are based on the general effective methods presented in this book.

Affiliated Faculty

James Danckert, Assistant Professor

Professor Danckert is a Canada Research Chair (Tier II) in Cognitive Neuroscience. Dr. Danckert's research explores the role of parietal cortex in the control of visually guided actions and examines the consequences of injury to this part of the brain. In particular, his work focuses on a disorder known as unilateral neglect in which patients

behave as if one half of their world has ceased to exist. His recent work on this disorder has involved using prismatic lenses that lead to a shift in visual perception in the patient, as a means of attempting to rehabilitate the disorder. Important findings from this work have provided insights into the disorder that have led to dramatic changes in neurocognitive models of right parietal function. Nevertheless, important aspects of the neglect syndrome remain a mystery, including disproportionate effects of prismatic adaptation in patients and dissociations in motor and perceptual skills post-adaptation. In recent collaborations with Professor Eliasmith, Dr. Dankert has been developing a neurocomputational model to address these issues in detail.

Jonathan Fugelsang, Assistant Professor

Dr. Fugelsang's research focuses on how we integrate multiple sources of information when making complex decisions. These decisions may involve analogical, causal, deductive, or inductive reasoning processes. To do this, he uses multiple experimental methodologies (e.g. behavioural, eye tracking, and brain imaging [ERP & fMRI] methodologies). He has published a number of recent papers examining the neuroanatomical correlates of both the perceptual and inferential processes associated with detecting causality in the environment. Recently, he and his colleagues have been extending their analyses of causality to the investigation of biases in scientific, legal, and medical decision making.

Brian Ingalls, Assistant Professor

Professor Ingalls' work involves the application of mathematical tools from systems and control theory to studies of biological systems. This analysis is applied to both intracellular systems (e.g. genetic regulatory networks) and networks of cells, including neuronal networks. Dr. Ingalls' work on sensitivity analysis – a key aspect of computational modelling – has been published in the *Journal of Theoretical Biology* and the *Journal of Physical Chemistry*. Professor Ingalls is an associate editor of IEEE Proceedings Systems Biology and a member of the editorial board of the *International Journal of Applied Mathematical Analysis and Applications*. His work on regulation of cellular activity is funded by NSERC and CIHR.

Mike Dixon, Associate Professor

Professor Dixon is the co-founder of UW's Synaesthesia Research Group, internationally recognized as the strongest and most prolific research consortium studying this condition. Its work has been published in top tier journals such as *Nature*, *Psychological Science*, the *Journal of Cognitive Neuroscience*, *Neurocase*, *Cortex*, and *Cognitive, Affective and Behavioral Neuroscience* and has reached an even wider audience by virtue of the numerous magazines (e.g., *Time*, *Smithsonian*, *APA Monitor*), newspapers, and television shows (e.g., *The Discovery Channel*) that have featured this work. Dixon and colleagues have proposed a reentrant processing model of synaesthesia in which early stage perceptual brain areas involving colour (V4/V8) are influenced by feedback from higher-order brain areas involving grapheme meaning (e.g., the magnitude of the digit 7). More generally, Professor Dixon's research program concerns how meaning influences perception and memory. He has used computational exemplar models of categorization (e.g., *Alcove*) to explain various

object identification disorders such as category specific identification deficits following temporal lobe damage.

4.2. Infrastructure

The most important physical infrastructure for theoretical neuroscience is computational resources for large-scale mathematical simulations. Waterloo is in an excellent position to provide this infrastructure. First, Waterloo is now a major participant in SHARCNET, an inter-university collaboration for supporting large computer clusters in South Western Ontario. SHARCNET has recently received a \$50 million second round of funding from CFI and OIT. Dr. Eliasmith is on the Waterloo board for SHARCNET. Second, Waterloo has a number of internal resources, including supercomputers in MFCF (flexor, monolith, scienide and vdw) and a smaller Beowulf cluster at the CNRG.

4.3. Funding

NSERC, CIHR, and CFI have funded theoretical neuroscience research in the past. Currently, there are no specific programs for theoretical neuroscience at these agencies. However, CIHR has recently begun to fund interdisciplinary work that would be ideally suited to theoreticians and experimentalists (e.g., Collaborative Health Research Projects and Collaborative Research Health Grants). Furthermore, given the international trend to target specific programs at theoretical neuroscience research, this is likely to be a future source of funding at Canadian agencies. As well, there are numerous private funding agencies in the United States (e.g., the McDonnell Foundation, the Sloan Foundation, the Schwartz Foundation) that have targeted theoretical neuroscience for funding. This funding is available to Canadian researchers. Similar, though less targeted, opportunities exist in Canada (e.g., Dr. Eliasmith is funded by Open Text Corp., a private company interested in applications of theoretical neuroscience to natural text understanding).

Most importantly, for both private and public sources, an institutionalized centre in theoretical neuroscience should help Waterloo researchers secure available funding given the demonstrable commitment to this area of research.

5. Requested Resources for the Centre for Theoretical Neuroscience

5.1. Administration

5.1.1. Director

The director of the Centre will be responsible for its general operation, supporting funding applications, organizing hiring committees, and other Centre-wide organizational tasks. We propose that these additional duties be offset by a teaching reduction or appropriate stipend for the director. We recommend that Dr. Eliasmith be appointed as the initial director of the Centre. Future directors will be appointed by a majority vote from core and affiliate members.

5.1.2. Administration

To support the director, faculty members, and graduate students associated with the Centre, we propose that one half-time staff member be provided for the Centre. The

staff member's duties will include organizing the details of colloquia speaker's visits, supporting funding applications, assisting committees, and other administrative tasks.

5.2. Location

We recommend that the graduate student research space affiliated with the Centre be grouped at a single location. As well, we recommend that space be allocated for collaborative research and visiting researchers. The centralizing of the major activities of the Centre will make the University's commitment to this research tangible, and thus help attract top graduate students and faculty. As well, these close quarters will greatly aid the research interactions between graduate students, visiting researchers, and participating faculty members.

Dr. Eliasmith has submitted a proposal to CFI in conjunction with his CRC nominations to address these needs. In addition, this CFI request includes the needed computing infrastructure for the Centre. The suggested location for this space is in the proposed 'Beehive' building between PAS and ML intended to house graduate students. The outcome of this application will be available in October, 2006.

5.3. Faculty Positions

To ensure that the Centre is a world-class institute, we believe that three additional faculty appointments in theoretical neuroscience are required. This includes two already targeted searches in theoretical neuroscience (one in Psychology and one in Applied Math). As a result, we feel one additional position would be beneficial. Providing this level of institutional support will help us attract top talent in the field when hiring, will prove very attractive to graduate students with a wide range of interests, and will provide a critical mass of researchers for being highly visible internationally, as explained in section 3.1.1.

Because theoretical neuroscience is a relatively new field, many of the best researchers are still earlier in their careers. This presents an excellent opportunity for Waterloo to attract the best in the field. As well, it is the reason that we propose to advertise one open position, one assistant/associate level position, and one assistant level position. In informal discussions with several established theoretical neuroscientists, we believe that there are excellent prospects for attracting top-quality researchers at each of these levels.

6. Conclusion

We feel that there is currently a unique opportunity for the University of Waterloo to become a world leader in a rapidly expanding research field. The establishment of the Centre for Theoretical Neuroscience would cement Waterloo's position as a leader in computational research and technological innovation, and help build its reputation as a centre for health-related research. As a result, we believe that creation of the Centre would be an excellent use of the University's resources.

Proposed Five Year Budget for the Center for Theoretical Neuroscience

1. Table of Expenses

Expense	Year 1	Year 2	Year 3	Year 4	Year 5
Colloquium series	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Outreach	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
Conference/ workshop	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000
Computer hardware		\$103,396			
Director stipend	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Research space	\$275,000				
Total:	\$300,000	\$128,396	\$25,000	\$25,000	\$25,000

Description of expenses

Colloquium series: This series will be run by the director with the help of the administrative assistant. It will provide members of the Centre access to state-of-the-art research in theoretical neuroscience.

Outreach: The proposed outreach program is to participate in an annual ‘Waterloo Brain Day’ to be co-sponsored by the Cognitive Science program.

Conference/workshop: The conference or workshop will be organised by the director with assistance of other members and administrative support. The conference will be an intense two-day series of talks and discussions on a recent topic in theoretical neuroscience. The participants will be internationally recognized speakers on the topic of interest. This will expose students, faculty and invitees to each other and stimulate discussion and collaboration.

Computer hardware: This hardware includes workstations for researchers (including students) in the Centre, and collaboration hardware (Smartboard, projector, etc.) for long distance collaboration.

Director stipend: These funds cover the proposed stipend, or teaching release (more funds would need to be allocated, or the appropriate permission obtained) available to the director. If the director refuses the stipend or release the funds will be available for other center expenses.

Research space: These funds are to cover space allocated to the Centre in the building being built by Arts.

2. Table of Income

Income	Year 1	Year 2	Year 3	Year 4	Year 5
Provost	\$25,000	\$25,000	\$25,000		
CFI/OIT CRC Grant	\$275,000	\$103,396			
Member grants				\$5,000	\$5,000
External sources				\$15,000	\$15,000
Internal sources				\$5,000	\$5,000
Total:	\$300,000	\$128,396	\$25,000	\$25,000	\$25,000

Description of income

Provost (secured): The provost has committed \$25,000 per year for the first three years to the Centre (see attached memo).

CFI/ OIT CRC grant (expected): The Canada Research Chair has submitted a CFI proposal that is expected to be funded. It covers \$375,000 of research space (1450 sq ft) and \$103,396 in support of computer and collaboration hardware.

Member grants (expected): These funds consist of approximately \$1,000 from each member's research funding to be used at their discretion to support research dissemination (e.g., colloquia, workshops) to all members of the Centre.

External sources (expected): These are funds to be raised through external governmental grants or private support.

Internal sources (expected): These are funds expected to be provided as needed by departments, Faculty, or University-level administration in support of the Centre.

UNIVERSITY OF WATERLOO
SENATE UNDERGRADUATE COUNCIL
Report to Senate – October 16, 2006

Senate Undergraduate Council met on September 12, 2006 and agreed to forward the following items to Senate for approval and information, as indicated below [*further details may be obtained from the Secretary, ext. 3-3183*].

FOR APPROVAL

ACADEMIC PLAN CHANGES [*effective September 1, 2007*]

Faculty of Science
Computational Science

The Faculty recommends that the requirements for the following plans be revised as below.

Computational Science (Regular and Co-op)

Rationale: The revision of the preamble material has been undertaken to reduce confusion regarding the common core courses. The expanded list of Computer Science courses from which the two upper year CS electives can be chosen is intended both to provide more flexibility in CS content and greater resolution of timetable conflicts involved in acquiring relevant upper year CS electives. Changes to specific plans follow.

Revised Calendar text:

These Academic Plans have a **common** core of mathematics, computer science and science courses **plus two upper year Computer Science electives chosen from a specialized list of CS courses** that is common to all of the specializations. Each Plan has ~~upper year~~ **additionally a number of core** ~~courses specified for particular emphasis that are specific to the particular Plan, plus some~~ **electives**. There are also required upper year electives in computer science. Finally, each Plan has a number of free electives which can be used for either unrelated courses or for further courses in computing or science. **Electives may also be divided into two classes: Specialization Electives that are specific to a particular plan, and Free Electives.**

Continuation in the Plans will require **the maintenance of** an Overall Average of 60%, and a Science Average of 60% ~~and a non-Science average of 60%~~. Failure of more than 2.0 units of core courses **in any given Plan** will result in withdrawal from ~~the plans~~ **that Plan**.

The **Computational Science Core** defines 9.5 lecture units and 1.5 lab units that are common to all plans. ~~In each of the Plans there may be Specialization Core Courses, Specialization Elective Courses and Free Electives.~~ **Each Plan**

contains a set of plan core courses in addition to the common Computational Science Core courses plus a number of Free Electives; further, the four sets of Specialization Plans each contain several Specialization Elective courses.

Computational Science Plans are:
Computational Science (No Specialization)
Computational Science/Biochemistry
Computational Science/Chemistry
Computational Science/Earth Sciences
Computational Science/Physics

The common Core courses include: MATH 114, 127, 128, 227, 228, ENVE 224 or STAT 202, CS 123 or 125*, 126, 230, 234, 370, CHEM 120/120L, 123/123L, EARTH 121/121L, 122/122L, PHYS 121/121L, 122/122L.

~~CS Electives (1.0 unit) from: CS 430, 436, 437, 452, 472, 476.~~

The two upper year CS Electives are chosen from: CS 330, 338, 372, 430, 436, 437, 452, 472, 476.

*CS 125 should be taken by students who have had little or no exposure to programming principles and practice in the Ontario Grade 11 CS course or its equivalent.

Honours Computational Science (No specialization)

Rationale: CHEM 305, EARTH 360 and PHYS 263 have less relevance to these Computational Science plans than do the replacement courses, CHEM 340L, EARTH 123, and PHYS 339. Specifically, CHEM 340L is a new course that provides extensive hands-on experience with computational chemistry program

suites, EARTH 123 is the lead-in course to the EARTH Sciences sequence EARTH 123, 458 and 456; and PHYS 339 is the final member of the Computational Physics sequence PHYS 139, 239, 339.

Core Courses (7.5 course units + 0.25 lab units)

CHEM 209 Introductory Spectroscopy and Structure
CHEM 254 Introductory Chemical Thermodynamics
~~CHEM 305 Atmospheric Chemistry and Physics~~
CHEM 340L Introductory Computational Chemistry Laboratory
CHEM 350 Chemical Kinetics
CHEM 355 Computational Physical Chemistry
CHEM 356 Introductory Quantum Mechanics
CHEM 358 Statistical Thermodynamics
or PHYS 359 Statistical Mechanics

EARTH 123 Introductory Hydrology

EARTH 359 Flow Through Porous Media
~~EARTH 360 Earth Physics and Plate Tectonics~~
EARTH 456 Groundwater Modelling
EARTH 458 Physical Hydrogeology
PHYS 139 Scientific Computer Programming
PHYS 239 Scientific Computation 1
PHYS 252/252L Electricity and Magnetism 1/Lab
~~PHYS 263 Classical Mechanics 1~~
PHYS 339 Scientific Computation 2

Free Electives (3.0 units)

Honours Computational Science/Biochemistry

Rationale: The primary change is an expansion of the list of fourth year Specialization Electives. BIOL 208 has been added because it is a co-requisite course for BIOL 366. The replacement of CHEM 465 by CHEM 340L and the addition of CHEM 465 to the Specialization Electives list is an outgrowth of the recent introduction of CHEM 340L as a new computationally oriented course in Chemistry. CHEM 340L will serve as a prerequisite for CHEM 465 as well as for CHEM 434.

Core Courses (5.0 course units)

CHEM 209 Introductory Spectroscopy and Structure
CHEM 233 Fundamentals of Biochemistry
CHEM 254 Introductory Chemical Thermodynamics
CHEM 264 Organic Chemistry 1
CHEM 265 Organic Chemistry 2
CHEM 331 Metabolism 1
CHEM 340L Introductory Computational Chemistry Laboratory
CHEM 350 Chemical Kinetics
CHEM 355 Computational Physical Chemistry
CHEM 356 Introductory Quantum Mechanics
~~CHEM 465 Molecular Modelling~~

Specialization Electives (3.5 units)

Three of:

CHEM 212 Inorganic Structure and Bonding 1
CHEM 213 Inorganic Structure and Bonding 2
CHEM 220 Introductory Analytical Chemistry
CHEM 221 Multi-Component Analysis
CHEM 310 Transition Element Compounds and Inorganic Materials

CHEM 360 Organic Chemistry 3

Four of:

CHEM 323 Analytical Instrumentation
CHEM 358 Statistical Thermodynamics
CHEM 433 Advanced Biochemistry
CHEM 434 Bioinorganic Chemistry
CHEM 434 Biochemistry and Structure of Molecules
CHEM 434 Molecular Properties of Proteins and Nucleic Acids
CHEM 434 Proteins and Proteonomics
CHEM 434 Advanced Molecular Modeling in Biochemistry
CHEM 452 Chemical Thermodynamics 2
CHEM 465 Molecular Modeling
BIOL 139 Genetics
BIOL 208 Analytical Methods in Molecular Biology
BIOL 366 Introduction to Bioinformatics
BIOL 382 Computer Modelling of Cellular Systems

Free Electives: 2.0 units

Honours Computational Science/Chemistry

Rationale: The removal of CHEM 465 or PHYS 359 from the Specialization Core course list and its replacement by CHEM 340L is a result of the recent creation of CHEM 340L in the Department of Chemistry. As CHEM 340L will serve as a prerequisite to CHEM 465, it is appropriate to add CHEM 465 to the Specialization Electives list. The other additions reflect the introduction of new relevant courses at the fourth year level, and PHYS 339 introduces another aspect of Computational Science

(namely, Monte Carlo and molecular dynamics modeling of bulk systems) to the roster of applicable courses.

Core Courses (4.0 course units)

CHEM 209 Introductory Spectroscopy and Structure
CHEM 254 Introductory Chemical Thermodynamics
CHEM 350 Chemical Kinetics
CHEM 355 Computational Physical Chemistry
CHEM 356 Introductory Quantum Mechanics
CHEM 358 Statistical Thermodynamics
~~CHEM 465 Molecular Modelling~~
or ~~PHYS 359 Statistical Mechanics~~
PHYS 139 Scientific Computer Programming
CHEM 340L Introductory Computational Chemistry Laboratory

Specialization Electives (4.0 units)

Two of the two course sequences:

CHEM 212 and 213 Inorganic Structure and Bonding 1 and 2

CHEM 220 and 221 Introductory Analytical Chem. & Multi-component Analysis
CHEM 264 and 265 Organic Chemistry 1 and 2

Four of:

CHEM 323 Analytical Instrumentation
CHEM 305 Atmospheric Chemistry and Physics
CHEM 310 Transition Element Compounds and Inorganic Materials
CHEM 360 Organic Chemistry 3
CHEM 452 ~~Intermediate~~ **Quantum Mechanics in Chemistry**
CHEM 452 Chemical Thermodynamics 2
CHEM 452 Topics in Computational Chemistry
CHEM 452 Surface Science and Nanotechnology
CHEM 465 Molecular Modeling
PHYS 339 Scientific Computation 2

Free Electives (2.5 units)

Honours Computational Science/Earth Sciences

Rationale: The Specialization Electives list has been expanded in order to allow students greater flexibility, both to ease timetabling problems and to include some of the prerequisites for upper year specialization electives so that students will not lose free elective choices. EARTH 123L was removed due to an unsolvable scheduling conflict and isn't an integral part of the program.

Core Courses (5.50 course units + 0.25 lab units)

~~EARTH 123/123L~~ Introductory Hydrology Lab
EARTH 221 Geochemistry 1
EARTH 235 Stratigraphy and Earth History
EARTH 342 Applied Geomorphology
EARTH 359 Flow Through Porous Media
EARTH 421 Geochemistry 2
EARTH 456 Groundwater Modelling
EARTH 458 Physical Hydrogeology
EARTH 459 Chemical Hydrogeology
PHYS 139 Scientific Computer Programming
ENVE 214 Fluid Mechanics and Thermal Sciences

Specialization Electives (2.5 units)

Five of:

GEOG 255 Data Management & Analysis using Geographic Info Systems
EARTH 260 Applied Geophysics 1
EARTH 231 Mineralogy
EARTH 232 Petrography
EARTH 331 Igneous Petrology
EARTH 333 Introductory Sedimentology
EARTH 358 Environmental Geology for Earth Sciences
EARTH 360 Earth Physics and Plate Tectonics
EARTH 437 Rock Mechanics
EARTH 438 Engineering Geology
EARTH 460 Applied Geophysics 2
EARTH 461 Applied Geophysics 3
CIVE 353 Geotechnical Engineering 1
CIVE 381 Hydraulics

Free Electives (2.5 units)

Earth Sciences

Rationale: A few subject areas were identified where students do not receive sufficient grounding and consequently, several courses were added to the plan. Other courses were deemed to provide helpful information to prepare students in several fields, but they were not considered sufficiently critical to warrant listing them as requirements so they have been changed from required to recommended.

Honours Earth Sciences (Hydrogeology Specialization) (Regular and Co-operative)

Year One

CHEM 120/120L Physical and Chemical Properties of Matter/Laboratory
CHEM 123/123L Chemical Reactions, Equilibria and Kinetics/Laboratory
EARTH 121/121L The Planet We Live On/Laboratory
EARTH 122/122L The Planet We Live Off/Laboratory
EARTH 123/123L Introductory Hydrology
MATH 127/128 Calculus 1/2
PHYS 121/121L Mechanics, Wave Motion and Heat 1/ Laboratory
PHYS 122/122L Mechanics, Wave Motion and Heat 2/ Laboratory
One elective (0.5 unit)

Year Two

EARTH 221 Geochemistry 1
EARTH 231 Mineralogy
EARTH 232 Petrography
EARTH 235 Stratigraphy and Earth History
EARTH 238 Introductory Structural Geology
EARTH 260 Applied Geophysics 1
MATH 125 Linear Algebra
MATH 218 Differential Equations for Engineers or MATH 228 Differential Equations for Physics and Chemistry
Arts Core (0.5 unit)
One Two-electives (0.5 +.5 unit)

Year Three

~~EARTH 332 Metamorphic Petrology~~
EARTH 333 Introductory Sedimentology
EARTH 281 Geological Impacts on Human Health or EARTH 358 Environmental Geology for Earth Scientists
EARTH 342 Applied Geomorphology
EARTH 390 Methods in Geological Mapping
EARTH 421 Geochemistry 2
EARTH 458 Physical Hydrogeology
~~ENVS 201 Introduction to Environmental Planning Law or BIOL 140 Fundamentals of Microbiology~~

GEOG 255 Data Management and Analysis using GIS
CIVE 353 Geotechnical Engineering 1
STAT 202 Introductory Statistics for Scientists
Two One electives (1.0 +.5 unit)

Year Four

EARTH 359 Flow Through Porous Media
EARTH 436 A/B Honours Thesis
EARTH 440 Quaternary Geology
EARTH 456 Groundwater Modelling
EARTH 459 Chemical Hydrogeology
Two of:
EARTH 331 Igneous Petrology
EARTH 332 Metamorphic Petrology
EARTH 361 Introduction to Atmospheric Sciences
EARTH 433 Applied Sedimentology
EARTH 460 Applied Geophysics 2
EARTH 461 Applied Geophysics 3
EARTH 471 Mineral Deposits
~~GEOG 355 Spatial Data and Spatial Data Bases or~~
~~GEOG 376 Environmental Remote Sensing~~
~~BIOL 447 Environmental Microbiology or~~
~~approved alternative~~
Two electives (1.0 unit)

Recommended Electives

CS 123 Developing Programming Principles or CS 125 Introduction to Programming Principles
ENVS 201 Introduction to Environmental Planning Law
BIOL 140 Fundamentals of Microbiology
BIOL 447 Environmental Microbiology
GEOG 355 Spatial Data and Spatial Data Bases
GEOG 376 Environmental Remote Sensing
EARTH 281 Geological Impacts on Human Health or
EARTH 358 Environmental Geology for Earth Scientists

Science/Psychology (Reg & Co-op)

Rationale: Bullet 3 in number 3 has been removed because students may find it beneficial to have upper year Science lab units in order to pursue professional programs or graduate studies; the new note number 4 highlights this information. The current number 4 has been removed because students in First Year, preparing to apply to enter Psychology already take a total of 6.0 lab units; adding two further BIOL labs in first year will make those requirements onerous and will reduce the number of unspecified electives students may want to take later in the program.

Revised Calendar text:

In order to graduate in Honours Psychology, students must successfully complete 21.0 units of which at least 19.0 must be lecture units. The units must include:

1. The Year-One academic plan as listed in the Recommended Course Sequence below.
2. The Psychology course requirements (9.0 units) as given for the Honours Psychology BA. See the Faculty of Arts.
3. A total of 5.0 Science units over Years Two to Four including:
 - o no more than 2.0 "SCI"-labelled units.
 - o at least 2.0 units at the 300- or 400-level, exclusive of "SCI"-labelled units.
 - ~~o no more than 1.0 upper year Science lab units.~~
 - o no more than 1.5 Science faculty units at the first year level.
4. ~~Must take all labs associated with Biology, Chemistry, Earth Sciences and Physics courses.~~
4. **Students considering applying to professional or graduate programs should ensure that they have the appropriate first and upper year labs associated with courses needed for admission.**

FOR INFORMATION

Curricular Modifications

On behalf of Senate, Council approved several changes to academic plans, new courses, course changes and course inactivations for: Professional Development (PD2 – Critical Reflection and Report Writing; PD3 – Communication), and the Faculties of Engineering (Nanotechnology Engineering), Environmental Studies (Professional Development) and Science (Biology; Chemistry; Earth Sciences).

/kjj
September 19, 2006

Gail Cuthbert Brandt
Chair

UNIVERSITY OF WATERLOO
SENATE UNDERGRADUATE COUNCIL
Report to Senate – October 16, 2006

Senate Undergraduate Council will meet on October 10 to review the 2008 Undergraduate Admission Requirements. Following this review, the requirements will be recommended to Senate for consideration at its October 16 meeting.

The earlier than normal consideration was prompted by profound changes in the Grade 12 mathematics curriculum (high school students will benefit from knowing university admission requirements when they select courses for Grade 12 in early 2007). In order to support the high school community and assist students and their parents, the Ontario Universities' Council on Admissions (OUCA) has committed to a coordinated announcement of all university admission requirements in early November.

/kjj
September 12, 2006

Gail Cuthbert Brandt
Chair