McMaster University

School of Graduate Studies Calendar 2012-2013

(REVISED AS OF AUGUST 31, 2012)

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(Revised as of August 31, 2012)

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McMaster University

Produced by the School of Graduate Studies, Medy Espiritu, Assistant Secretary and SynApps System Administrator

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Applying to Graduate Studies at McMaster University

Consult the department/program website and listing in the Graduate Calendar. A separate application for financial assistance is not required as all applicants are automatically considered for financial support. There is an application fee of $100. Applications will be considered at any time, but graduate programs commence in September, January, and May.

DIRECTORY FOR INFORMATION AND CORRESPONDENCE

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Ext. 23679	General Inquiries
Ext. 24205	Associate Vice-President and Dean of Graduate Studies
Ext. 23681	Special Advisor to the AVP and Dean of Graduate Studies
TBD	Associate Dean (Business)
Ext. 26489	Associate Dean (Engineering)
Ext. 22982	Associate Dean (Health Sciences)
TBD	Associate Dean (Humanities)
Ext. 23682	Associate Dean (Science)
TBD	Associate Dean (Social Sciences)
Ext. 24623	Assistant Dean, Graduate Student Life and Research Training
Ext. 23684	Associate Graduate Registrar
Ext. 24341	Admissions
Ext. 27748	Data Analysis
Ext. 24204	Graduate Committees, Online Graduate Application (SynApps), Graduate Calendar
Ext. 24258/23686	Payroll, Financial Awards
Ext. 24234	Scholarships
Ext. 24267/23685	Student Records
Ext. 23680	Theses, Ph.D. Orals

Release from Liability

McMaster University reserves the right to change or revise information contained in this Calendar, including the alteration of fee structures, schedules, and/or courses. The University reserves the right to limit enrolment in, or admission to, any course or program at any level.

The University will not be liable for any interruption in, or cancellation of, any academic activities as set forth in this Calendar and related information where such interruption is caused by fire, strike, lock-out, inability to procure materials or trades, restrictive laws or governmental regulations, actions taken by the faculty, staff, or students of the University or by others, civil unrest or disobedience, or any other cause of any kind beyond the reasonable control of the University.

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OFFICERS OF THE ADMINISTRATION

Chancellor: Lynton R. Wilson, O.C., B.A., M.A., D.h.c. (Hon.), LL.D. (Hon.), D.C.L. (Hon.), LL.D. (Hon.), LL.D. (Hon.), LL.D. (Hon.)

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Associate Vice-President (Health Sciences, International Health): Andrea Baumann, B.Sc.N.,M.Sc.N., Ph.D., R.N.

Associate Vice-President (International Affairs): M.W. Luke Chan, B.Sc., M.A., Ph.D.

Associate Vice-President (Institutional Research and Analysis): TBD

Associate Vice-President (Research): Fiona E. McNeill, B.Sc., Ph.D.

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Dean of Engineering: (Acting) Arthur Heidebrecht, M.S., Ph.D., P.Eng., Prof. Emeritus

Dean of Humanities: Suzanne Crosta, B.A., M.A., Ph.D.

Dean of Science: John Capone, B.Sc., Ph.D.

Dean of Social Sciences: Charlotte Yates, B.A., M.A., Ph.D.

Special Advisor to the AVP and Dean of Graduate Studies: Donald Goellnicht, B.A., M.A., Ph.D.

Associate Deans of Graduate Studies:
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Catherine Hayward. M.D., Ph.D., F.R.C.P.C.
Bonny Ibhawoh, B.A., M.A., Ph.D.
Tony Porter, B.A., M.A., Ph.D.
Heather Sheardown, B. Eng., Ph.D.

Assistant Dean, Graduate Student Life and Research Training: Peter Self

Associate Registrar and Graduate Secretary: Stephanie Baschiera, B.A. Hons., M.L.I.S.

University Registrar: Melissa Pool

University Librarian: (Acting) Vivian Lewis

Secretary of the Board of Governors and the Senate: W. Bruce Frank, B.A., M.A., Ph.D.

Principal of McMaster Divinity College: Stanley E. Porter, B.A., M.A., Ph.D.

THE ASSOCIATE VICE-PRESIDENT AND DEAN’S MESSAGE

McMaster University is known world-wide for innovation in education and research, and the students who are enrolled in the School of Graduate Studies’ programs are the engine that drives that reputation.

We offer Master’s and Ph.D. level programs in fields spanning the Humanities and Social Sciences, the Natural Sciences and Engineering, Business, and the Health Sciences. McMaster also has a long tradition of interaction across disciplinary boundaries, and students and faculty are increasingly finding homes for research and scholarship in our interdisciplinary programs.

The School of Graduate Studies provides leadership for all of these graduate programs, and is responsible for maintaining and improving the standards of graduate scholarship and research at McMaster, and enhancing McMaster’s national and international reputation as a leader in graduate studies and research training. The School also leads strategic planning for graduate expansion and the development of new graduate programs and interdisciplinary programs, works to promote a holistic view of the graduate student experience at McMaster, and will play an increasing role in supporting knowledge translation, professional development, and research training at all levels.

I am honoured to be leading the School of Graduate Studies at this exciting time in the School’s history, as we renew the School’s mission: to provide the best education and training for our students, and to inspire the next generation of researchers, scholars, and leaders.

ALLISON B. SEKULER
Associate Vice-President and Dean (Graduate Studies)

ALLISON B. SEKULER

Dr. Allison Sekuler received her B.A. in Mathematics and Psychology degree from Pomona College in 1986. She completed her Ph.D. at the University of California, Berkeley. She is currently professor in the department of Psychology, Neuroscience and Behaviour.

Dr. Sekuler is a Canada Research Chair in Cognitive Neuroscience and focuses on vision science and aging in her research. She was McMaster’s first Associate Vice-President (Research), and has served as Acting Vice-President for Research and International Affairs, Acting Associate Dean, Research and External Relations, Faculty of Science, and Associate Chair (Graduate Studies), Department of Psychology, Neuroscience and Behaviour. As Associate Vice-President (Research), she crafted new programs for post-doctoral fellows, spearheaded the development of new undergraduate research initiatives, and facilitated interdisciplinary research programs, including innovative interactions bridging researchers across the arts, humanities, sciences, and engineering. She is also deeply committed to knowledge translation, and helped found several high profile public outreach programs at McMaster, such as Science in the City and the MACafé Scientifique.

Dr. Sekuler has won numerous national and international awards for research, teaching and leadership, while graduating and supervising Ph.D., Master’s, undergraduate students, and post-doctoral fellows, and has served on and chaired provincial, federal and international grant review panels and external boards related both to her research and to McMaster’s mission.

DONALD GOELLNICHT

Donald Goellnicht received his B.A. in English from Queen's University in 1975 and his M.A. and Ph.D. from McMaster University in 1976 and 1981. He taught at Henan University in Kaifeng, China in 1981-82 and then helda SSHRC Postdoctoral Fellowship before joining the Department of English at McMaster in 1984.

Dr. Goellnicht served as Chair of Graduate Studies in the Department of English from 1991 to 1995 and then as Department Chair from 1995 to 2004, during which time the Department undertook significant curricular development leading to the introduction of new B.A. and M.A. programs in Cultural Studies and Critical Theory that complement the B.A., M.A., and Ph.D. programs in English. He was Acting Associate Dean of Graduate Studies in 2006 and returned as Acting Chair of the Department in 2006-2007.

Dr. Goellnicht has served on the McMaster Senate and Board of Governors, as President of the Canadian Association of Chairs of English, and as Chair of the Asian American Literature Division of the Modern Language Association of America. In 2011, he held a Visiting Research Fellowship at the Institute for European and American Studies at Academia Sinica in Taiwan. He is currently Professor in the Department of English and Cultural Studies and a member of the University Planning Committee. To date, he has supervised eleven Ph.D. and twenty-one M.A. students.

Dr. Goellnicht has been appointed Special Advisor to the Associate Vice-President and Dean of the School of Graduate Studies for the 2012-2013 academic year.

Although originally trained as a scholar of British Romantic literature, Dr. Goellnicht's research and teaching focus has shifted over the years to Asian American and Asian Canadian literature, African American literature, and critical race studies. He is particularly interested in issues of race and ethnicity, gender and sexuality, diaspora and transnationalism in these literary and cultural traditions.

NARESH AGARWAL
Acting Associate Dean of Graduate Studies and Research – Faculty of Business

Dr. Naresh Agarwal received his B.A. (Hons.) in Economics from Delhi University, M.A. in Economics from the Delhi School of Economics, and Ph.D. in Industrial Relations from the University of Minnesota. His academic and professional interests lie in compensation/reward systems, human resources planning and management, and employment and pay equity issues. He has taught graduate courses, supervised doctoral students, and published extensively in these areas.

Dr. Agarwal has served as Area Chair, Acting Director of Ph.D. Program, and Associate Dean (Academic) in the School of Business. He has also served as Chair of the University Faculty Grievance Panel, Chair of the Senate Board for Student Appeals, and the first University Commissioner for Disclosure of Information and Privacy Protection. Externally, Dr. Agarwal has served as Chair of the Ontario Public Service Grievance Board, Board of Inquiry under the Ontario Human Rights Code, and Vice President of the Shastri Indo-Canadian Institute. He has also served on a number of professional bodies, including the Board of Examiners of the Human Resources Professionals Association and the Discipline Committee, the Application Committee, and the Public Accounting Licensing Board of the Institute of Chartered Accountants of Ontario.

Dr. Agarwal has been appointed as Acting Associate Dean of Graduate Studies and Research for the DeGroote School of Business for a one year term. He has the overall responsibility for the administration and development of graduate programs and furthering research activities in the Faculty of Business. As Acting Associate Dean, he chairs the Faculty's Graduate Curriculum and Policy Committee, Graduate Admissions Committee, and Research Committee.

CATHERINE HAYWARD
Associate Dean of Graduate Studies – Faculty of Health Sciences

Dr. Catherine Hayward trained in Medical Laboratory Technology at Dawson College and received her B.Sc. and M.D. from the University of Western Ontario in 1980 and 1984. She trained in Internal Medicine and Hematology at the University of Toronto and in Transfusion Medicine at McMaster University. In 1995, she received her Ph.D. in Medical Sciences from McMaster University, and the Governor General of Canada Gold Medal for her doctoral thesis. She is the recipient of the Gold Medal in Medicine from the Royal College of Physicians and Surgeons of Canada, a Premier's Research Excellence Award, a Canada Research Chair in Molecular Haemostasis, among others. Dr. Hayward joined McMaster University Faculty in 1995 and is a Professor of Pathology and Molecular Medicine, and Medicine. She is a Hematologist at Hamilton Health Sciences and St. Joseph's Healthcare. She runs a clinic focused on bleeding problems and serves as Head of Coagulation for the Hamilton Regional Laboratory Medicine Program.

Dr. Hayward has long standing interests in education and research in Health Sciences. She served on the Graduate Policy and Curriculum Committee (Health Sciences) and she was Program Director for the McMaster University Adult Hematology Program. She established the Clinician Investigator Training Program at McMaster University as the first Program Director. She is Chair of the Clinician Investigator Program Advisory Committee for the Royal College of Physician and Surgeons of Canada, and is leading initiatives to assess and improve clinician investigator training in Canada. She has served as Scientific Officer and Member of numerous peer review panels for granting agencies. She is the Immediate Past President of the North American Specialized Coagulation Laboratory Association, Co-Chair of the Platelet Physiology Committee for the International Society on Thrombosis and Hemostasis and Executive Secretary of the International Society of Laboratory Hematology. She also serves on Editorial and Advisory boards for journals in her field.

Dr. Hayward's research interests span bench to bedside investigations on bleeding disorders and the molecular mechanisms of hemostasis. Dr. Hayward has held continuous, peer reviewed grant funding and external career awards since her recruitment to Faculty. She is the recipient of a Heart and Stroke Foundation of Ontario Career Investigator Award, and operating grant support from the Canadian Institutes of Health Research, the Heart and Stroke Foundation of Ontario and the Canadian Hemophilia Society. Her research team includes M.Sc. and Ph.D. students in Medical Sciences and postdoctoral fellows.

Dr. Hayward has been appointed Associate Dean of Graduate Studies for the Faculty of Health Sciences for a five-year term. As Associate Dean, she has primary responsibility for furthering McMaster goals for graduate education and research in health sciences, and provides the leadership and coordination of all activities related to these goals. She is also a member of Graduate Council and its Executive.

BONNY IBHAWOH
Associate Dean of Graduate Studies and Research – Faculty of Humanities

Bonny Ibhawoh has received his M.A from the University of Ibadan and Ph.D. from Dalhousie University. He teaches in the Department of History, the Institute on Globalization and the Centre for Peace Studies where he was previously the Director. His research interests include legal history, international human rights, and peace and conflict studies. He has taught in Universities in Africa, the United Kingdom and the United States. He also has extensive experience working with international research and policy think tanks. He was previously a Human Rights Fellow at the Carnegie Council for Ethics and International Affairs, New York; a Research Fellow at the Danish Institute for Human Rights, Copenhagen and Associate Member of the Centre for African Studies, School of Oriental and African Studies (SOAS), University of London.

At McMaster, Dr. Ibhawoh has served on several university committees including Departmental and Faculty Executive and Tenure Committees, Scholarships Committee of Graduate Council, the Provost's Taskforce on Interdisciplinary Studies and the Board-Senate Hearing Panel for Sexual Harassment and Anti-Discrimination. He has also served on Canadian and international grant review panels and as consultant on human rights to public, non-profit and corporate organizations.

As a believer in the value and utility of public scholarship, Dr. Ibhawoh strives to disseminate his research findings on human rights and peace/conflict studies beyond the academic community through monographs and journal publications but also through policy papers, project reports, documentary films and media commentaries.

Dr. Ibhawoh has been appointed Associate Dean of Graduate Studies and Research for the Faculty of Humanities for a five-year term. As Associate Dean, his responsibilities include assisting with the development, maintenance, and improvement of graduate programs in the Faculty of Humanities and the University at large.

TONY PORTER
Associate Dean of Graduate Studies and Research – Faculty of Social Sciences

Dr. Tony Porter received his B.A. in Political Science from McGill University in 1976, and his M.A. and Ph.D. from Carleton University in 1987 and 1992. He joined the Department of Political Science at McMaster in 1992. He served as Department Chair from 2002 to 2007. He has been a member of the Boards of Directors of the Canadian Political Science Association (2005-2007) and the Canadian Federation of Humanities and Social Sciences (2010-2012) and has served on the McMaster Research Ethics Board (2008-2011), McMaster's Arts Research Board (2008-2011), and the Social Sciences and Humanities Research Council of Canada Ad-Hoc Committee on Research Ethics (2009-2010).

Dr. Porter has been appointed Associate Dean of Graduate Studies and Research, Faculty of Social Sciences, for a five year term. In this position he has primary responsibility within the Faculty of Social Sciences for furthering McMaster's goals regarding graduate education, research, and research training, and for providing leadership and coordination of all activities related to those goals.

Tony Porter conducts research on business regulation and global governance, including especially financial regulation, private and hybrid public/private rulemaking, the organizational effects in governance of technologies, and safety and environmental standards in the automobile industry. He is currently engaged in SSHRC-funded research on the transnational regulatory response to the global financial crisis that began in 2007.

HEATHER SHEARDOWN
Associate Dean of Graduate Studies – Faculty of Engineering

Heather Sheardown received her B. Eng. in Chemical Engineering from McMaster in 1989 and her Ph.D. from the University of Toronto in 1995. She did a post doctoral fellowship at McMaster from 1994-1996 and taught at the University of Ottawa from 1996 to 1998 before returning to the Department of Chemical Engineering at McMaster in 1998. She is cross-appointed to the Department of Pathology and Molecular Medicine and is a member of the School of Biomedical Engineering and holds an Adjunct Appointment to the School of Optometry at the University of Waterloo.

Dr. Sheardown has been appointed Associate Dean of Graduate Studies for the Faculty of Engineering for a five-year term. As Associate Dean, she is responsible for admissions and allocation of graduate scholarships as well as for working with the Faculty of Engineering and the School of Graduate Studies on graduate student issues including recruiting and the development of new programs. She chairs the Faculty's Graduate Admissions and Study Committee and the Graduate Curriculum and Policy Committee and sits on Graduate Council and its Executive Committee.

Dr. Sheardown is an active researcher in the field of ophthalmic biomaterials, with more than 70 publications and 8 patents pending for her work in this area. She has graduated 4 Ph.D. students and 16 M.A.Sc. students to date. She is currently the Scientific Director of the 20/20 NSERC Ophthalmic Materials Network which focuses on the development of new materials and drug delivery systems for the treatment of various eye diseases.

Associate Dean of Graduate Studies and Research – Faculty of Science - TBD

SESSIONAL DATES 2012-2013

DEADLINE DATES FOR GRADUATE PROGRAMS	**FALL TERM (1)** Sept.-Dec. 2012 (w & x) w = Sept.-Oct. 2012 x = Nov.-Dec. 2012	**WINTER TERM (2)** Jan.-April 2013 (y & z) y = Jan.-Feb. 2013 z = March-April 2013	**SUMMER TERM (S)** May-August 2013
On-Time Registration*(except MBA)*	Thursday, July 12 to Friday, August 3	Thursday, December 6 toThursday, December 20	Thursday, April 11 to Thursday, April 25
Late Registration	Saturday, August 4 to Monday, September 10	Friday, December 21 to Monday, January 7	Friday, April 26 to Monday, May 6
Final Dates to Add Courses:*(except MBA)* Full Courses Half Courses or Quarter Courses (1w or 2y) Quarter Courses (1x or 2z)	 Friday, September 28 Friday, September 28 Friday, November 2	 Friday, January 25 Friday, March 1	 Friday, May 24
Final Dates to Delete Courses: *(except MBA)* (**Note:** All courses on a student's record after these dates will require a grade.) Full Courses Half Courses Quarter Courses (1w or 2y) Quarter Courses (1x or 2z)	 Friday, January 11 Friday, October 12 Friday, September 28 Friday, November 9	 Friday, February 8 Friday, January 25 Friday, March 15	 Friday, June 14
Final Dates to Submit Grades: Full Courses Half Courses Quarter Courses (1w or 2y) Quarter Courses (1x or 2z)	 Monday, January 7 Friday, November 2 Monday, January 7	 Monday, April 29 Monday, April 29 Friday, March 1 Monday, April 29	 Friday, August 30
Final Date to Submit Results of Incomplete (INC) Grades for Previous Term with Permission of Associate Dean	Friday, March 15	Friday, July 12	Friday, November 15
MBA PROGRAM On-Time Registration Drop and Add Dates	 Thursday, August 2 to Wednesday, August 22 Tuesday, Sept. 4 to Sunday, Sept. 23	 Monday, October 22 to Sunday, November 18 Sunday, Dec. 9 to Sunday, Jan. 20	 Monday, March 4 to Sunday, March 31 Monday, April 8 to Sunday, May 12
THESES Final Date to Submit Ph.D. Theses to Graduate Studies (Prior to Defense) Final Date to Submit Master's Theses to Departments (Prior to Defense) Final Date to File Theses with Graduate Studies and Complete Degree Requirements - Faculty of Health Sciences - All Other Faculties	**FALL 2012** Friday, July 20 Friday, August 17 Wednesday, Sept. 26 Wednesday, Sept. 26	**SPRING 2013** Tuesday, Feb. 5 *(Health Sci.)* Tuesday, Feb. 26*(All others)* Friday, March 15 Weds., April 3*(except Nursing)* Wednesday, April 24 *(including Nursing)*	**FALL 2013** Friday, July 19 Friday, August 16 Wednesday, Sept. 25 Wednesday, Sept. 25
CONVOCATION DATES Fall – All Faculties Spring – Faculty of Health Sciences *(except nursing)* Spring – All Other Faculties *(including Nursing)*	**FALL 2012** Friday, November 16	**SPRING 2013** Friday, May 17 Monday, June 10 to Friday, June 14	**FALL 2013** TBD

1. GRADUATE STUDY AT McMASTER UNIVERSITY

When McMaster moved to its current graduate organization, the aims of graduate work were described as "the highest development of the powers of reasoning, judgment, and evaluation in intellectual concerns; specialized training in professional skills; initiation into research or scholarly work and development of a capacity for its successful and independent pursuit; the fruitful pursuit of research and scholarly work". This description remains as valid today as it was then.

Research is central to graduate work, and McMaster's strong research orientation has a pronounced effect on the character of its graduate programs. The numerous research achievements of McMaster faculty members have been recognized by grants, prizes, medals, and fellowships in academic societies. Such distinctions attest to the qualifications and dedication of faculty members in developing and disseminating knowledge. The education that McMaster faculty provide is valuable not only for the graduate student's career but also for the student's development as a person.

1.1 Programs of Study

McMaster University offers graduate programs that lead to one of the following degrees:

Master of Arts in Anthropology, Classics, Communication and New Media, Cultural Studies and Critical Theory, Economics, Economic Policy, English, French, Gender Studies and Feminist Research, Geography, Globalization, Health and Aging, History, Philosophy, Political Science, Religious Studies, Sociology, and Work and Society;

Master of Business Administration;

Master of Applied Science in Biomedical Engineering, Chemical Engineering, Civil Engineering, Computational Engineering and Science, Electrical and Computer Engineering, Engineering Physics, Materials Engineering, Mechanical Engineering, Software Engineering;

Master of Communications Management;

Master of Engineering in Chemical Engineering, Civil Engineering, Computational Engineering and Science, Computer Science, ADMI Design and Manufacturing, Electrical and Biomedical Engineering, Electrical and Computer Engineering, Engineering Physics, Manufacturing Engineering, Mechatronics, Nuclear Engineering (UNENE), Software Engineering; Software Engineering and Virtual Systems Design;

Master of Engineering Design;

Master of Engineering Entrepreneurship and Innovation;

Master of Engineering and Public Policy;

Master of Health Management;

Master of Science in Biochemistry, Biology, Chemical Biology, Chemistry, Cognitive Science of Language, Computational Engineering and Science, Computer Science, Earth and Environmental Sciences, eHealth, Geography, Global Health, Health and Radiation Physics, Health Research Methodology, Health Science Education, Kinesiology, Materials Science, Mathematics, Medical Sciences (Blood and Vasculature; Cancer and Genetics; Infection and Immunity; Metabolism and Nutrition; Neurosciences and Behavioural Sciences; Physiology/Pharmacology), Neuroscience, Nursing, Occupational Therapy, Physics and Astronomy, Physiotherapy, Psychology, Radiation Sciences, Rehabilitation Science, and Statistics;

Master of Social Work;

Master of Technology Entrepreneurship and Innovation;

MD/Ph.D. in Medicine and Biochemistry; Medicine and Medical Sciences.

Doctor of Philosophy in Anthropology, Biochemistry, Biology, Biomedical Engineering, Business Administration (Finance; Human Resources; Information Systems; Management Science), Chemical Biology, Chemical Engineering, Chemistry, Civil Engineering, Classics, Cognitive Science of Language, Computational Engineering and Science, Computer Science, Earth and Environmental Sciences, Economics, Electrical and Computer Engineering, Engineering Physics, English, French, Geography, Health Policy, Health Research Methodology, History, Kinesiology, Materials Engineering, Materials Science, Mathematics, Mechanical Engineering, Medical Sciences (Blood and Vasculature; Cancer and Genetics; Infection and Immunity; Metabolism and Nutrition; Physiology/Phamacology), Neuroscience, Nursing, Philosophy, Physics and Astronomy, Political Science, Psychology, Radiation Sciences, Rehabilitation Science, Religious Studies, Social Work, Sociology, and Software Engineering.

1.2 Responsibilities to Graduate Students

The principal responsibilities that McMaster University has for the academic endeavours of its graduate students are shared by the School of Graduate Studies, the Faculty, the Department, the Supervisory Committee, and the Faculty Advisor. The following summarizes the responsibilities of each of these bodies.

1.2.1 The School of Graduate Studies

The name "School of Graduate Studies" refers to the Associate Vice-President & Dean and Associate Deans of Graduate Studies, the Graduate Council, and the registrarial duties associated with graduate administration.

The Associate Vice-President & Dean of Graduate Studies provides leadership in maintaining and improving the standards of graduate scholarship in the University. The responsibilities include: being the School's voice in graduate matters concerning research and its funding, scholarships and assistantships, the development of graduate programs and policy statements affecting graduate work; being the designatedchair of Ph.D. dissertation oral examinations; approving the nomination of external examiners for Ph.D. theses and receiving the examiners' reports. The Associate Deans of Graduate Studies routinely act as the Dean's delegates. They recommend revision or development of regulations or policies affecting graduate work, refer matters of policy and curriculum to the Graduate Curriculum and Policy Committees, and deal with student appeals. In addition to acting on behalf of the Graduate Admissions and Study Committees as described below, the responsibilities of the Associate Deans include the awarding of McMaster Graduate Scholarships by acting on recommendations received from departments offering graduate work.

The Associate Graduate Registrar and Secretary of the School administers the academic affairs of students enrolled in the School of Graduate Studies. This responsibility includes: registering graduate students; assessing tuition fees; maintaining records and files for applicants and new or in-course students; arranging Ph.D. oral examinations; ranking candidates for competitive scholarships, and allocating scholarship funds for graduate programs.

1.2.2 The Faculty

For each Faculty there is a Graduate Admissions and Study Committee, which is chaired by an Associate Dean of the School of Graduate Studies. This committee, or the Associate Dean on its behalf, is responsible for matters concerning both incoming and in-course graduate students. More specifically, these responsibilities include:

- determining the admissibility of applicants;
- receiving reports on the progress of students and making decisions thereon, including recommendations to require a student to withdraw;
- ensuring that program requirements have been met prior to the awarding of degrees; approving off-campus courses and leaves of absence; and
- deciding on applications from students for special consideration with respect to academic regulations.

In all of these matters, the Committee or the Associate Dean acts on recommendations made by departments.

1.2.3 The Department (or Graduate Program)

Typically, many of the duties of the Department in regard to graduate students are carried out by the Department Chair and the Graduate Advisor (in some programs these are referred to as Graduate Coordinators or Area Coordinators) for the Department. For purposes of graduate studies policies stated in sections 1 through 6 of the Graduate Calendar, all reference to

Department Chair shall mean, in the graduate programs of the Faculty of Health Sciences, Program Coordinators or appropriate Assistant Dean. The departmental duties include making recommendations to the Graduate Admissions and Study Committee of the Faculty as noted above. The Department is responsible for matters such as:

- ensuring that every student has, at all times, a faculty advisor or a properly constituted supervisory committee;
- reviewing annually each student's academic progress and reporting thereon;
- conducting comprehensive examinations and language examinations, when these are required;
- preparing and distributing guidelines and departmental regulations for supervisors and students;
- ensuring that each student is properly trained in all safety practices, guidelines, and policies for the use of any resources required in carrying out their work, where appropriate.

In performing those duties that relate to individual students, the Department relies on advice from the Supervisory Committee or the faculty advisor.

In those cases in which a Supervisory Committee or faculty advisor determines that a student's progress is unsatisfactory, and recommends that the student be required to withdraw, the Department is expected to verify the reasons for the recommendation. If the recommendation is confirmed, the Department will forward the recommendation to the Associate Dean of Graduate Studies, who will receive it and act on behalf of the Faculty Admissions and Study Committee.

If the Department is not convinced that the recommendation is appropriate, the Department may attempt to mediate between the supervisor and student, or may attempt to find an alternate Supervisory Committee or faculty advisor. If that is notpossible because all members with expertise in the student's topic are already on the Supervisory Committee, then the Department may find it best to encourage the student to transfer elsewhere. If the student is very close to completion, the Department may advise the student to continue in the program despite the lack of Supervisory Committee support.

1.2.4 The Supervisory Committee

The Supervisory Committee, or the faculty advisor when no such committee is required, provides advice to the Department as noted above. Additional responsibilities include, where applicable:

- planning and approving the student's program of courses and research;
- approving thesis proposals;

- deciding, within departmental regulations, on the timing of the comprehensive examination and, language and other examinations;
- maintaining knowledge of the student's research activities and progress;
- giving advice on research;
- providing the student with regular appraisals of progress or lack of it;
- initiating appropriate action if the student's progress is unsatisfactory, including any recommendation that the student withdraw;
- deciding when the student is to write the thesis and giving advice during this process;
- acting as internal examiners for the thesis.

1.2.5 The Faculty Advisor

When a supervisory committee is not required, a faculty advisor will be assigned by the Department. Like the supervisory committee, the advisor will provide advice to the Department as noted in Section 1.2.3above. His/her responsibilities will include: planning and approving the student's program of courses and research; deciding within departmental regulations, on the timing of the comprehensive examination, andlanguage and other examinations; maintaining knowledge of the student's research activities and progress; giving advice on research; providing the student with regular appraisals of progress or lack of it (i.e., the student and student advisor have a mutual obligation to meet on a regular basis); initiating appropriate action if the student's progress is unsatisfactory, including any recommendation that the student withdraw.

1.2.6 Guidelines for Graduate Course Instructors

For most faculty members and graduate students alike, the graduate classroom offers aunique site of intellectual development, exploration, and exchange. The following guidelines are intended to highlight best practices to help instructors plan and run successful graduate courses, and to optimize the learning experience for graduatestudents. These guidelines supplement the official *Policy on Graduate Course Outlines,* to which all graduate courses must adhere.

In fields that include diverse knowledge bases or skill sets, the instructor may wish to meet with prospective students before the course starts, particularly with students who are from outside the home program or department. Such a meeting might include adiscussion of the overall objectives and content of the course, an explanation of the methods of assessment, and a description of the expertise and skill level expected of thestudent.

The graduate course instructor may decide to recruit one or more faculty members or field experts to give special lectures during the course. Such an invitation should be made well in advance of the lecture date. Invited instructors usually are not expected to evaluate the students. However, there may be rare cases in which an invited instructor contributes some aspect of course evaluation. In that event, the official course instructor still bears ultimate responsibility for overall evaluation and course outcome. Accordingly, best practice would be for the invited instructor to receive information, preferably in writing, about evaluation criteria and expectations that are consistent with the course outline. Students also should be informed of the mechanism and mode of evaluation.

To receive credit for a course, each student is responsible for confirming on SOLAR that his/her registration status is appropriate for that course. Students are responsible for ensuring that they have formally registered for the course (including any seminar course) through their department or graduate program. Best practice suggests that the instructor should remind students of their responsibilities at the first meeting ofthe course.If the instructor becomes aware that a student is not listed on the grade sheet, or that the grade sheet includes the name of a student who has not been attending theclass, the instructor should inform the department/graduate program.

As noted in the *Policy on Graduate Course Outlines,* the course instructor is responsible for providing each student with evaluations of the student's academic performance at various stages during the course, and, whenever possible, a list of due dates. It is best practice in graduate courses for each student to receive at least one written evaluation prior to the 'drop' date so that students can have the chance to withdraw from the course without academic penalty. Such an evaluation could take any of a number offorms (e.g., evaluations of a seminar presentation, a written assignment, or a collaborative work).

At the graduate level, students normally are expected to actively participate in courses (i.e., contribute to discussion, be encouraged to ask questions), and instructors often award marks for participation. Participation marks typically amount to a relatively minor proportion (e.g., 5-20%) of the final grade. Some students, particularly those whose first language is not English, may be reluctant to participate in a discussion inclass. Best practice suggests that these students should be recognized early and, whenever possible, tactfully drawn into the discussion by the instructor. The ultimate aim of anygraduate course is not only to convey information to and exchange information with students, but also to equip students with the confidence and ability to exchange information with others, both in the spoken word and in writing.

Although instructors are required to provide written course outlines at the beginning of courses, the *Policy on Graduate Course Outlines* also provides instructors with the opportunity to alter a course's content to reflect shifting research interests as long as the students are informed of such changes promptly and *in writing*. Even in the case of changing content, best practice is for instructors to adhere to the original course outline in terms of the amount of work expected from the students, the schedule ofassignments, due dates, and the evaluation scheme.

Best practice suggests that instructors should calculate and provide final grades to the School of Graduate Studies for *all students* by the date stipulated in the Graduate Calendar. Final marks also should be provided to the students in a timely manner. Although there may be rare instances in which the instructor may need to report grades before all work is complete for a student, instructors should be aware that a grade of“incomplete” will be converted to an “F” and recorded on the student’s transcript.

1.3 Responsibilities of Graduate Students to the University

Just as the University has responsibilities to graduate students, they have responsibilities to the University.

The student’s responsibilities include, but are not limited to:

- registering annually until graduation, withdrawal, or withdrawal in good standing due to time limit;
- paying fees as required;
- complying with the regulations of the School of Graduate Studies as set out in this Calendar.

Where applicable, students are responsible for complying with such conditions as may be laid out in an accepted letter of offer. Students are also responsible for complying with the regulations governing graduate students at McMaster University with respect to full- and part-time status (see sections 2.4.2 and 2.4.3) and, in particular, for informing the School of Graduate Studies of any change in employment status. Students are further responsible for informing the School of Graduate Studies within two weeks, which acts as the official keeper of student records, of any change in personal information such as address, name, telephone number, etc. Students are also responsible for reporting through the department any change in student status, course registration, or withdrawal.

With regard to research and study, students are responsible for maintaining contact and meeting regularly with the faculty advisor, thesis/project supervisor or supervisory committee, for observing departmental guidelines, and for meeting the deadlines of the department and the School of Graduate Studies.If there is a problem with supervision, it is the student’s responsibility to contact the Department Chair or Graduate Advisor. The provisions for changing a supervisor are outlined in Section 2.6.

Students who undertake to write master’s or doctoral theses assume responsibility both for creating drafts of the thesis and for responding to direction from the Supervisory Committee. The student shall have the responsibility to write and ultimately to defend the thesis, and the Supervisory Committee has the responsibility to offer guidance in the course of the endeavour, and to recommend or not recommend the completed thesis for defence.

In order to receive a degree, the student must fulfill all departmental or program requirements and all University regulations, including those of the School of Graduate Studies. Students who have outstanding financial accounts at the end of the academic year will not receive their academic results, diplomas, or transcripts.

Since registration permits access to libraries and certain other academic facilities (including off-campus facilities), it also implies a commitment on the part of each graduate student to use such facilities in accordance with applicable rules, including all safety practices, guidelines and policies. Inappropriate behaviour that is deemed to be in violation of such practices and/or policies may lead to denial of access to the facility. If such a denial of access to facilities means that a student can no longer fulfill his/her academic obligations, the student will be required to withdraw involuntarily from his/her academic program. (see also Sections 6.2 and 7.3.5)

Full-time students are obliged to be on campus, except for vacation periods or authorized off-campus status, for all three terms of the university year. Vacation entitlement is discussed in Section 2.4.6. Any absence of one week or longer from campus, which is not part of the student's vacation entitlement requires the supervisor's approval. If the absence exceeds two weeks, the approval of the department chair is also required. In accordance with government regulations (see Section 2.4.2) students who will be absent from campus for more than four weeks in any one term require not only permission from the Department but also that of the appropriate Associate Dean of Graduate Studies. Note that this permission is needed even for field work or study elsewhere in the world, in order to allow the University to comply with the regulation requiring that a written explanation for such absences be lodged in the Graduate School office. Students may arrange, through the Department and the Associate Dean of Graduate Studies, to be "full-time off-campus" for periods of up to a year. In cases of unauthorized absence the student will be deemed to have withdrawn voluntarily from graduate study and will have to petition for readmission. No guarantee of readmission or of renewal of financial arrangements can be made.

2. GENERAL REGULATIONS OF THE GRADUATE SCHOOL

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University communications are considered received if sent by postal mail, by fax, or by e-mail to the student's designated primary e-mail account via their @mcmaster.ca alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.

2.1 Admission Requirements

McMaster University seeks candidates for graduate study who show high scholarly promise. Admission to a graduate program is based on a judgement by the University that the applicant can successfully complete the graduate degree program. The University's minimum requirements are identified in this section. Departments or programs may establish additional requirements, such as scores on the Graduate Record Examination (GRE). Applicants should read the admission statement for the program or department, as well as the section here. Admission is competitive: meeting the minimum requirements does not guarantee admission. Final decisions on matters of admission rest with the Graduate Admissions and Studies Committee for each Faculty.The admission decision is not subject to appeal.

2.1.1 Admission Requirements for Master's Degree

The University requires, as the major indicator of ability to complete a Master's program successfully, the holding of an Honours bachelor's degree with at least a B+ average (equivalent to a McMaster 8.5 GPA out of 12) in the final year in all courses in the discipline, or relating to the discipline, in which the applicant proposes to do graduate work. In a Master's program in the Faculty of Engineering the requirement is at least a B- average (equivalent to a McMaster 7.0 GPA). Strong letters of recommendation are also required.

Degrees and grades from foreign universities are evaluated for their equivalency to McMaster's. In recognition of the changes taking place in the structure of university education as a consequence of the Bologna Accord, three-year, first-cycle degrees that meet the criteria of the "Framework for Qualifications of the European Higher Education Area" will be accepted in place of a four-year Honours degree. The equivalent of at least a B+ average (B- in Engineering) will still be required. A Diploma Supplement should accompany the official transcript [item (a) under Section 2.2].

Prospective applicants who lack some background in the discipline they wish to enter should consult the Undergraduate Calendar with regard to Continuing Student status. A continuing student is a university graduate who is not currently enrolled in a degree program,but who wishes to take one or more undergraduate classes.

Prospective applicants who did not attain the required standing in theirundergraduate degree, but who have several years of work experience that is relevant to the program they wish to undertake, should discuss their situation with the department of interest. Evidence of ability to do graduate work will still be required.

2.1.2 Admission Requirements for Ph.D. Degree

Applicants may be admitted to a regular Ph.D. program at one of three stages in their academic work. Often they will have completed a Master's program. In some cases, they will be admitted to Ph.D. studies from a Master's program at McMaster without completing the Master's degree. Students still enrolled in a Master's with thesis program beyond 22 months must complete the degree requirements including the thesis prior to admission to the Ph.D. program. In exceptional cases, they may be admitted directly from a bachelor's degree.

For applicants who hold a Master's degree, the primary requirements are distinction in their previous graduate work (equivalent to at least a McMaster B+), and strong letters of reference.

Students enrolled in a Master's program at this University may be transferred to the Ph.D. program prior to completion of the Master's degree. Not sooner than two terms after initial registration in the Master's program here, students may request to be reclassified as Ph.D. students. After proper review, the department will recommend one of the following:

(a) admission to Ph.D. studies following completion of the requirements for the Master's degree;
(b) admission to Ph.D. studies without completion of a Master'sprogram;

(c) admission to Ph.D. studies but with concurrent completion of all requirements for a Master's degree within two months from the date of reclassification;
(d) refusal of admission to Ph.D. studies.

For students in (b), the recommendation for admission to Ph.D. must identify which if any courses taken as a Master's student can be credited toward the requirements for the Doctoral program.

A student in (b) may re-register as a candidate for the Master's degree, provided that work to date has met the standards for the Master's program.

Students in (c) who do not complete the requirements for the Master's degree within the two months will lose their status as a Ph.D. candidate and be returned to Master's status.

In certain programs, applicants with a first degree only, may be admitted directly to Ph.D. studies. Such students must show sufficient promise, including at least an A average. Within one calendar year the progress of students admitted to Ph.D. studies directly from a Bachelor's degree will be reviewed by their supervisory committee and the program. The program then will recommend one of the following:

(a) proceed with Ph.D. studies;

(b) not proceed with Ph.D. studies but re-register as a Master's candidate;

(c) withdraw from the University.

A student admitted to a Ph.D. program who re-registers as a candidate for a Master's degree must meet all of the requirements for the Master's degree in order for it to be awarded.

Admission to a part-time Ph.D. program is possible only for an individual holding a Master's degree whose circumstances preclude uninterrupted full-time doctoral studies. Because of the divergent nature of academic disciplines, part-time doctoral work is not feasible in some areas.

Accordingly, no Department or Program is obligated to offer part-time doctoral work. As part of their applications prospective part-time students are required to provide a plan of study, including a clear account of when and where the thesis research is to be conducted. If facilities at the place of employment are to be used for the research, the signed agreement of the employer, recognizing the conditions surrounding graduate work, is also required. In addition, departments may have other requirements for admission to a part-time doctoral program. A part-time doctoral student must be geographically available on a regular basis, and must be able to participate regularly in departmental seminars and colloquia.

2.1.3 Admission of Students with Related Work Experience or Course Work Beyond the Bachelor's Degree

As noted in Section 2.1 of the Graduate Calendar, "Admission to a graduate program is based on a judgement by the University that the applicant can successfully complete the graduate degree program". Some potential applicants may not satisfy our admission requirement for a 4-year honours degree with a B+ average in the final year. However, work experience and/or completed course work beyond the Bachelor's degree, may have some bearing on the applicant's ability to complete a graduate program. The admissions process will recognize these accomplishments as follows.

Admission to graduate studies for a student with related work experience and/or course work beyond the Bachelor's degree will be based on the following criteria:

1. References from reliable sources, which specifically identify the applicant's aptitude for research and graduate education.

2. University 4-year undergraduate degree or equivalent, completed more than 4 years ago, together with additional course work taken since that time.

3. Significant record of workplace experience, the relevance of which will be assessed by the graduate program of choice.

2.1.4 Admission Requirements for Graduate Diploma Programs

See Section 12 for descriptions of McMaster's approved diplomas. The admission requirements for a graduate diploma are the same as are identified in Section 2.1.1 for admission to a Master's program.

Graduate Diploma students with at least a B+ average in their diploma course work may be eligible to transfer to a Master's degree in a related program, subject to the recommendation of the department or program to the relevant Faculty Graduate Admissions and Study Committee. If the diploma has not been completed, credit may be given toward the degree requirements for all graduate courses completed successfully. Approval of the department is required for any such credit to be applied toward a degree; it is not automatic. Departmental or program approval is normally based on an assessment of the amount of additional coursework that will be required for the degree.

If a student wishes to enter a related Master's program after the diploma has been completed, credit may be granted towards the subsequent degree program for those courses completed successfully, with a limit of one full course or half of the course requirements for the degree, whichever is less.

2.1.5 Admission Requirements for Post-Degree Students

A Post-degree Student is one who has not been admitted to a graduate degree or diploma program but who holds a university degree and has been given permission to take a specific graduate course. Permission to take a course as a post-degree student requires the approval of the course instructor, the Department Chair, and the School of Graduate Studies. An application is required for each course.

Although acceptance as a post-degree student carries no implications with respect to acceptance for a degree program in the School of Graduate Studies, the level of academic achievement expected for admission under this category is the same as that required of students admitted to a Master's program (Section 2.1.1). Courses taken as a post-degree student may be eligible for credit toward a Master's degree in a related program, to a maximum of one-half of the degree's course requirement, subject to the recommendation of the department or program to the relevant Faculty Graduate Admissions and Study Committee.

A student who has completed a relevant undergraduate degree and is not admissible under current standards, but who is currently in (or has had) full-time employment in the intended area of study may be admitted as a post-degree student. In such cases, any courses taken as a post-degree student will not be available for credit in a subsequent graduate program, because they will have been necessary to demonstrate admissibility.

The deadline for registration is the same as for graduate degree programs (see Sessional Dates, Registration).

(Note: A Graduate Diploma is distinct from a baccalaureate, Master's or Ph.D. degree, or diplomas and certificates awarded by the Centre for Continuing Education at McMaster University).

2.1.6 Non-Credit Participants in Graduate Courses

Graduate courses are not normally open to "auditors" who attend a course without the usual qualifications and without seeking academic credit. Under some circumstances, however, people who are not registered graduate students and who do not meet the requirements for admission as Post-degree (see Section 2.1.4) may attend a graduate course. This requires the written permission of the course instructor, the Department Chair, and the School of Graduate

Studies. Upon completion of the course, and subject to confirmation from the instructor that his/her expectations regarding the student's participation were met (i.e. that the student attended at least 80% of the instruction), a transcript notation "Audit" will be recorded. No other grade will be assigned. Enquiries should be directed to the instructor or the Chair of the Department offering the course.

A fee is charged for each course taken as a non-credit participant (by persons who are not registered graduate students). See Section 5.1, *Fees for Graduate Students*, for the fee schedule.

2.1.7 Visiting Students

Visiting Students are individuals who are currently registered in a graduate degree program in another university, and who have made arrangements through both their home university and a graduate program at McMaster to spend some time at McMaster as part of their degree program at the home university. While they are visiting students, they will not be enrolled in a degree program at McMaster. They are not part of any official exchange agreement including Ontario Visiting Graduate Student (OVGS) arrangement, although there may be an agreement between the McMaster program and their home institution. McMaster currently allows out-of-province and international students to visit in one of three ways: to take course work in a specific program; to conduct research in a specific lab; or to participate in an internship with a specific program or faculty member. In any case, students will be registered as full time students for a maximum of one year. Acceptance is on the recommendation of the department or program at McMaster. Details about these options are available in Section 11 of the Graduate Calendar.

The student is expected to pay the incidental fees (see Section 5.1 – Fees for Graduate Students) and the appropriate Canadian or international equivalent per course fee for the time that they are registered here. It may also be necessary for them to enrol in the UHIP program to ensure adequate health insurance coverage during their stay.

2.1.8 Exchange Students

Exchange students are individuals who much like visiting students, are registered in a graduate degree program in another university and are paying fees to that university. The difference between a visiting student and an exchange student is that the exchange student participates in a formal exchange program between McMaster University and their home institution. A complete list of exchange agreements that McMaster participate in can be found on the Office of International Students Affairs webpage (http://oisa.mcmaster.ca).

Students participating in a formal exchange program are not assessed incidentals, or course fees, and are entitled to take a full course load (assuming they are registered for a full course load at their home institution). It may be necessary for them to enrol in the UHIP program to ensure adequate health insurance coverage during their stay.

2.1.9 English Language Requirements

English is the language of instruction at McMaster, except in the M.A. program in French. Hence it is essential that all students (except in the French program) be able to communicate effectively in English.

Applicants whose native language is not English will be required to furnish evidence of their proficiency in the use of the English language. Such applicants are required to supply this evidence as part of their application.

The most common evidence is a score on the Test of English as a Foreign Language (TOEFL), administered by the Educational Testing Service (Princeton, N.J., USA).

- In Engineering, a TOEFL (iBT) score of 80 (550 on the paper-based TOEFL test or 213 on the computer-based TOEFL test) is necessary;
- In Business, the normal requirements are a score of at least 100 with a minimum of 22 in the reading component, 22 in the listening component, 26 in the speaking component and 24 in the writing component on the Internet-Based Test (IBT); or 600 on the Paper-Based Test (PBT); or 250 on the Computer-Based Test (CBT). The Faculty of Business may also consider the equivalent score on other recognized tests. Applicants may be exempted from this requirement if they have completed a university degree at which English is the language of instruction;
- In other Faculties a minimum of 92 (580 or 237) is required.

Students who have completed an Academic ESL program through Canadian academic institutions may petition to have this considered in lieu of TOEFL.

2.2 Application for Admission

Enquiries about graduate work should be made directly to the department of interest. Our onlineapplication system is located at

https://gradapplication.mcmaster.ca/account/instructions.asp.

Applications may be submitted at any time. However, most University scholarships and awards are adjudicated in late March or early April, so students applying later than March cannot be considered for these awards.

Applications from outside Canada should be completed at least five months before the desired date of entry in order to allow for any delays and for obtaining the necessary visa.

Application Fee

Applications must be accompanied by the required $100 application fee. This fee is non-refundable and must be paid in Canadian dollars by means of a credit card payment or a cheque drawn on a Canadian bank made payable to McMaster University. Cheques drawn on Canadian banks should also include a $15 processing fee for a total of $115.

Required Documents

The following items are required before your online application will be considered complete.

(a) One official transcript of academic work completed to date, sent directly from the issuing institution. If the final transcript does not show that a completed degree has been conferred, an official copy of your diploma is also required.

(b) Two confidential letters of recommendation from instructors most familiar with your academic work. Please note that McMaster University uses the Electronic Referencing System. By entering the email address of your referee through the online application, the system will automatically send an eReference request on your behalf.

(c) see Section 2.1.9 – *English Language Requirements*

(d) Statement of interest in pursuing graduate studies.

A graduate of a university outside Canada may also be required to submit a description of undergraduate and graduate courses taken in the field of specialization and in similar fields.

Collection of Personal Information

Under the authority of the *McMaster University Act, 1976*, and by applying to McMaster or by enrolling in a program at the University, students expressly acknowledge and agree that the collection, retention, use and disclosure of relevant personal information is necessary for McMaster University to:

- establish a record of the student's performance in programs and courses;
- to assist the University in the academic and financial administration of its affairs;
- to provide the basis for awards and government funding; and
- to establish the student's status as a member of relevant student governmental organization.

Similarly, and in compliance with McMaster University's access to information and protection of privacy policies and Canadian and Ontario privacy laws, the University provides personal information to:

- the Canadian and Ontario government for the purposes of reporting purposes; and
- to appropriate student government organizations for the purposes of allowing such organizations to communicate with its membership and providing student government-related services consistent with the enrolment by a student at the University.

By applying and/or enrolling at McMaster University the student expressly consents to this collection, retention, use and disclosure of such personal information in this manner. Questions regarding the collection or use of personal information should be directed to the University Secretary, Gilmour Hall, Room 210, McMaster University.

2.3 Acceptance

Initial assessment of completed applications is the responsibility of departments. If that assessment is favourable, the department will recommend to the School of Graduate Studies Office of a favourable decision, or by the department of a negative decision. Applicants may be accepted conditionally before completing their present degree programs. Such conditions must be cleared at the time of registration.

Official letters of admission are sent only by the School of Graduate Studies, and are valid only for the program and term stated in the admission letter. Successful applicants are required to respond in writing to the offer of admission within the interval identified in the offer letter. If circumstances develop making it impossible for a student to begin graduate work in the specified term, the department and the School reserve the right to revoke the offer of admission, and any financial aid offered.

2.4 Registration

2.4.1 Procedures

All graduate students, in both the regular and part-time programs, are required to register and pay fees annually in September until they graduate or withdraw. If they fail to do so they do not retain the status of graduate student and must apply for re-admission if they wish at a later date to continue their studies. If the department approves, a student may be allowed to begin graduate work in the winter or summer term (January or May), in which case they will first register at the start of that term, but in any following years will register in September.

At the time of registration,students declare their program of studies as approved by their advisor (supervisor) and the chair of the department.

2.4.2 Provincial Definition of Full- and Part-time Status

Under the regulations of the Government of Ontario, A *full-time* graduate student must:

(a) *be pursuing his or her studies as a full-time occupation;*

(b) *identify himself or herself as a full-time graduate student;*

(c) *be designated by the university as a full-time graduate student;*

(d) *be geographically available and visit the campus regularly. Without forfeiting full-time status, a graduate student, while still under supervision, may be absent from the university (e.g. visiting libraries, doing field work, attending a graduate course at another institution, etc.) provided that, if any such period of absence exceeds four weeks in any one term, written evidence shall be available in the Graduate Studies Office to the effect that the absence has the approval of the Chairman* (sic) *of the Department and the Associate Vice-President & Dean of Graduate Studies;*

(e) *be considered to be a full-time graduate student by his/her supervisor or equivalent (designated by the university).*

2.4.3 McMaster University's Regulations for Full- and Part-time Status

In accordance with the above provincial regulations, McMaster requires students to register annually, and to confirm their status as a full-time graduate student. Only full-time graduate students are eligible for scholarship support. University-related employment should be limited to an average of ten hours per week for full-time students, and full-time students are expected to limit time spent on employment both inside and outside the University.

Exceptions to this rule are possible with the approval of the School of Graduate Studies. A full-time student seeking an exception must provide a study plan that has been approved by the departmental graduate studies committee or its equivalent, along with a written statement from the student's supervisor. Ph.D. students who seek an exemption from the rule must arrange for a supervisory committee meeting, with a report of that meeting submitted to the Graduate School, every four months during the time they are employed beyond ten hours per week. No exceptions totalling 505 hours or morein a single academic year will be approved.

All active graduate students other than full-time graduate students as defined above are part-time graduate students.

2.4.4 Employment Regulations

In the McMaster context, there are three terms in the School of Graduate Studies for purposes of interpreting the rule in Section 2.4.2 limiting employment with the University to ten hours per week on average: Fall (September through December); Winter (January through April); and Summer (May through August). These are deemed to have 17, 17, and 18 weeks respectively. The ten-hour limit includes work as a Teaching Assistant at McMaster.

If the student is to be employed at the University other than as a TA, the School of Graduate Studies should be informed in writing of the nature of the employment, and the approval of the supervisor and the chair of the department is required. The approval of the School of Graduate Studies is required if the student is to be hired for University teaching.

2.4.5 Leaves of Absence

<u>General Regulations</u>

Leaves of absence are normally granted on a term-by-term basis. Whenever possible the leave should start and end at the beginning of a term (i.e., January 1, May 1, or September 1). During the period of a Leave the student cannot expect to be given supervision or be entitled to use the University's facilities. During a Leave of Absence, no tuition will be charged, nor will the student be eligible for any scholarship support. The length of time for completing the degree, and for scholarship support eligibility (see qualifier below), will be extended by the duration of the Leave on the resumption of studies. If a leave begins or ends in the middle of a term, term count will be determined upon return in consultation with the Associate Dean.

Leaves of absence affecting Teaching Assistantship duties are covered by the Collective Agreement with Local 3906 (Unit 1) of the Canadian Union of Public Employees.

Students should be aware that in the event of Leaves of Absence, continuation of the same research project and/or supervisor cannot be guaranteed. Students applying for a leave of absence for personal reasons must normally have completed at least one year of full time graduate studies. Students who have not completed a minimum of 16 weeks of graduate studies at McMaster will not be eligible for parenting leave scholarship funding as noted below. For additional information related to parental and maternity leaves, please refer to the next section.

<u>Reasons for Leaves of Absence</u>

A Leave of Absence for up to one year is permitted for reasons of illness, provided that the request is supported by adequate medical documentation. Students who have successfully completed at least one full year in a graduate program may apply for a Leave of Absence once for up to one year for other personal circumstances, provided that the student's supervisor and the department support the request. Alternatively, the student may request withdrawal

(Withdrawal at the Request of the Student). Should the student opt to withdraw, he/she may be eligible for reinstatement upon reapplication.

A Leave of Absence to obtain externally paid relevant work experience may be granted for one term for a Master's student and for two terms for a Ph.D. student. No two Leaves taken to obtain relevant work experience may be consecutive.

A Leave of Absence will not be granted to pursue another program of study.

Note**:** Students who hold fellowships, scholarships or grants from NSERC, SSHRC, CIHR, or OGS should be aware that these agencies have policies governing the interruption and continuation of awards that may differ from the University's policy on leaves of absence. Students holding such awards and who intend to keep them are responsible for ensuring that any leave of absence taken does not conflict with the granting agency's regulations. The appropriate agency should be contacted for details.

Parenting Leave Policy

Intent

The Parenting Leave Policy (the "Policy") is intended to assist parents in successfully combining their graduate studies and family responsibilities with minimum financial and/or academic impact. The University will provide the following arrangement for parents requiring parenting leave from their studies. The Policy applies only to full time graduate students as defined by the School of Graduate Studies.

Definitions

"McMaster Graduate Scholarship Funds"- The sum total of departmental and graduate scholarships as well as research account support committed to the student. It does not include funding from external sources; funding from employment such as Teaching Assistantships or Research Assistantships, or; most scholarships held in trust.

"Parent"- Includes the birth mother of a child; a person with whom a child is placed for adoption; and a person who is in a relationship of some permanence with a parent of a child and who intend to treat the child as his or her own.

"Parenting Leave"- An unpaid leave of absence from studies of up to 52 weeks' duration for a birth mother of a child or up to 37 weeks' for the parent of child who is not the birth mother.

Leave of Absence from Studies

Eligibility

A leave of absence for up to 52 weeks is permitted for Parenting Leave. A student electing not to take the maximum amount of time available for parenting leave will not have the option of taking any unused portion at a later date.

Parameters

A Parenting leave for the birth mother may consist of two parts – a pregnancy leave and parental leave. The pregnancy leave must begin, at the earliest, up to 17 weeks before the anticipated due date or on the date the child comes into the care and control of the parent for the first time and lasts for 17 weeks. The parental leave must begin right after the pregnancy leave and lasts for up to 35 weeks. Alternatively, the birthing mother may only take the parental leave. In this case the leave can be a maximum of 37 weeks in length and must begin at latest within 52 weeks after the birth of the child or the date on which the child comes into the care and control of the parent for the first time.

The Parenting leave for a non-birth mother can be a maximum of 37 weeks in length and must begin at latest within 52 weeks after the birth of the child or the date on which the child comes into the care and control of the parent for the first time.

It is understood that when a student takes a Parenting leave, the duration of the leave will not be counted as time towards the time limits in which the student is required to complete or make progress in his or her graduate studies program.

In order that the student's supervisor and/or program can make suitable arrangements to cover ongoing responsibilities during the student's absence, students are expected to provide as much notice as possible of the intention to take a Parenting Leave under this Policy.

A student is normally expected to give at least four weeks' notice of the date on which he/she intends to take his/her leave(s) and at least four weeks' notice of the date on which he/she intends to return from leave, should this date be different from the date agreed upon at the time the leave was granted.

A Parenting Leave or a portion thereof *may* be taken simultaneously with a Pregnancy and/or Parental leave from employment, in accordance with the Employment Standards Act, should the student also be an employee of McMaster University.

If both parents of a child are McMaster Graduate Students, only one parent is eligible to access Parenting Leave under this Policy at any one time. This Policy does not preclude the other parent from applying for a leave of absence under another policy or program and the approval or denial of that leave application will be determined on the basis of the parameters of that leave policy or program.

Combination with Other Leaves

If a student is also an employee, it is incumbent upon the student to review their terms and conditions of employment and/or Collective Agreement (if any) and apply for the appropriate leave of absence from employment there under.

Financial Support from the School of Graduate Studies for Parenting Leave

Eligibility

Students who have not completed a minimum of 16 weeks of graduate studies at McMaster will not be eligible for Financial Support under This Policy. They will remain eligible for a leave of absence from studies, in accordance with the above.

Parameters

A student in receipt of McMaster Graduate Scholarship Funds who has a child (or children) by birth or adoption may receive the financial support available under the Policy for a minimum period of 4 months and a maximum period of 8 months.

A student electing not to take the maximum amount of time available will not have the option of taking any unused leave at a later date.

A student in receipt of McMaster Graduate Scholarship Funds who takes a Parenting Leave under the Policy will be entitled to continue to receive graduate scholarship funds at the normal monthly rate, to a maximum of $750 per month and to a maximum total of $3,000, provided that a “Leave of Absence Information Form” has been submitted to and approved by the School of Graduate Studies.

The formula used to determine the “normal monthly rate” when a student is not currently in receipt of scholarship funds is the total of their McMaster Graduate Scholarship Funds averaged over the previous or current academic year depending on the start date of the parenting leave.

Combination with Other Forms of Financial Support

To maximize flexibility, the financial support available under the Policy can be combined with stipends from sources, excluding those from the Tri-Agencies (noted below) and can be spread over a period of between 4 and 8 months at the discretion of the student. However, in no case will funding for Parenting Leave from the School of Graduate Studies exceed a total of $3000 (and $750.00/month).

If the parent of the child for whom the Parenting Leave is being taken is eligible to receive parental support from CIHR, NSERC, or SSHRC for the leave at any time during the Parenting leave, the parent is not eligible for financial support under McMaster’s Parenting Leave Policy.

When two McMaster graduate students are the parents of a child, only one of those students will be entitled to claim the financial support under the Policy.

Financial support during Parenting Leave for students who are also employees of the University, provided as part of their terms and conditions of employment, are distinct and separate from the financial support available under this Policy. Other financial benefits, except as specifically excluded herein, can be taken concurrently with the financial support provided under this Policy provided that the individual meets the eligibility requirements for those plans for the duration for which they are accessing financial support under those plans.

The financial support provided under this Policy is not considered an approved Supplemental Unemployment Benefit Plan for the purposes of receiving Employment Insurance. Therefore, students wishing to access financial support under this Policy in addition to Employment Insurance (“EI”) benefits should be aware that Human Resources and Skills Development Canada (“HRSDC”) may consider financial support under this Policy to be earnings and could therefore require repayment of some of all EI benefits received. It is incumbent upon the student accessing financial support under this Policy to contact HRSDC if they have questions in this regard.

For questions on the administration of the Policy, contact the School of Graduate Studies.

2.4.6 Vacations

Full-time graduate students are expected to be on campus for all three terms of the university year, as specified in Section 1.3. In addition to statutory holidays (see Sessional Dates) and the weeklong closing of the University from late December until early January, normal vacation entitlement is two weeks of vacation during the year, to be scheduled by mutual agreement with the research supervisor and the employment supervisor. Exception to this allottment requires approval from the supervisory committee.

2.4.7 Appeals and Petitions for Special Consideration

The University wishes to assist students with legitimate difficulties. It also has the responsibility to ensure that degree, program and course requirements are met in a manner that is equitable to all students. Students may submit, in a prompt and timely manner, a *Petition for Special Consideration* to the office of the Associate Dean of the School of Graduate Studies in those instances where a student acknowledges that the rules and regulations of the University have been applied fairly, but is requesting that an exception be made because of special circumstances (compelling medical, personal, or family reasons). The appropriate form may be found on the School of Graduate Studies website. The student’s supervisor and Associate Chair are normally required to provide their independent assessments of the student’s statement in the petition. Supporting documentation will be required but will not ensure approval of the petition. The authority to grant petitions lies with the School of Graduate Studies and is discretionary. It is imperative that students make every effort to meet the originally-scheduled course requirements and it is a student's responsibility to write examinations as scheduled.

In accordance with the Student Appeal Procedures, decisions made on *Petitions for Special Consideration* cannot be appealed to the Senate Board for Student appeals. However, if a student believes that a decision is a violation of his/her human rights, he or she must contact the office of Human Rights and Equity Services in room 212 of the McMaster University Student Centre, to initiate a complaint.

2.5 Graduate Course Work

2.5.1 Averaging of Letter Grades

Grades in graduate courses are reported as letter grades. However, instructors may record grades for individual components of the course either as letter or numerical grades. The averaging of letter grades assigned to individual components of a course must be done by using the McMaster 12-point scale, as follows: A+ = 12, A = 11, A- = 10, B+ = 9, B = 8, B- = 7, C+ = 6, C = 5, C- = 4, D+ = 3, D = 2, D- = 1, F = 0. Further, all .5 marks should be rounded up. The passing grades for courses at the graduate level are A+, A, A-, B, and B-. Graduate students enrolled in undergraduate courses will be subject to some set of passing grades as courses at the graduate level.

Example of Weighted Average Calculation, using the grade points and units for courses completed:

Course Grade	Grade Points		Course Units	
A-	10	x	6	= 60
B	8	x	6	= 48
B+	9	X	3	= 27
F	0	X	3	= 0
		Total	18	135
				To calculate Average: 135 ÷ 18 = 7.5

Note: 6-unit course is equivalent to a full course
3-unit course is equivalent to a half course

Note: McMaster University's Policy on Graduate Course Outlines is available at:
http://www.mcmaster.ca/policy/faculty/Conduct/GraduateCourseOutlines.pdf

2.5.2 Course Levels and Types

Courses available for graduate credit are numbered either at the 700- or 600-level (e.g. 771 or 6D06). Courses are restricted in enrolment to graduate students, with the exception of those undergraduate students registered in approved, acceleratedM.Eng. programs and with written permission of their department (or program) chair, director, or designate. (Departments may have restrictions on the number of 600-level courses allowed for graduate credit). Graduate students taking 600-level courses are regularly required to do extra course work beyond that required of undergraduates in the corresponding 400-level course. Each department offers only a selection of its courses in any given year.

For 700-level courses, there are three types of courses. Full-year (i.e. two-term) courses do not have a prefix. One-term courses (half courses) are indicated by an asterisk (*) sign preceding the course number. Half-term (quarter courses or modules) are indicated by a pound (#) sign preceding the course number. In all cases, the expectation is that the course will meet at least three hours per week (on average). For 600-level courses, the first character represents the level of the course (combined graduate-undergraduate), the second character is a letter identifying the specific course within a department, the third character is a letter identifying the area of study within a program or simply a zero, and the fourth character indicates the number of units of course credit. Generally, 3-unit and 4-unit courses are one-term courses; 6-unit courses are full-year courses.

2.5.3 Course Categories

Courses can be designated as being in one of the six categories:

M (Count towards the Master's degree requirements)
This category identifies the courses that are to count towards the Master's degree requirements (including any additional graduate requirements or undergraduate courses specified by the supervisory committee or Department Chair). The passing grades for an M course are A+, A, A-, B+, B, and B- (except in the M.B.A. program, which uses a different scale).

D (Count towards the Doctoral degree requirements)
This category identifies the courses that are to count towards the Doctoral degree requirements (including any additional graduate requirements or undergraduate courses specified by the supervisory committee or Department Chair). The passing grades for a D course are A+, A, A-, B+, B, and B-.

EC (Extra Course)
This category identifies courses that the student is taking with the approval of the supervisor but that are not necessary to the student's current degree program. If a failing grade (i.e. less than B-) is received in a course taken as Extra, the courses (and grade) will not appear on the student's transcript unless because of academic dishonesty. Students may petition to change the designation of an EC course to an M or D course prior to the deadline to drop a course provided that this change is supported by the supervisor and program. Changes of designation after the drop date will not be approved. Courses designated as EC may subsequently be counted towards graduate degree requirements and the course designation changed to M or D, if approved by the Faculty Admissions and Study Committee or the Associate Dean acting on its behalf.The passing grades for a D course are A+, A, A-, B+, B, and B-.

Courses that are required by the supervisory committee or the Department Chair as additional requirements in excess of the stated minimum for the program must be designated as M or D.

DIP (Diploma Course)
This category identifies courses that are to count towards the requirements for a diploma. The passing grades for a DIP course are A+, A, A-, B+, B, and B-.

CER (Certificate Course)

This category identifies courses that the student is taking as individual courses not counting towards the requirements for a diploma. The passing grades for a CER course are A+, A, A-, B+, B, and B-.

AUD (Audit Course)

Graduate courses are not normally open to “auditors” who attend a course without seeking academic credit. Under some circumstances, however, graduate students may audit a graduate course. This requires the written permission of the course instructor and the student’s supervisor (or graduate advisor if no supervisor exists) on the form entitled ‘Audit Add Form’. Permission must be obtained prior to the deadline for adding courses. Upon completion of the course, and subject to confirmation from the instructor that his/her expectations regarding the student’s participation were met (usually that the student attended at least 80% of the course), a transcript notation of “Audit” for that course will be recorded. No other grade will be assigned. Enquiries should be directed to the instructor or the Chair of the Department offering the course.

A fee may be charged for a course taken for audit if the graduate student is in a part-time program. See Section 5.1 - Fees for Graduate Students, for the fee schedule.

2.5.4 Failing Grades and Incomplete Grades

All instances of failures are reviewed by the appropriate Faculty Committee on Graduate Admissions and Study or the Associate Dean acting on its behalf. The Faculty Committee on Graduate Admissions and Study or the Associate Dean acting on its behalf requests a departmental recommendation regarding the student, and this recommendation is given considerable weight. In the absence of a departmental recommendation to allow the student to continue, the student will be required to withdraw. Those allowed to remain in the program must either repeat or replace the failed course. A failing grade in a CER, DIP, M or D course remains on the transcript.

Under exceptional circumstances a course instructor may approve an extension for the student for the completion of work in a course and assign an Incomplete grade (INC). Normally this extension is in the range of a few weeks. A student who receives this permission must complete the work as soon as possible, and in any case early enough to allow the instructor to report the grade to the School of Graduate Studies by the date specified in the Sessional Dates near the beginning of this Calendar. If the INC grade is not cleared by the deadline, a failing grade will automatically be recorded.

2.5.5 Required Course and Training for All Graduate Students

All graduate students, including part-time students, must complete and pass the course *SGS #101- Academic Research Integrity and Ethics* within the first twelve months after their admission to graduate studies at McMaster. The purpose of this course is to ensure that the standards and expectations of academic integrity and research ethics are communicated early and are understood by incoming students. All students are required to take and pass SGS #101. Students may not graduate or register in subsequent academic year without having successfully completed this course. The course description for *SGS #101* may be found in Section 11.

All graduate students are required to complete appropriate training required to complete their research and studies (health and safety training, ethics training, biosafety training, etc.), as determined by their home Department or Program. All graduate students also are required to complete and pass *SGS #201 - Accessibility for Ontarians with Disabilities Act (AODA)*, which can be completed on-line [www.mcmaster.ca/accessiblity]. Having an understanding of how we can identify and reduce attitudinal, structural, information, technological, and systemic barriers to persons with disabilities is core to McMaster University’s commitment to supporting an inclusive community in which all persons are treated with dignity and equality, and completion of AODA training is critical as McMaster’s graduates move forward in their varied, chosen professions.

Students may not graduate or register for subsequent years in their program until they have completed their required training.

2.6 Supervision

It is the responsibility of the department/program to ensure that every graduate student has, at all times, a faculty advisor or a properly constituted supervisory committee. The department/program should ensure that the members of a supervisory committee are sufficiently competent and experienced to serve at the required level. In identifying a supervisory committee, the department/program should consider the following, among other things: the balance of the committee by rank and experience; publications and other demonstrations of competence in scholarship or research on the part of the supervisor. Supervisory committees for Ph.D. candidates shall be reviewed annually by the department/program.

While the supervisor and student have a mutual obligation to meet on a regular basis, the department/program shall ensure there is a formal regular meeting of each Ph.D. supervisory committee at least once within the academic year (September-August), and possibly more often, to discuss the student's progress. Each Ph.D. supervisory committee must report annually on the student's progress and the department/program chair must forward such reports to the School of Graduate Studies. The report formally documents the supervisory committee's assessment of the progress of the student's program.

The department/program should prepare a set of guidelines for supervisors and students. The guidelines should deal with the selection and functioning of supervisory committees and should cover the joint responsibilities of faculty members and graduate students. The guidelines may be attached to or incorporated in department/program handbooks which give regulations supplementary to those inthe Calendar. Items relevant to graduate supervision should be approved by the appropriate Faculty Committee on Graduate Admissions and Study. A copy of the guidelines shall be given to each faculty member and each graduate student.

It is possible to change supervisors or the membership of a supervisory committee, although this is not the norm. If the direction of the research changes, membership can be changed by mutual consent of the parties involved. Supervisors and/or supervisory committee members may not resign without the department's/program's approval. A change in supervisor is at the discretion of the department/program, not the student or supervisor.

If a student feels that she/he is receiving unsatisfactory supervision, he/she should consult the Department/Program Chair or Graduate Advisor. If this avenue is not sufficient, the student is encouraged to speak with the appropriate Associate Dean of Graduate Studies about the problem (see Section 4.5 – Supervision).

Graduate students and supervisors are encouraged to familiarize themselves with the McMaster University Graduate work Supervision Guidelines for Faculty and Students, which follow below and to list of policies, policies on accommodations available on the School of Graduate Studies website at http://graduate.mcmaster.ca/current-students/student-responsibilities.

2.6.1 Graduate Work Supervision Guidelines for Faculty and Students

<u>Preamble</u>

The relationship between the graduate student and supervisor/advisor is unique and provides a remarkable opportunity to guide and mentor the student engaged in advanced academic learning. What is considered 'good' supervision will vary from discipline to discipline, and it naturally evolves as the student advances through a graduate program. This document provides suggestions to initiate, promote, and sustain successful student-supervisor/advisor relationships.

Guidelines for the Graduate Student

1) Commitment to scholarly activity is a pre-requisite for graduate success.

2) To support mentorship and guidance, the student must engage in effective, timely and on- going communication with the supervisor/advisor regarding the status of their project.

3) The student should discuss expectations with the supervisor/advisor to ensure that there is a mutual understanding of research goals and related activities, coursework, timelines and deadlines.

4) The student must manage their time, meet deadlines, and prepare for regularly scheduled meetings (e.g., with the supervisor/advisor and supervisory committee). Students should recognize that graduate program academic expectations will not be modified if they choose to engage in other activities, such as working outside of his/her graduate studies, studying for professional program entrance exams or applying for jobs or postdoctoral fellowships. Student- supervisor meetings for thesis work typically occur at least monthly, although meeting regularity will vary amongst disciplines and at various stages. Students are encouraged to discuss concerns about the type and amount of supervision needed for their work with their supervisor. Students are expected to inform the academic head of the graduate program if they are concerned about inadequate or inappropriate supervision.

5) The student is expected to develop effective communication and collaborative skills and to demonstrate respect for others. The student should carefully and earnestly consider advice, suggestions, comments and criticisms received from the graduate supervisor/advisor. The student should expect timely, but not immediate, responses (regarding meetings, feedback on written work, etc.) from the supervisor/advisor and supervisory committee.

6) The student is obliged to act ethically in conducting graduate work. This includes, but is not limited to, following McMaster University policies on the ethical conduct of research and academic integrity. The student is required to document and honestly report research data, to conscientiously cite information and data sources, and to seek guidance on any data exclusions. He/she must acknowledge contributions of the supervisor/advisor, committee members and others, in accordance with the norms of their academic discipline.

7) It is the student's responsibility to carry out all work safely and in accordance with standard operating procedures. Potentially dangerous tasks should not be done while impaired and should not be done until properly trained. It is the student's duty to learn about safe practices, ask questions, and seek appropriate help and guidance on safety matters.

8) It is the student's responsibility to be aware of all the requirements, regulations, and guidelines outlined in the Graduate Calendar as well as all University policies pertaining to graduate work.
See http://graduate.mcmaster.ca/images/files/graduate/forms/Graduate Work Supervision Guidelines.pdf (see Appendix).

Guidelines for Supervisors and Advisors of Graduate Students

1) The supervisor/advisor must be aware of the inherent power imbalance in the relationship with students, behave professionally, and communicate appropriately. He/she must provide a safe, healthy environment that fosters productive scholarly work, curiosity, and freedom of expression. The environment must be free from harassment, discrimination, and intimidation.

2) The supervisor/advisor is expected to have sufficient time and resources (as appropriate for the field) to support the student's work effectively. It is the supervisor's responsibility to ensure that students have appropriate safety training, and that they carry out all work safely, and in accordance with standard operating procedures, once properly trained.

3) The supervisor/advisor should help the student develop a realistic thesis/research plan with reasonable plans, that balance exploration with achievable, manageable and focused goals, and allow completion of scholarly work "in time."

4) The supervisory committee must approve thesis project plans, including those that are part of a larger collaborative project led by others (e.g. research team members or collaborators).

5) The supervisor/advisor may encourage the student to undertake some research that is not formally part of their scholarly paper project or thesis project, provided that it will not negatively impact the student's academic progress. If appropriate, the additional work can be supported by a research assistant stipend.

6) The supervisor/advisor should be aware that a student might experience changes in motivation and productivity. The supervisor/advisor should be prepared to adapt his/her mentorship approach to promote success in a range of different situations.

7) The supervisor/advisor is expected to be aware of accommodation policies, procedures and support services, and to support students with disabilities in designing and organizing accommodations. They are expected to be respectful of graduate students who are dealing with stressful situations and personal difficulties. When appropriate, the supervisor/advisor should direct the student to campus resources and other supports. The supervisor/advisor is responsible for promoting a culture of respect and collaboration and encouraging timely conflict resolution when disputes arise, which may

require consultation with the supervisory committee or others (e.g. head of the graduate program).

8) The supervisor must regularly communicate and have face-to-face meetings with the student to provide feedback on the student's progress, strengths, weaknesses, gaps in knowledge, and how well the student is addressing deficiencies. Written summaries of feedback should be prepared when there are significant deficiencies. When a student is struggling with meeting graduate program/thesis work expectations, a supervisory committee meeting should be scheduled early to assess progress and plans, and to provide a clear statement of requirements to meet expectations.

9) The supervisor/advisor and supervisory committee are required to provide students with timely, but not instantaneous, feedback. As an example, corrections to a thesis chapter, major research project, or a manuscript optimally should occur within a few weeks. Faculty should be aware that they must respond to a draft of the thesis within the timelines outlined in the graduate calendar.

10) Supervisors/advisors who undertake a research leave or other leaves must communicate to their graduate students, and graduate student applicants, the plans to provide supervision during the leave. Supervisors/advisors who will be away from campus for extended periods of time must name an alternate faculty member, with graduate supervisory privileges, who will have day-to-day responsibility and signing-authority for students.

11) The supervisor/advisor is expected to encourage increasing independence as the student progresses through graduate work. Although the supervisor/advisor is not expected to be a copy editor for the student's written work, he/she should review and provide feedback on materials that the student produces prior to external review or defence.

12) Students' contributions to research must be acknowledged in accordance with the University policies and the norms of the academic discipline.

13) When feasible and appropriate, supervisors/advisors are expected to encourage students to submit their graduate work for presentation at conferences and workshops, and for publication.

14) The supervisor/advisor should recognize that there are multiple career paths available to different students, and should be respectful of the student's choice of career path, providing advice, where appropriate, on the best way for the student to reach his/her career goals. The supervisor also should be aware of professional development opportunities for the student offered through the Department/Program, Faculty, or University, and should encourage the student to take advantage of such opportunities.

15) It is the supervisor/advisor's responsibility to be aware of all the requirements, regulations, and guidelines outlined in the Graduate Calendar and University policies. See http://graduate.mcmaster.ca/images/files/graduate/forms/Graduate Work Supervision Guidelines.pdf (see Appendix).

2.7 Theses

2.7.1 General

The thesis will be a coherent work prepared as an electronic document (an e-thesis) that provides a complete and systematic account of the research accomplished by the writer. A printed paper version is no longer acceptable for thesis defense or for storage in the university library after a successful defense. A Doctoral student may prepare and defend either a standard e-thesis (see 'GUIDE FOR THE PREPARATION OF MASTER'S AND DOCTORAL THESES', May 2011;http://graduate.mcmaster.ca/images/files/graduate/ThesisGuide_Final_May2011.pdf) or a "sandwich" e-thesisat oral examination (also known as the 'thesis defense'). Normally, a Master's student may submit only a standard e-thesis (see 'Thesis Guide' section 5.2). Each department or program offering graduate work is wholly responsible for setting up oral examinations for Master's candidates (see 'Thesis Guide' Sections 6.1 and 6.2). The School of Graduate Studies is wholly responsible for arranging all Ph.D. oral examinations (see 'Thesis Guide' Sections 6.3, 6.4, and Appendix 1).

Starting on May 1, 2011, all candidates for Master's or Doctoral degrees who have successfully completed their oral examinations and who have made all required revisions to the satisfaction of their supervisor must upload an electronic version of their final e-thesis to 'Digital Commons' (http://digitalcommons.mcmaster.ca; see section 2.7.3 below).The e-thesis must be presented in a format acceptable to the School of Graduate Studies. Having filed the e-thesis to Digital commons, the student may choose to purchase printed and bound copies for their personal use or for presentation. Details of selected companies who are organized to print and bind the thesis are listed on the School of Graduate Studies website (http://www.mcmaster.ca/graduate). The cost of printing and binding will be borne by the student.

No research for the Master's or Ph.D. degrees at McMaster may be secret or classified. All e-theses will be available to readers through Digital Commons.

Individual Departments or graduate programs may issue special instructions concerning the expected forms of graphs, tables, maps, diagrams, and sound and video files which may be included within the e-thesis. Accepted forms of bibliographical reference in the particular discipline and other matters of format should be discussed with the thesis supervisor. Students may also refer to the instructions set forth in Kate L. Turabian's A Manual for Writers of Term Papers, Theses, and Dissertations (7^{th} ed., 2007). In those instances where an examiner requests a printed copy of the thesis, it is the student's responsibility to produce a print version well before the oral examination.

Doctoral students and their supervisors should keep in mind that theses of extraordinary length are to be discouraged. The preparation of a lengthy Ph.D. thesis almost certainly extends the time that the student takes to complete his or her degree. As a general rule, doctoral students are urged to limit their theses to no greater length than three hundred (300) pages of text (Master's thesis to less than 200 pages).In cases where students and their supervisors believe that responsible scholarly treatment of the thesis topic requires substantially greater length than that specifiedabove, a written approval from the appropriate Associate Dean of Graduate Studies must be obtained before the external examiner is contacted.

2.7.2 Response Times for Theses

Supervisory committees should respond to the draft of a Ph.D. thesis within 2 months. Providing comments on individual chapters will take proportionately less time. Very long theses or chapters may take more time. There are busy periods within the academic year when the time taken to provide comments might be a bit longer than this norm. However, in no case should the response time exceed 3 months.

For Master's theses the corresponding times are 1 month and 2 months.Master's students are entitled to defend within 2 months of providing the final draft of the thesis to the department/program.

2.7.3 Publication of Electronic Theses at McMaster University

Every successfully-defended thesis for a Master's or a Ph.D. degree shall be published substantially as it was approved at the thesis defense, including any changes mandated by the defense committee, through the University Library's Digital Commons and the Library and Archives of Canada. To this end, as a final requirement of the degree, each student must sign a license enabling such digital publication, and must upload the thesis to the Digital Commons in electronic form. Note that the student may request postponement of digital publication for up to one year at the time of uploading the thesis to Digital Commons, and all such requests will be automatically granted. E-publication delays normally would be requested for the shortest amount of time required to facilitate publication with external organizations, to protect any right to immediate commercial gain, or to permit a patent application to be completed. Students wishing extensions of their initial postponement must apply directly to the Associate Vice-President & Dean of Graduate Studies, at least 4 weeks before the termination of the initial e-publication postponement, with a full description of why an additional delay is requested and what steps have been taken to address the issues that required the initial delay. The Associate Vice-President & Dean of Graduate Studies will determine whether further publication postponement is warranted, and, in no case will a publication delay of more than 2 years be permitted.

3. REGULATIONS FOR MASTER'S DEGREES

Master of Applied Science, Master of Arts, Master of Communications Management, Master of Engineering, Master of Engineering Design, Master of Engineering Entrepreneurship and Innovation, Master of Engineering and Public Policy, Master of Health Management, Master of Science, Master of Social Work, Master of Technology Entrepreneurship and Innovation. Regulations for the M.B.A. program may be found in the M.B.A. Calendar, available from the DeGroote School of Business.

3.1 General

Three types of Master's programs are available, although not all departments offer each type. The first is the thesis program, consisting of both course work and a research thesis. The second type entails a project rather than a thesis, as well as course work. In some departments a course work-only program is available. Consult the departmental listings to see what types are available in a specific discipline.

If a department offers more than one of these types, the ability for a student to switch between them is not automatic, but is sometimes permitted. Approval of the supervisor and department chair (or graduate chair/advisor) is required. In many departments, there will be consequences for the level of financial support to the student. As well, there are likely to be consequences for the expected time to completion. Both financial support and expected time to completion should be clarified prior to approval of the change. If such a change is approved, notification should be sent to the School of Graduate Studies by the department or program, along with any change to the payroll authorization. Graduate Studies approval is not required.

The regular Master's programs are designed for those students who can devote their full time to graduate studies. (See Section 2.4.2 for the definitions of a full-time student.) Some departments also offer part-time programs. Consult the departmental listing in this Calendar to see whether or not a part-time program is available in a particular department.

Prior to the 2001-2002 academic year, all Master's degrees awarded within the Faculty of Engineering were designated as Master of Engineering (M. Eng.) degrees. On April 11, 2001, the University Senate approved the use of the Master of Applied Science (M.A.Sc.) designation for thesis-based degrees in the Faculty of Engineering. Non-thesis Master's degrees in the Faculty of Engineering retain the M. Eng. designation.

3.2 Program Requirements

A Master's program involving a thesis will normally be somewhat more specialized and will involve fewer courses than is the case in a Master's program without a thesis. A course Master's program is constructed by departments to contain a sufficient number of courses to make possible a diversified experience, for the student.

The student who is presenting a thesis as part of a program is required to complete, with at least B- standing, at least one full graduate course (or equivalent). Certain programs regularly prescribe additional graduate courses. In accordance with OCGS requirements, no more than one-third of the departmental minimum course requirements may be at the 600-level. The student may be required or permitted by the department to take courses in addition to those prescribed for graduate credit. In consultation with the programs concerned, one or more graduate courses in a related subject may be taken outside of the program.

Students will be required to meet any additional requirements of the program, including special seminars or colloquia. Such requirements are subject to approval by the appropriate Graduate Curriculum and Policy Committee.

3.3 Thesis

A thesis may be submitted at any time. The final date for submitting a thesis to the department for Fall or Spring Convocation is found in the Sessional Dates Section. The thesis will be examined by a committee of not fewer than three members (including the supervisor and an examiner external to the supervisory committee) who will be appointed by the department/program chair;the thesis will be defended by the candidate in an oral examination before this committee. The Associate Vice-President & Dean of Graduate Studies may appoint members to these committees. The time of the defense will be set by the department/program chair; normally this will be about two weeks after the completed thesis (as an electronic file; see section 2.7 above) has been submitted to the department for examination.

After a successful examination and all requested changes have been made, the student will upload the final e-thesis to Digital Commons (see section 2.7). The student may wish to have printed copies of the final thesis suitably bound for personal use or for presentation. The student will be responsible for the cost and distribution of any bound copies.

3.4 Project

In departments where there is the option of submitting a project, the department regulations must be observed. If the project is to be submitted to the University Library, the rules governing Master's theses must be followed.

3.5 Supervision

The general regulations regarding supervision, described earlier (Section 2.6, "Supervision"), apply to Master's students. If the student is registered in a thesis degree program, the thesis supervisor will have been identified by mutual consent, based on the nature of the thesis research. If the student is registering in a degree program without a thesis, a faculty advisor will be assigned. In either case, the advisor may be changed with the approval of the Department, as described in Section 2.6.

3.6 Program Duration

The amount of work in a regular (full-time) Master's program for a student with good preparation varies across the campus, but generally, programs involving a thesis are designed to take longer than those without a thesis. Programs with a thesis typically take sixteen to twenty months. Twelve-month non-thesis programs occur in Anthropology, Classics, Cultural Studies and Critical Theory, Economics, Economic Policy, English, French, History, Physics, Political Science, and Sociology.

For students in a regular program, the permissible time for completion of a Master's degree program is limited to three years from their initial registration in the program. For those students admitted to a part-time Master's program, and who complete all degree requirements while registered part-time, the permissible time is limited to five years from their initial registration.

Each student's progress is reviewed annually by the department and on a more frequent basis by the supervisor. A student whose work is unsatisfactory may at any time be required to withdraw from the University. In those cases in which a student does not manage to complete the degree before the end of the time limit specified above, the University has no further obligation to provide supervision. Upon consultation with the department and on its recommendation, the student will be shown as having been "withdrawn in good standing due to time limit".

In the case of a student in a thesis program, if a completed thesis is submitted, and is acceptable to the department, the student can be readmitted in order to defend the thesis. However, thesis program students who have been withdrawn in good standing should be aware that they may be required to complete additional course work before being permitted to proceed to a defense of the thesis. In all cases, the department must first declare that the submitted thesis is ready for defense before the student will be readmitted.

A student enrolled in a course work or project program may also be readmitted if this is deemed acceptable by the student's department. However, course work and project program students who have been withdrawn in good standing should be aware that they may be required to retake courses in which the content is judged by their department to have changed significantly since first completion and/or may be required to take additional courses that are necessary to fulfill current program requirements.

At the time of readmission, the student will be required to pay a fee (equivalent to one term's tuition) at the rate paid when the student last enrolled, to compensate for the costs of the defense and subsequent processing of the thesis.

4. REGULATIONS FOR THE DOCTOR OF PHILOSOPHY DEGREE

4.1 General

The regular doctoral programs at McMaster have been designed for students who can devote full time to their studies. Academically, full-time Ph.D. study is the best and most efficient way to undertake the degree. However, some departments at McMaster University will consider individual applicants holding a Master's degree whose circumstances preclude uninterrupted full-time graduate work to undertake Ph.D. studies. Because of the divergent nature of academic disciplines, part-time Ph.D. work is not feasible in some areas.

Accordingly, no Department or Program is obligated to offer part-time Ph.D. work. Consult the department listings for information as to whether a part-time program is available in any particular department, or correspond with the department directly.

4.2 Program Requirements

McMaster University does not have a minimum course requirement for the Ph.D. Instead, it is left to each graduate program to establish its own minimum requirement, subject to the approval of the appropriate Graduate Curriculum and Policy Committee, and Graduate Council. In accordance with OCGS requirements, no more than one-third of the program's minimum course requirements may be at the 600-level.

Students should consult that section of the Calendar applicable to the graduate program in which they are interested.

The supervisory committee may also require a student to take courses in addition to the minimum prescribed by the program's regulations. These additional courses must be relevant to the student's program. They may be taken in another program and may be at either the undergraduate or the graduate level. The student who is required to take undergraduate courses may register for a maximum of 12 units of such work.

Students will be required to meet any additional requirements of the program, including special seminars or colloquia. Such requirements are subject to approval by the appropriate Committee on Graduate Curriculum and Policy.

4.3 Examinations

All Ph.D. candidates at McMaster are expected to acquire, during the course of their studies, a comprehensive knowledge of the discipline or sub-discipline to which their field of research belongs. The Comprehensive Examination is designed to test students for this breadth of knowledge and the ability to integrate ideas. The form of the exam and its administration are the responsibility of the department in which the student is registered, not of the student's supervisory committee. The outcome will be reported to the School of Graduate Studies as "pass with distinction", "pass", or "fail."

If the result of the examination is "fail", the student must be given a second opportunity to take the examination, or those portions on which the failure occurred. This second opportunity is given in place of any 're-read' of a comprehensive exam, which is explicitly excluded from the Student Appeal Procedures, and in recognition of the fact that the failure may occur on the oral part of the examination. If a student chooses to withdraw from the program prior to that second opportunity, the result "fail" will remain on the student's record. A second failure will result in the student being withdrawn by the beginning of the following month.

The Comprehensive Examination for full-time students will normally take place between 12 and 20 months after the student has begun Ph.D. work at McMaster, with an upper limit of 24 months. Individual exceptions require the approval of the appropriate Faculty Committee on Graduate Admissions and Study. Programs which offer part-time Ph.D. programs must require such students to take the Comprehensive Examination by the end of the 36th month.

Departments may hold qualifying or entrance examinations at the beginning of a student's doctoral studies.

There is no University-wide foreign language requirement for Ph.D. students. Many departments, however, do have such a requirement (see departmental regulations).

All departmental examination rules and practices are subject to approval by the Faculty Committee on Graduate Curriculum and Policy, which may refer questions to Graduate Council.

4.4 Thesis

A candidate must present a thesis which embodies the results of original research and mature scholarship. In the case of sandwich theses, mature scholarship specifically includes substantial and significant contributions to the composition of text in papers with multiple authors.The student must be authorised by a majority of the supervisory committee before producing the final version of the thesis for oral defense. Normally the thesis will be distributed to committee members and examiners in an electronic format (see Section 2.7 - Theses).

When a majority of the supervisory committee have approved the final version of the thesis, it may be submitted to the School of Graduate Studies for examination. The oral defense will not be arranged by the Thesis Coordinator until a majority of the supervisory committee has submitted a report approving the thesis for defense and an agreed date of defense has been received.

Selection of the Examining Committee

Selection of an external examiner is the responsibility of the Associate Vice-President & Dean of Graduate Studies. To aid in that selection, the supervisory committee is required to provide, through the Chair of the Department (or equivalent), the names and contact information for three potential examiners, at least one month prior to the submission of the thesis. The nominees must not have primary appointments at McMaster University, and they must be at arm's length* from all members of the supervisory committee and the student. To maintain this distance, all communication with a potential or selected external examiner that is related to the examination and defense of the student must originate only from the School of Graduate Studies.The external examiner will provide a written report to the Associate Vice-President & Dean of Graduate Studies judging whether the written thesis is satisfactory for defense or not. The external examiner will provide this assessment regardless of their ability to be present at the defense.

The examining body will consist of the following members: the student's supervisor, two representatives of the department selected by the chair (normally from the supervisory committee), and an external examiner. If the external examiner cannot attend the oral defense, either in person or through tele- or video-conferencing, one additional representative of the faculty at large will be selected as an attending external examiner. In unusual situations where the supervisor is not available to participate in the defense for an extended period, the program Chair may designate a different faculty member to serve on the examining committee in place of the supervisor.

The definition of 'arm's length' is as follows: The nominees should not have been a research supervisor or student of the supervisor or the student within the last 6 years; should not have collaborated with the supervisor or the student within the past 6 years, or have made plans to collaborate with these individuals in the immediate future. There also should be no other potential conflicts of interest (e.g., personal or financial). External examiners should not have been employed by or affiliated with the student's or supervisors' Department within the past 6 years, nor expect to become employed in the Department in the immediate future.

Scheduling and Conducting the Oral Examination (Oral Defense)

If the external examiner approves the thesis for oral examination, an oral defense will be convened by the Associate Vice-President & Dean of Graduate Studies, chaired by herself or her delegate and conducted by all members of the examining committee. Quorum for the examination will be the Chair of the examining committee plus four examiners. At the discretion of the student, the oral defense will be open to members of the university community and the public who wish to attend as observers. The examination proper will be conducted only by the members of the examining committee. When they have completed their questions, the Chair may permit a few minutes of questioning by visitors. Normally the student will attempt to answer visitors' questions, but these are not to be considered part of the examination for the degree. Observers will withdraw prior to the committee's deliberations on the student's performance at the defense.

If the external examiner does not approve the thesis for an oral defense, the appropriate Associate Dean will convene a meeting with the student's supervisory committee to discuss the external examiner's report. The supervisory committee and student will make every effort to address the concerns of the examiner, and the revised thesis may be re-assessed again by the external examiner. In rare cases, a new external examiner may be appointed by the Associate Vice-President and Dean of Graduate Studies.

After a discussion of the examination, the Chair will ask for a vote on each of the two questions, the acceptance or rejection of the **written document** and the success or failure of the **defense**. If the examiners approve both the written thesis and the defense, the Chair will ask the examiners to complete the Examination Report by initialling appropriately. The student will be invited back to the examination room for congratulations by the committee. In the event the written thesis is approved conditionally, the Chair of the examination committee is responsible for ensuring that (1) the candidate is advised of the conditions in writing, (2) the candidate receives and understands the 'Final Thesis Submission form' to be used by the Supervisor to confirm that the conditions have been met, and (3) the supervisor is also aware of the form. The Chair will complete and sign the Examination Report and return it to the School of Graduate Studies.

However, if there are two or more negative or abstaining votes on either question, with at least one of these votes being from a member of the supervisory committee, the candidate will be deemed to have failed the defense, and a reconvened oral defense must be held at a later date. The candidate should be told as clearly as possible by the Chair and the examining committeewhat he/she must do to improve the written thesis and/orthe defense of it. The reconvened defense is the candidate's final opportunity to complete the degree. Membership on the reconvened examining committee should be the same as that for the original defense, except that one or two substitutions are permitted in order to expedite scheduling of the reconvened defense. If the written thesis, or the defense of it, fails a second time, that decision is final, and is not open to appeal.

After a successful defense, the candidate must correct any errors detected by the readers to the satisfaction of the Supervisor and then submit an electronic copy to the School of Graduate Studies via Digital Commons (see Section 2.7.3 - Publication of Electronic Theses at McMaster University). The fee for archiving the thesis is paid by the student.

4.5 Supervision

The general regulations in regard to supervision, described earlier (Section 2.6), apply to doctoral students.

Students will be expected to confer with the Chair of the Department/Program and others in choosing a supervisor for their entire doctoral program, including the proposed research. As soon as possible, and in any case not later than six months following their arrival, a supervisory committee will be appointed by the department/program, on the recommendation of the students and their possible supervisors. The supervisory committee will consist of at least three members. Two, including the supervisor, must be from within the department/program. A third member, whose scholarly interests include the area of the student's main interest, may be from outside the department/program. One member may be appointed from outside the University with the permission of the Associate Vice-President & Dean of Graduate Studies. If the need arises, the membership of a supervisory committee will be subject to change by the same procedures involved in its appointment (see Section 2.6 - Supervision). Supervisory committee members,including supervisors, may not resign without the department's/program's approval.The duties of the Ph.D. supervisory committee will be as follows:

- to assist in planning and to approve the student's program of courses and research;
- to approve the thesis proposal;
- to decide, within departmental regulations, on the timing of the comprehensive examination and, where applicable, of the language and other examinations;
- to maintain knowledge of the student's research activities and progress;
- to give advice on research, usually through the student's supervisor;
- to provide the student with regular appraisals or progress or lack of it;
- to perform such other duties as may be required by the department;
- to report on the above matters annually, in writing, on the approved form to the department, which in turn will report to the Faculty Graduate Committee on Admissions and Study;
- to initiate appropriate action if the student's progress is unsatisfactory, including any recommendation that the student withdraw, for approval by the department and the Faculty Committee on Graduate Admissions and Study;

- to decide when the student is to write the thesis and give advice during this process;
- to act as internal examiners for the student's thesis;
- to act as members of the examination committee for the final oral defense when so appointed.

The supervisory duties of the department/program will be as follows: to provide all Ph.D. students in its doctoral program with copies of the complete departmental regulations of the program (such regulations are subject to approval by the Faculty Committee on Graduate Curriculum and Policy); to approve the membership and work of the supervisory committee; and, when necessary, to make changes in the membership; to report this membership to the Faculty Committee on Graduate Admissions and Study; at least once a year to review each student's course grades and research progress, as reported by the supervisory committee; to conduct comprehensive examinations; to conduct or arrange for language examinations when these are required; to attest to the Faculty Committee on Graduate Admissions and Study that all departmental and University requirements for the degree have been satisfied; to name any departmental representatives to the examination committee for the final oral defense of the thesis; to replace any members of the supervisory committee, including the supervisor when on leave of absence or, if necessary, when on research leave.

Part-time students must have their course grades and research progress reviewed at least once a year by the supervisory committee.

4.6 Program Duration

The minimum time in which to complete a Ph.D. program at McMaster is three calendar years beyond the bachelor's level or two calendar years beyond the master's level. However, the minimum time may be reduced by up to one year for graduate work beyond the Master's level taken in a university or research institution approved by the Faculty Committee on Graduate Admissions and Study.

Completion of the Ph.D. degree is normally limited to six years from initial registration in a regular doctoral program at McMaster. The time for completion of the Ph.D. program for those admitted to a part-time program is normally limited to eight years from initial registration at McMaster as a Ph.D. student.

Each student's progress is reviewed annually by the department and on a more frequent basis by the supervisory committee. A student whose work is unsatisfactory may at any time be required to withdraw from the University.

In those cases in which a student does not manage to complete the degree requirements before the end of the time limit specified above, the University has no further obligation to provide supervision. Upon consultation with the department and on its recommendation, the student will be shown as having been “withdrawn in good standing due to time limit”.

If a completed thesis is submitted, and is acceptable to the department, the student can be readmitted in order to defend the thesis. Students who have been withdrawn in good standing should be aware that they may be required to complete additional course work before being permitted to proceed to a defense of the thesis. In all cases, the department must first declare that the submitted thesis is ready for defense before the student will be readmitted.

At the time of readmission, the student will be required to pay a fee (equivalent to one term’s tuition) at the rate paid when the student last enrolled, to compensate for the costs of the defense and subsequent processing of the thesis.

5. FINANCIAL MATTERS

5.1 Fees for Graduate Students

(The Board of Governors reserves the right to amend fees after the printing of this statement.) These regulations apply to tuition and student fees. They cover the various charges which would be incurred for reasons of late payment or late registration. The 2012-2013fees schedule is in effect for a period of September 1, 2012 to August 31, 2013 and applies to all graduate students whether registered in regular or part-time degree programs.

2012-2013 Schedule of Fees
(Canadian Fees)

New Students (Term 1)	**Fall**	**Winter**	**Spring**	**Total**
Regular Tuition Fees	2,336.00	2,336.00	2,336.00	7,008.00
Part-time Fees	1,168.00	1,168.00	1,168.00	3,504.00

Returning Students (Terms 2-4 in September 2012)	**Fall**	**Winter**	**Spring**	**Total**
Regular Tuition Fees	2,249.00	2,249.00	2,249.00	6,747.00
Part-time Fees	1,125.00	1,125.00	1,125.00	3,375.00

Returning Students (Terms 5-7 in September 2012)	**Fall**	**Winter**	**Spring**	**Total**
Regular Tuition Fees	2,166.00	2,166.00	2,166.00	6,498.00
Part-time Fees	1,083.00	1,083.00	1,083.00	3,249.00

Returning Students (Terms 8-10 in September 2012)	**Fall**	**Winter**	**Spring**	**Total**
Regular Tuition Fees	2,086.00	2,086.00	2,086.00	6,258.00
Part-time Fees	1,043.00	1,043.00	1,043.00	3,129.00

Returning Students (Terms 11 or greater in September 2012)	**Fall**	**Winter**	**Spring**	**Total**
Regular Tuition Fees	2,009.00	2,009.00	2,009.00	6,027.00
Part-time Fees	1,003.00	1,003.00	1,003.00	3,009.00

Discounted Fees (Ph.D. only)	1,003.00	1,003.00	1,003.00	3,009.00

2012-2013 Schedule of Fees
(International Fees)

All Levels	**Fall**	**Winter**	**Spring**	**Total**
Regular Tuition Fees	5,271.00	5,271.00	5,271.00	15,813.00
Part-time Fees	2,705.00	2,705.00	2,705.00	8,115.00
Discounted Fees (Ph.D. only)	1,003.00	1,003.00	1,003.00	3,009.00

Mandatory SupplementalFees (Full time)	**Sept. 2012**	**Jan. 2013**	**May 2013**
Administrative Services	21.27	14.18	7.09
Student Services	114.03	76.02	38.01
GSA Fee	54.00	54.00	0.00
GSA Health Insurance Plan	180.00	120.00	0.00
GSA Dental Insurance Plan	170.00	133.33	0.00
HSR (Bus Pass)	182.70	182.70	0.00
Sports Complex Building Fee	34.47	22.98	11.49
GSA Capital Building Fee	60.00	60.00	60.00
Total	816.47	663.21	116.59

Mandatory SupplementalFees (Part time)	**Sept. 2012**	**Jan. 2013**	**May 2013**
Administrative Services	10.65	7.10	3.55
Student Services	57.03	38.02	19.01
GSA Fee	32.68	32.68	0.00
GSA Health Insurance Plan	180.00	120.00	0.00
GSA Dental Insurance Plan	170.00	133.33	0.00
HSR (Bus Pass)	0.00	0.00	0.00
Sports Complex Building Fee	34.47	22.98	11.49
GSA Capital Building Fee	60.00	60.00	60.00
Total	544.83	414.11	94.05

2012-2013 Post Degree (Canadian)	**up to 1 Half course**	**up to 2 Half courses**	**up to 3 Half courses**
Tuition	1,168.00	2,336.00	3,504.00
Administrative Services	3.55	7.10	10.65
Student Services	19.01	38.02	57.03
GSA Fee	10.89	21.78	32.67
Sports Complex Building Fee	11.49	22.98	34.47
GSA Capital Building Fee	60.00	60.00	60.00
Total	1,272.94	2,485.88	3,698.82

2012-2013 Post Degree (International)	up to 1 Half course	up to 2 Half courses	up to 3 Half courses
Tuition	2,705.00	5,410.00	8,115.00
Administrative Services	3.55	7.10	10.65
Student Services	19.01	38.02	57.03
GSA Fee	10.89	21.78	32.67
Sports Complex Building Fee	11.49	22.98	34.47
GSA Capital Building Fee	60.00	60.00	60.00
Total	2,809.94	5,559.88	8,309.82

2012-2013 Special Program Fees

Advanced Design and Manufacturing Institute

2,700.00 per half course

Advanced Neonatal Nursing Diploma

12,165.00per year plus PT mandatory supplemental fees

Gender Studies and Feminist Research Diploma

Canadian 1,168 per half course
International 2,705 per half course

Master of Health Management

Canadian 2,600.00 per 1/2 course plus PT mandatory supplemental fees
International 5,200 per ½ course plus PT mandatory supplemental fees

Master of Communications Management

Canadian 3,373.00 per course plus PT mandatory supplemental fees
International 3,572.00 per course plus PT mandatory supplemental fees

Master of Engineering Design

Canadian

Level 1 Full-time 5,267.00 per term (15,801.00 annually) plus mandatory supplemental fees
Part-time 2,703.00 per term (8,109.00 annually) plus mandatory supplemental fees
Level 2 Full-time 5,072.00 per term (15,216.00 annually) plus mandatory supplemental fees
Part-time 2,603.00 per term (7,809.00 annually) plus mandatory supplemental fees

International

All Levels Full-time 5,676.00 per term (17,028.00 annually) plus mandatory supplemental fees
Part-time 2,912.00 per term (8,736.00 annually) plus mandatory supplemental fees

Master of Engineering Entrepreneurship and Innovation / Master of Technology Entrepreneurship and Innovation

Canadian

Level 1 Full-time 6,055.00 per term (18,165.00 annually) plus mandatory supplemental fees
Part-time 3,027.00 per term (9,081.00 annually) plus mandatory supplemental fees
Level 2 Full-time 5,831.00 per term (17,493.00 annually) plus mandatory supplemental fees
Part-time 2,915.00 per term (8,745.00 annually) plus mandatory supplemental fees

International

All Levels Full-time 9,089.00 per term (27,267.00 annually) plus mandatory supplemental fees
Part-time 4,544.00 per term (13,632.00 annually) plus mandatory supplemental fees

Master of Engineering and Public Policy

Canadian

Level 1 Full-time 5,267.00 per term (15,801.00 annually) plus mandatory supplemental fees
Part-time 2,703.00 per term (8,109.00 annually) plus mandatory supplemental fees
Level 2 Full-time 5,072.00 per term (15,216.00 annually) plus mandatory supplemental fees
Part-time 2,603.00 per term (7,809.00 annually) plus mandatory supplemental fees

International

All Levels Full-time 5,676.00 per term (17,028.00 annually) plus mandatory supplemental fees
Part-time 2,912.00 per term (8,736.00 annually) plus mandatory supplemental fees

MD/Ph.D. Program

This program covers both the MD and Ph.D. curriculum over a period of seven years. During the MD years, students will be assessed tuition fees based on tuition for the MD programs. During the Ph.D. years, students will be assessed tuition fees based on tuition for full time Ph.D. students as shown on the schedule above. Mandatory supplemental fees are based on full time rates. During the MD portion of curriculum, extra fees will be assessed for the Learning Resource fee, Medical Society fee, Health Screening fee, and Respiratory Mask Fitting fee.

Nuclear Technology

1,224.00per 1/2 course
plus 60.00 GSA Capital Building Fee totaling 1,284.00

Rehabilitation Science - On-line

Canadian 1,406.00 per 1/2 course plus PT mandatory supplemental fees
International 2,381.00 per 1/2 course plus PT mandatory supplemental fees

UNENE

2,700.00 per 1/2 course plus PT mandatory supplemental fees

Visiting students

Zero tuition plus post degreemandatory supplemental fees on a per term basis

2012-2013 Occupational Therapy/Physiotherapy Fees

Canadian Fees	**M.Sc. (OT)**	**M.Sc. (PT)**
Tuition Fees	8,773.00	8,773.00
Administrative Services	21.27	21.27
Student Services	114.03	114.03
GSA Fee	54.00	54.00
GSA Health Insurance Plan	180.00	180.00
GSA Dental Insurance Plan	170.00	170.00
HSR (Bus Pass)	182.70	182.70
Sports Complex Building Fee	34.47	34.47
GSA Capital Building Fee	60.00	60.00
Learning Resource Fee	161.15	248.44
Health Screening Fee	26.42	26.42
Respiratory Mask Fitting Fee	21.62	21.62
Total	9,798.66	9,885.95

International Fees	**M.Sc. (OT)**	**M.Sc. (PT)**
Tuition Fees	29,772.00	29,772.00
Administrative Services	21.27	21.27
Student Services	114.03	114.03
GSA Fee	54.00	54.00
GSA Health Insurance Plan	180.00	180.00
GSA Dental Insurance Plan	170.00	170.00
HSR (Bus Pass)	182.70	182.70
Sports Complex Building Fee	34.47	34.47
GSA Capital Building Fee	60.00	60.00
Learning Resource Fee	161.15	248.44
Health Screening Fee	26.42	26.42
Respiratory Mask Fitting Fee	21.62	21.62
Total	30,797.66	30,884.95

Notes:

Students promoted to a Doctoral program from a Master's program will be considered as new admissions for the purpose of time limits for completion of the degree requirements, eligibility for financial assistance, and fee assessment.

Some international students may be eligible to pay Canadian fees depending on various immigration policies, and the Ministry Funding Manual. International students in Term 7 or greater of a Master's program or Term 13 or greater of a Ph.D. program will pay Canadian fees.

Most students will pay regular fees. Part-time fees apply only to those students originally offered admission to a part-time program. If students change status from full time to part time, they will still be required to pay regular fees. The part-time fees will allow registration in up to 3 half courses per academic year. Students registering in more than 3 half courses will be assessed full-time fees (not students in the UNENE, ADMI, Health Management, Rehabilitation Science (on-line), and Communications Management programs). In situations where a student in a part-time program completes the degree or withdraws from the university, fees for the academic session will be assessed by the number of terms or number of half courses (whichever is the greater). Term count is adjusted if student changes status from part to full time at a ratio of 2:1.

Ph.D. students who have been registered as full-time for longer than the normal period of funding eligibility (as defined in Section 5.2.1) will be assessed discounted fees.

A fee is charged for each course taken on the basis of Section 2.1.4 by persons who are not registered graduate students. The fee for certain courses may be higher.

Students on leave of absence do not pay tuition fees but do pay mandatory supplemental fees. Students who are on leave for a complete academic year do not pay mandatory supplemental fees. Students who have "withdrawn in good standing due to time limit" do not pay fees until readmission. See Section 5.1.4 (Readmission Tuition Charges). Students admitted in January or May, will have a slightly different schedule of fees.

For M.B.A. fees refer to the M.B.A. Calendar available from the DeGroote School of Business.

Enquiries should be referred to the School of Graduate Studies, 905 525-9140 Ext. 23679.
E-mail: askgrad@mcmaster.ca

5.1.1 Payment of Fees

In order to register a student must either:

(a) pay by cash or cheque, full tuition and all additional fees for the full year;
or

b) have been offered and accepted a teaching assistantship and/or scholarship whose sum less appropriate taxes and deductions exceeds the amount of tuition and all other mandatory supplemental fees. Fees will be deducted from the student's monthly pay;
or

(c) have made special arrangements with Financial Services.

5.1.2 Non-payment of Fees or Charges

Students with outstanding accounts at the end of the academic year will:

(a) not receive academic results; and
(b) not be permitted to register for the next academic year until the account is settled.

5.1.3 Discounted Fees – Ph.D. Students

Full-time Ph.D. students (Canadian and international), who have reached term 13 or greater of their Ph.D. studies, will be charged tuition at a discounted fee rate. The discounted tuition rate is normally equal to 1/2 of the Canadian tuition rate.

5.1.4 Readmission Tuition Charges

Students who do not register and pay tuition for any academic session are deemed to have withdrawn. These students and those who have been withdrawn in good standing due to time limit are required to apply for readmission. Ph.D. students who were withdrawn in good standing due to time limit and are successful in gaining readmission will be assessed a full year's fees at the discounted rate and the existing application fee, and will not be eligible for a refund. The readmission fee covers registration until the next academic session.

Students who withdrew voluntarily or did not register for an academic session and wish to apply for readmission must pay a full year's fees at the current rate of the last category (regular or part-time) in which they were registered and the existing application fee and will not be eligible for a refund. Readmissions in this category are not eligible for the part-time rate unless the student was registered in a part-time program at the time of withdrawal.

5.1.5 Refund of Tuition Fees

A student, who completes the degree requirements, withdraws from the program, or takes a leave of absence prior to the end of the academic year will be entitled to a refund. (Note**:** This does not apply to students who are readmitted.) The refund is based on the number of full months remaining in the academic year. Mandatory supplemental fees are not refundable.

5.2 Financial Assistance

5.2.1 Financial Support for Full-time Students

The University normally provides four types of financial support to full-time students. They are employment income, graduate/department or research scholarships, internal scholarships and bursaries, and external awards tenable at the university. A student's letter of offer or award letter from the University will include all details of financial support. Students with questions regarding financial support should contact their department or graduate program directly for assistance.

The University provides graduate scholarship awards to most regular graduate students in Ph.D. programs and in many Master's programs. These students must be full-time as defined in section 2.4. Such scholarships are awarded annually. A Ph.D. student is normally eligible for his/her first four years. Students in Master's programs are usually supported for their first three to six terms depending on the department. Subsequent support is at the department or graduate program's discretion, unless the offer of admission guarantees otherwise.

Teaching Assistantships (TA) (or Research Assistantship-in-lieu under the collective agreement between Canadian Union of Public Employees, Local 3906, Unit 1 and McMaster University) and contract employment income are offered to many graduate students registered in full-time programs. TA duties vary according to department but will normally consist of performance in connection with undergraduate teaching, such as leading tutorials, demonstrating labs, and marking assignments. The award of a TA may vary but should not exceed 10 hours per week, plus three hours of training per term. TA funding is contingent on fulfillment of the employment obligations and maintaining satisfactory work performance, as stated in the letter of offer or employment contract. No exceptions totalling 505 hours or more in a single academic year will be approved. Employment is paid as earned over the period in which the work is performed. Note that employee number and student number are different.

5.2.2 Financial Payments to Graduate Students

International students must provide a clear demonstration of their means of financial support in order to obtain a student visa. The Faculties may provide tuition bursary funds to visa students to assist with tuition fees. These monies are paid over the same time period that the tuition is deducted.

For students receiving scholarship support and/or employment income, graduate pay is distributed on the last Thursday of each month, except in December when wages shall be paid by the 15th of the month. The direct deposit method of payment is mandatory. A Statement of Earnings, showing details of payment, will be mailed to the student at the department's general address.

The University is required by law to deduct Canada Pension Plan and Employment Insurance premiums on all employment income. Income Tax will be assessed on employment income only.

Payment of employment or scholarships and bursaries may be distributed unevenly during the academic year in order to provide approximate equal payments throughout the year. Generally, this approach will result in a graduate student receiving a greater percentage of his/her scholarship funding during the summer than during the first eight months of the year. Students should consult with their program or department about the schedule of payments.

If the student withdraws or graduates from the program part way through an academic year, the student is not entitled to any further portion of the award. Note that monies owing to McMaster, such as taxes or award repayments to an external agency, will be deducted from the student’s financial support as necessary.

6. ADDITIONAL UNIVERSITY REGULATIONS AFFECTING GRADUATE STUDENTS

6.1 <u>Academic Integrity</u>

The following brief statement is excerpted in part from the McMaster University Academic Integrity Policy. For guidance on how to proceed in the case of suspected academic dishonesty, please consult the Office of Academic Integrity and the complete policy at *http://www.mcmaster.ca/academicintegrity*. The Associate Deans of Graduate Studies are available for confidential consultations on matters related to academic integrity.

Academic Work

Academic work includes any academic paper, term test, proficiency test, essay, thesis, research report, evaluation, project, assignment or examination, whether oral, in writing, in other media or otherwise and/or registration and participation in any course, program, seminar, workshop, conference or symposium offered by the University.

For graduate students, comprehensive/qualifying exams, any research work, and thesis work (a thesis proposal, or thesis draft, or draft of one or more chapters) also constitute academic work and must adhere to standards of academic integrity.

Academic Dishonesty

<u>Definition</u>

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage.

Wherever in this policy an offence is described as depending on "knowingly," the offence is deemed to have been committed if the person ought reasonably to have known.

<u>Students (Undergraduate and Graduate)</u>

Students are responsible for being aware of and demonstrating behaviour that is honest and ethical in their academic work. Such behaviour includes:

(a) following the expectations articulated by instructors for referencing sources of information and for group work;
(b) asking for clarification of expectations as necessary;
(c) identifying testing situations that may allow copying;
(d) preventing their work from being used by others, e.g., protecting access to computer files; and

(e) adhering to the principles of academic integrity when conducting andreporting research.

Students are responsible for their behaviour and may face penalties under this policy, if they commit academic dishonesty.

Graduate Students

Graduate students, having been deemed admissible to higher studies, are expected to be competent in the acknowledgement of other people's work, whether that work is in print or electronic media.

Graduate students are expected to understand the demands of ethical conduct of research and reporting research results. All graduate students are responsible for familiarizing themselves with the definition of research misconduct in the University's policy, namely, "a researcher must be honest in proposing, seeking support for, conducting, and reporting research; a researcher must respect the rights of others in these activities."

6.2 Code of Conduct

McMaster University is a community dedicated to furthering learning, intellectual inquiry, and personal and professional development. Membership in the community implies acceptance of the principle of mutual respect for the rights, responsibilities, dignity and well-being of others and a readiness to support an environment conducive to the intellectual and personal growth of all who study, work and live within it.

The *Code of Conduct* outlines the limits of conduct considered to be consonant with the goals and the well-being of the University community, and defines the procedures to be followed when students fail to meet the accepted standards.

Copies of the *Code of Conduct* may be obtained from the website at
http://www.mcmaster.ca/policy/student.htm.

6.3 Appeal Procedures

The University has a responsibility to provide fair and equitable procedures for the lodging and hearing of student complaints arising out of University regulations, policies and actions that affect students directly. The procedures described in the Student Appeal Procedures are intended to provide a mechanism to fairly address alleged injustices.

Students who wish to raise questions or who have a concern are strongly encouraged to communication informally with their instructors, the Chair of his/her Supervisory Committee (or the Department Graduate Advisor where no committee exists), the Department Chair and/or the Associate Dean of Graduate Studies, the University Ombud, or the appropriate administrative officer *before* seeking a review under the formal procedures. Experience has shown that many complaints can be resolved satisfactorily through informal communication. Students are requested to speak with the University Secretary regarding a complaint before submitting an application.

Students should seek remedies for their grievances as promptly as possible and must do so within the time limitations set out in the Student Appeal Procedures.

A Master's or Ph.D. thesis is specifically excluded from the re-read procedures identified in the Student Appeal Procedures, as is a Ph.D. comprehensive exam. If a student does poorly in any of these examinations, the original examining committee is required to allow the student a second opportunity at the examination after at least a week. If the student fails on that second attempt, no further "re-read" of the examination is permitted.

The Student Appeal Procedures may be found at:

http://www.mcmaster.ca/policy/Students-AcademicStudies/StudentAppeal.pdf

6.4 Ownership of Student Work

In Canada, the author is the immediate owner of the copyright in an original work, except when the author is employed to create such material. 'Copyright' is an exclusive property right to publish, produce, reproduce, translate, broadcast, adapt or perform a work, as defined in the Copyright Act (R.S.C. 1985, c. C-42, as amended). For work done by a graduate student, McMaster has the following policies related to the interpretation of copyright and other aspects of intellectual property rights. These policies distinguish in general between items done solely by the student and those undertaken as part of a joint research effort.

In the former case, the intellectual property is primarily the student's, but the University reserves certain rights as detailed in the remainder of this section. In the latter case, the intellectual property rights involve the student, the research supervisor, (and possibly other individuals as well), the University, and on occasion the financial sponsor of the research. If the work is anticipated to have commercial possibilities, it is recommended that the parties involved agree in writing beforehandon the sharing of any financial returns. The Associate Deans of Graduate Studies are available for confidential consultations on matters of ownership of student work involving faculty and/or other individuals.

6.4.1 Examinations, Reports and Papers Done as Part of Course Requirements

When work that is eligible for copyright is submitted to meet a requirement of a course, the University acknowledges the student's ownership ofthe copyright, but places the following conditions on the submission of the work to meet course requirements.

(a) The original physical document becomes the property of the University. This applies particularly to examination answer scripts, and may also be applied to term papers and other course work.

(b) Except for examination scripts, the University receives a royalty- free,non-exclusive licence to make copies of the work for academic purposes within the University, and to circulate the workas part of the University library collection.

6.4.2 Theses and Master's Project Reports

As with other papers, the University recognizes that the student holds copyright to the finished thesis. Copies of the thesis shall have on them in a prominent place on the title page the international copyright notice.

The student is required to sign a licence to the University library (and for Ph.D. students an additional licence to the National Library). (See Section 2.7.3 above. These licences grant the two libraries permission to reproduce the thesis and to circulate it, but do not affect ownership of the copyright.)

However, the University also recognizes that the ideas in the thesis will often arise from interaction with others. In some cases, this interaction will have been solely with the thesis supervisor; in other cases, a larger research team will have been involved. For this reason, it is understood that the copyright refers only to the written document of the thesis. The ideas, or commercial exploitation of the work may or may not be the exclusive property of the student. For the student who has worked closely with a supervisor, or as part of a research group, the rights to publish, patent, or commercially exploit the results of the research are shared with the supervisor and/or the research group, and with the University. In those cases in which the work has been supported in part by research grants or contracts, there may be other conditions affecting any patent or commercial exploitation. (The student should be made aware of any such conditions before work begins.)

6.4.3 Computer Programs

Computer programs written as part of employment duties, as for example by a teaching assistant, are the property of the employer, as specified in the Copyright Act. Computer programs written as part of course work, a project or a thesis may also have value as a potentially marketable intellectual property. The University recognizes that such software may arise in two different ways, and accordingly has two policies. In setting forth these policies, it is understood that in those cases in which software development draws upon other software owned or licensed by the University, the terms and conditions of the licence or purchase must be followed.

(a) Where a student develops such software at the direct request of a supervisor, and under supervision, it is assumed that there is joint ownership of the intellectual property rights. In such cases, it is recommended that the individuals involved co-author a working paper documenting the software, rather than including it as an appendix to a thesis or report. Prior agreement between the student and supervisor that this is to be the case would behelpful, but is not mandatory.

(b) Where a student develops such software on his/her own, as for example for an independent project in a course, copyright remains with the student. As a condition of using University computing facilities, the student is required to grant the University a royalty-free licence to use the software. This includes the right of the University to distribute copies of the software to McMaster faculty, staff, and students for the University's administration, education and research activities. This licence does not include the right to use the software for commercial purposes or to distribute the software to non-McMaster people.

6.4.4 Research Data

As with computer software, the University recognizes that research is conducted and data are acquired in two different fashions. When the data are acquired as part of a joint or collaborative effort, such as one relying on the equipment within a laboratory, they are not solely the property of the student, although some of the data may ultimately appear in tables or appendices in a completed thesis. As a general rule, such data are the joint property of the student and the research supervisor, either of whom has the right to make them available to other individuals as well. Both student and supervisor are responsible for insuring that proper acknowledgement of the contributions of the student, supervisor, and other members of the research team is made when the data are released in any form.

When the data are acquired through the student's individual effort, and without the use of University laboratories or funding, then they are usually the property of the student making that effort. However, exceptions may occur when the student collects data using research instruments, including interview schedules and questionnaires, developed wholly or in part by the research supervisor or by some other person or agency. In such instances the right to ownership and/or use of the data may be shared among the parties involved. Given the range of possible alternatives it is not possible to set absolute guidelines in advance covering all such situations. Consequently, it is recommended that students and supervisors make clear agreements in advance concerning the ownership and use of data collected in this fashion. Ownership of data may also be affected by the terms of a research contract that has supported the work.

6.4.5 Equipment

If University resources have been applied to the construction or design of equipment, it is not the property of the student, but of the University. Equipment constructed or designed as part of course or thesis work is the property of the student if the work, materials, and workroom space have been provided by the student or other non-University source. Ownership of newly constructed equipment may also be specified in a research contract that has supported the work.

6.5 McMaster University Policy for Academic Accommodation of Students with Disabilities

McMaster University is committed to ensuring that each student is afforded an academic environment that is dedicated to the advancement of learning and is based on the principles of equitable access and individual dignity. To this end, the University has a Centre for Student Development and is continuously making improvements to its facilities to maximize access for all students. The School of Graduate Studies, along with the relevant academic department(s) and the Centre for Student Development, encourages academically qualified students to investigate the full range of possibilities at McMaster.

As with all applicants, those with disabilities are expected to select graduate programs that are appropriate for their skills and abilities. Materials provided to applicants by departments should describe specific program requirements, including the nature of research and/or course work, to ensure that the applicant is aware of the expectations for successful completion of the program. Students with pre-existing disabilities, as well as students who become disabled after their admissions to graduate studies, may require special support services and accommodations in order to complete their programs successfully. The University will take reasonable steps to provide such services and accommodations that do not compromise the quality and integrity of the student's academic program. Self-identification is voluntary and confidential, and access to information must be approved by the applicant. To facilitate accommodation, however, McMaster University urges applicants to declare any disabilities, as well as to provide details concerning accommodations provided by their previous educational institutions, at the time of application. Such declaration is encouraged particularly in cases where it is felt that the disability may have affected past academic performance, and/or where accommodation may be required in order for the student to complete his/her graduate program. Applicants who have been identified and who are offered admission will need to consult with their Department/Program Chair and the Centre for Student Development as early as possible, and preferably prior to enrolment, to identify and implement an appropriate accommodation plan. At all times, concern for maintaining the dignity of the individuals involved will be paramount. Failure to disclose a disability at the time of admission, however, may delay or otherwise compromise the accommodation process.

Special services and accommodations are provided on an individual basis, are disability specific, and are consistent with the academic objectives of the course and program. McMaster University's *Policyfor Academic Accommodation of Students with Disabilities* outlines the steps that must be taken in order to arrange for such services and accommodations (see Sections 31-34 inclusive). The full policy is available from the Centre for Student Development.

6.6 Student/Faculty Non-Disclosure Agreements

The School of Graduate Studies encourages the cooperation of faculty with the private sector. Often cooperation will permit the involvement of graduate students. When this happens, it is not unusual for a company to protect its interests by asking the faculty member and the student to sign a confidential Non-disclosure Agreement. Such agreements, even those signed only by the faculty member but referring to student involvement, can restrict conditions for a number of matters important to students, such as their wish to publish research results, the thesis defense, and the deposit of the thesis with libraries. In many cases, the restrictions are reasonable and do not clash with academic principles that require the presentation of research findings for peer assessment.

In those instances where a Non-disclosure Agreement has been signed, a supervisor must notify the Associate Vice-President & Dean of Graduate Studies in writing of the Agreement, giving a brief description of its contents and assessing the impact on the thesis defense or dissemination of the thesis.

Students are advised to discuss any non-disclosure waivers or comparable agreements with the department chair, graduate advisor, or the School of Graduate Studies, before signing.

It has been common practice, in cases where a corporation wishes to protect its interests in a discovery, to delay placing copies of a thesis in libraries for up to twelve months after the oral defense, but not for longer periods.

It has not been common practice in these same cases to limit attendance at oral defences to only examination committee members; nor has it been common practice to have examination committee members agree to non-disclosure agreements. The pertinent guiding principle is that oral defences are public events.

Students in doubt about how these norms of academic activity apply to their circumstances should approach the Associate Vice-President & Dean of Graduate Studies.

6.7 Conflict of Interest Guidelines, School of Graduate Studies

6.7.1 General

There shall be no prohibition on the grounds of family relationship against the admission of persons as full- or part-time graduate students or against the eligibility for financial awards of such persons. Faculty members normally shall not take part in any proceedings at any level which affect the graduate standing of a spouse or other relative (including admission, financial assistance, promotion, courses of instruction, supervisory, thesis and examining committees). It is understood that the merits of each individual shall be the overriding consideration in all such cases.

6.7.2 Conflict of Interest in the Evaluation of Graduate Students

All faculty members responsible for the evaluation of graduate students have a general responsibility to the University to ensure that they are not in a position of conflict of interest (or the appearance of a conflict of interest) in their obligations to the University with regard to the nature of their relationships with graduate students. Specifically, a faculty member may not be involved in the evaluation of a graduate student if the faculty member has a close family relationship with the student (including spouse, parent, child, sibling, niece/nephew or spouses of the foregoing), if the faculty member is, or has been engaged to be married to the student, or if the faculty member has (or has had) an intimate personal relationship with the student. Evaluation includes grading course work or examinations (including the defense of a thesis) and supervision, whether as the principal supervisor or as a member of a supervisory committee.

A faculty member should question the propriety of evaluating a graduate student if there exists a distant family relationship with the student, or if the faculty member and the student maintain or have had a business relationship or any other relationship which should reasonably give cause for concern.

Questionable cases should be referred to the Associate Vice-President & Dean of Graduate Studies for a decision.

6.8 Student Academic Records

Student academic records are the property of the University. The University has developed procedures designed to protect the confidentiality of student records. A student may have access to her or his file, but documents received from a third party in confidence will not be disclosed.

Transcripts are issued only with the consent of the student.

6.9 McMaster University Workplace and Environmental Health and Safety Policy

McMaster University is committed to provide and maintain healthy and safe working and learning environments for all employees, students, volunteers and visitors. This is achieved by observing best practices which meet or exceed the standards to comply with legislative requirements as contained in the Ontario Occupational Health and Safety Act, Environmental Protection Act, Nuclear Safety and Control Act and other statutes, their regulations, and the policy and procedures established by the University. To support this commitment both McMaster University and its employees are responsible jointly to implement and maintain an Internal Responsibility System directed at promoting health and safety, preventing incidents involving occupational injuries and illnesses or adverse effects upon the natural environment.

The University is responsible for the provision of information, training, equipment and resources to support the Internal Responsibility System and ensure compliance with all relevant statutes, this policy and internal health and safety programs. Managers and Supervisors are accountable for the safety of workers within their area, for compliance with statutory and University requirements, and are required to support Joint Health and Safety Committees. Employees are required to work in compliance with statutory and University requirements, and to report unsafe conditions to their supervisors.

Contractors and subcontractors undertaking to perform work for McMaster University must, as part of their contract, comply with all relevant workplace and environmental health and safety statutes and to meet or exceed the University’s Workplace and Environmental Health and Safety Program requirements.

In addition to the above stated managerial responsibilities, Deans, Directors, Chairs, Research Supervisors and other Managers are also accountable for the safety of students, volunteers and visitors who work and/or study within their area of jurisdiction. Students are required by University policy to comply with all University health, safety and environmental programs.

Implementation:
The authority and responsibility for the administration of procedures and programs to provide for the implementation of this policy isassigned to the Office of the Vice President, Administration.

The Risk Management Support Group is responsible for facilitating the development, implementation and auditing of the Health and Safety Programs effective under this policy. This is achieved through the implementation of a risk management system that is directed at supporting the Internal Responsibility System through the application of best practices for the management of occupational, environmental, public health and safety related risks.

The Office of the Vice President, Administration will provide reports to the University Board of Governors concerning the status and effectiveness of the Workplace and Environmental Health and Safety System and any notices of violation issued to the University regarding breaches of workplace health and safety or environmental protection statutes.

6.10 Inter-University Cooperation – Ontario Visiting Graduate Student

It is possible for a graduate student registered at McMaster University to take a graduate course at another Ontario university for credit toward the McMaster degree. To do so, the student must complete the form for an Ontario Visiting Graduate Student (available from the School of Graduate Studies website) and describe the course to be taken, the term in which it will be taken, and the reasons for taking the course. Approval of the student's Department Chair and Supervisor are required before the form is submitted for approval to the School of Graduate Studies, which will send it to the host university. The course selected must be required for the student's program, must be a graduate level course, and must not be available at McMaster University. Auditing of courses or registration for "extra" courses is not permitted.

7. GENERAL INFORMATION

Counselling Services
Human Rights and Equity Services - http://www.mcmaster.ca/hres
International Student Services – Tel. 905-525-9140 ext. 24748; iss@mcmaster.ca
Ombuds Office – http://www.mcmaster.ca/ombuds
Student Accessibility Services - http://sas.mcmaster.ca/
Student Financial Aid and Scholarships – http://sfas.mcmaster.ca
Student Success Centre – http://careers.mcmaster.ca

Health Services
Environmental and Occupational Health Support Services – Tel. 905-525-9140 Ext. 24352
Ontario Health Insurance Card – Tel. 905-521-7825 (Service Ontario)
Student Wellness Centre – http://wellness.mcmaster.ca
University Health Insurance Plan – Tel. 905-525-9140 Ext. 24748; iss@mcmaster.ca
Workplace Safety and Insurance Board Coverage for Graduate Students (Working at McMaster) - http://www.workingatmcmaster.ca

Housing and Conference Services and Hospital Services
Conference and Event Services – http://conference.mcmaster.ca
Hospitality Services – http://hospitality.mcmaster.ca
McMaster Community Homes Corporation – Tel. 905-578-3833;
E-mail: receptionist@communityhomes.ca
Off-Campus Housing – http://macoffcampus.ca (Off-Campus Resource Centre)
On-Campus Housing – http://housing.mcmaster.ca (Housing and Conference Services)

Student Associations
Graduate Students Association (GSA) – http://www.mcmaster.ca/gsa
McMaster University Alumni Association – http://www.mcmaster.ca/ua/alumni

Other University Services/Facilities
Athletics and Recreation – http://www.marauders.ca
Bookstore and Post Office – http://www.bookstore.mcmaster.ca (Titles Bookstore)
Day Care Facilities at McMaster

- McMaster Children's Centre Incorporated – http://www.mcmaster.ca/mcmcc
- McMaster Students' Union Child Care Centre – Tel. 905-526-1544;
  E-mail: dthomson@msu.mcmaster.ca

Parking Services – http://parking.mcmaster.ca
Security Services – http://security.mcmaster.ca
University Chaplain Centre – http://www.mcmaster.ca/chaplain

Special Resource Services/Facilities
Centre for Continuing Education – http://www.mcmastercce.com
Centre for Leadership in Learning – http://cll.mcmaster.ca
McMaster Media Production Services – http://www.media.mcmaster.ca
McMaster Museum of Art – http://www.mcmaster.ca/museum
Office of International Affairs – http://www.mcmaster.ca/oia
Office of Sustainability - http://www.mcmaster.ca/sustainability/index.html
University Library – http://library.mcmaster.ca
University Technology Services (UTS) – http://www.mcmaster.ca/uts

8. GRADUATE SCHOLARSHIPS, BURSARIES AND OTHER AWARDS

(http://graduate.mcmaster.ca/graduate-scholarships)

8.1 Overview

The following information is intended to provide details about the various forms of scholarship support available at McMaster. Students with questions regarding financial support should contact their department or graduate program (hereafter referred to as the department) directly for assistance.

All efforts have been made to ensure the accuracy of information of awards on the School of Graduate Studies website. However, it is ultimately the responsibility of fellowship and award applicants themselves to verify program deadlines and/or requirements with external agencies. The School of Graduate Studies cannot be held responsible for any error or omissions, but would appreciate being informed of these, for correction or addition in the next edition.

8.1.1 General Regulations

Graduate students at McMaster University are expected to apply annually for external funding opportunities that may be available to them.

Scholarships (including fellowships, prizes, medals and awards) and bursaries may be cancelled without notice if the conditions under which they are granted are violated. To hold an award at McMaster University, students must:

- Have been unconditionally admitted into the eligible graduate degree program for which funding was granted;
- Be registered full-time and progressing satisfactorily in the eligible graduate degree program; part-time students are normally not eligible to receive scholarship support;
- Accept the terms and conditions of the award;
- Comply with all academic regulations of McMaster University and the requirements of the scholarship and/or award;
- Not hold or accept full-time employment while holding the award; and
- Agree to have McMaster University administer the award in accordance with its policies and procedures.

In accordance with the *Freedom of Information and Protection of Privacy Act* and McMaster University's Statement on the collection of Personal Information and the Protection of Privacy, where notice is given, the University is permitted to publish an individual's name, Faculty, program and award information. McMaster University publishes the names of recipients of most scholarships and awards, in the University's convocation program and other award publications.

8.1.2 Value and Duration of Award

The value and duration of scholarships and awards are detailed in the terms of letter of offer or award letter. Should a successful applicant receive an internal scholarship or external award subsequent to the letter of offer, McMaster's normal practice is to adjust the contributions to the applicant's offer in such a way that the applicant benefits from the additional award, but not to the extent that it simply adds the value of the award to the original offer. The fractional financial benefit of an internal scholarship or external award varies by program but is consistent within a given program.

Any approved change in degree, program, registration, supervisor or research area must be reported to the School of Graduate Studies and may result in a change to the value and/or duration of the award. The value of some external awards must be refunded if conditions of the awards are not met.

8.2 Graduate Scholarships

Upon admission to McMaster, graduate students are automatically considered for funding by the various departments. Offers that include funding will state the amount and duration of funding, conditions for renewal (if any), terms of continued funding, and other relevant details. Continued funding for graduate students from the University or from individual programs will be based on satisfactory progress of the student in his/her program as determined by academic criteria or as specified in an offer of funding. If the student has been awarded a Graduate or Departmental Scholarship, he/she should be aware that the funds for this scholarship might come from funds awarded by the School of Graduate Studies and/or from the department. The student may also receive a Research Scholarship provided by funds from the supervisor. If the student has been awarded an Entrance Scholarship, he/she should realize that it is for the first term of study only and is not renewable.

8.2.1 Internal Scholarships and Bursaries

Internal scholarships (including fellowships, prizes, medals and awards) and bursaries (hereafter referred to as awards) support students registered in a specific program or Faculty through the generous contributions of our benefactors and donors, and initiatives from the School of Graduate Studies. Selection is based on academic merit, research excellence and potential or financial need. Adjudication for internal awards normally occurs at the department level. Departments forward their recommendations to the School of Graduate Studies for final approval. It is critical that students consult with their departments regarding eligibility, application procedures and deadlines as each department will have its own process for internal review. Deadlines for the various internal awards vary and are explained in more detail on the School of Graduate Studies website, which are listed alphabetically by their complete official names.

The University reserves the right not to grant an award in the absence of a suitable candidate, or to limit the number of awards where too few suitable candidates exist. Where the terms of such awards become impossible to fulfill, the University may amend the terms of an award to carry out the nearest possible intent of the donor, while still ensuring that the benefit of such award continues. The University also reserves the right to withdraw and/or to suspend granting of an award, or to adjust the stated value and/or number of awards in years in which insufficient income is available due to fluctuations in investment markets.

Additional bursaries or financial assistance may be available through the Office of Student Financial Aid & Scholarships (Gilmour Hall, Room 120).

8.2.2 External Awards Tenable at the University

External awards tenable at the University are given by federal and provincial government agencies and other private organizations that rely on McMaster University to recommend candidates, facilitate payments, and ensure compliance of terms and conditions of the award. Examples of these agencies include the Canadian Institute of Health Research (CIHR), the Natural Sciences and Engineering Research Council (NSERC), the Social Sciences and Humanities Research Council (SSHRC), and the Ontario Graduate Scholarships (OGS). Applicants must be invited by their department to submit an application to these competitions and verify eligibility requirements with the external agencies.

Awards from external agencies are sometimes renewable. The application process for the majority of these awards is usually held one year in advance of receipt of the award (for example, competitions are held in October for awards starting in May, September or January of subsequent year). Applications and eligibility requirements are usually indicated on respective government agency web sites by late August. Deadlines vary but can occur in early October of each academic year.

As the recipient of a CIHR, NSERC, SSHRC, OGS or similar award, the student may be required to complete additional acceptance/refusal forms, and provide copies to the department. If the student changes his/her status, or is granted a leave of absence, the student may be required to notify the external agency as outlined in the guidelines (or terms and conditions) of the award. It may also be the case that the external award is subject to restrictions that require altered terms of the original letter of offer, or forfeit the award.

8.3 Funding Application Deadlines

Students interested in applying for scholarships and awards should contact their home departments for specific details on the application process and department internal deadlines. Dates and information from external agencies may be updated periodically and without notice. Changes to internal due dates within departments or programs, and the School of Graduate Studies, will be updated accordingly.

9.0 GOVERNING BODIES

9.1 Senate

The University Senate consists of approximately 65 members, including the Chancellor, the President (Chair), the Vice-Presidents, the Associate Vice President & Dean of Graduate Studies, the Faculty Deans, three members from the Board of Governors, four members from the Alumni Association, and 32 faculty members. In addition, there are 12 student members, one graduate and one undergraduate from each of the six Faculties. The students are elected by and from the students in their respective Faculties.

The Senate has ultimate responsibility for determining academic policy, which includes new academic programs, changes in curriculum, standards for admission to the University, matters arising in connection with the award of scholarships and prizes, examination policy, academic regulations, procedures for student appeals, criteria and procedures for granting tenure and promotion to faculty members, the codes of conduct for students and so on.
Website: http://www.mcmaster.ca/univsec

9.2 Graduate Council

The Graduate Council is a deliberative, administrative, and executive body responsible directly to Senate but otherwise autonomous. Its membership consists of the Chancellor, the President and Vice-Chancellor, the Provost and Vice-President (Academic), the Associate Vice President & Dean of Graduate Studies (Chair), the Associate Deans of Graduate Studies, the Faculty Deans, the University Librarian, the University Registrar, the Secretary of Senate, the Vice-President (Research and International Affairs), the Assistant Dean (Graduate Student Life and Research Training, the Executive Director (Strategic Planning & Administration), the Associate Graduate Registrar and Secretary of the School of Graduate Studies, eighteen faculty members (three from each faculty), and twelve graduate students (two from each faculty).

The responsibilities of the Graduate Council have been specified in some detail by Senate and are outlined in the By-laws of the Senate of McMaster University and the Senate Resolutions. The more significant ones may be summarized by noting that it regulates matters concerning graduate work of common concern to the entire University, acts upon recommendations concerning graduate work from each Faculty upon matters of particular concern to that Faculty, reports to Senate on graduate matters, recommends candidates for graduate degrees, stipulates conditions for the awarding of graduate scholarships, and stipulates the departments eligible to offer graduate work.

9.2.1 Executive Committee of Graduate Council

The Executive Committee of Graduate Council is composed of the Associate Vice President & Dean of Graduate Studies (who acts as Chair), the Associate Deans of Graduate Studies as Deputy Chairs, the President and Vice-Chancellor, the Provost and Vice-President (Academic), one faculty member from each Faculty, and the Associate Graduate Registrar and Secretary of Graduate Studies.

The Executive acts as nominating committee, academic policy committee, and on any other matters put before it by Graduate Council or the Associate Vice-President & Dean. This body acts on behalf of Council in instances where there is some urgency (e.g., during the summer months when there are no regularly scheduled meetings).

9.2.2 Scholarships Committee of Graduate Council

The Scholarships Committee of Graduate Council is composed of the Associate Deans of Graduate Studies (who act as co-chairs) and fourteen faculty members (representing all six faculties). This committee is responsible for acting upon all recommendations and applications for internal endowed fellowships and scholarships, and external scholarships. Many of the scholarships listed in section 8 refer to the Scholarships Committee in its capacity as a selection committee.

9.3 Standing Committees

9.3.1 Faculty Graduate Curriculum and PolicyCommittees

Each of the six Faculties has a Committee on Graduate Curriculum and Policy which is responsible for dealing with matters of policy and curriculum affecting the Faculty, including new developments, course changes, changes in degree requirements, and new programs and fields of study arising from departmental proposals. The Faculty then acts upon the recommendations of this committee.

9.3.2 Faculty Graduate Admissions and StudyCommittees

For each Faculty, there is also a Committee on Graduate Admissions and Study responsible for determining admissibility of any applicant on the recommendation of the department, approving each student’s course program, reviewing annually the progress of each student, making necessary decisions thereon, recommending awarding of degrees, deciding upon applications from students for special consideration, and acting as a hearings committee for student appeals and cases of alleged academic dishonesty. The Secretary of all Committees, to whom business items may be addressed, is the Associate Graduate Registrar and Secretary of Graduate Studies.

10. DEGREE PROGRAMS

Approved degree programs of instruction and research are described in Section 10. The majority of these programs are described under the titles of the departments or schools offering them. However, there are some programs listed, notably those in Health Research Methodology, Nursing, Medical Sciences, and Statistics which cut across departmental lines. Section 11lists the various interdisciplinary/collaborative areas of research, which provide opportunities for graduate study but which are not formally approved degree programs.

Section 12 describes the various graduate diploma programs offered by McMaster. These diplomas consist of course work only in a minimum of four half courses from a predefined list. The diplomas are usually a subset of a larger program and are therefore highly specialized.

The title “Distinguished University Professor”, which appears under several program headings, is bestowed upon those faculty who have made a distinguished contribution to the University through research, scholarship, and education.

The courses listed in this Calendar represent the graduate teaching and research interests of each department. Not all courses, however, will be offered each year. Students should check with the department concerned.

ANTHROPOLOGY

The Department of Anthropology offers programs leading to the M.A. and Ph.D. degrees.

Enquiries: 905 525-9140 Ext. 24424
Website: http://www.socsci.mcmaster.ca/anthro

Faculty / Fall 2012

PROFESSORS
Ellen Badone, B.A., M.A. (Toronto), Ph.D. (California, Berkeley)/ Joint appointment with Religious Studies
Megan Brickley, B.A. (Birmingham), M.Sc., Ph.D. (U. London)
Aubrey Cannon, B.A. (Simon Fraser), Ph.D. (Cambridge)
John Colarusso, B.A. (Cornell), M.A. (Northwestern), Ph.D. (Harvard)/ Joint appointment with Modern Languages
Laura Finsten, B.A. (Western), M.A. (Calgary), Ph.D. (Purdue)
Ann Herring, B.A., M.A., Ph.D. (Toronto)
Petra Rethmann, B.A. (Vienna), M.A. (Munich), Ph.D. (McGill)
Wayne Warry, B.A., M.A. (McMaster), Ph.D. (Australian National) / Chair

ASSOCIATE PROFESSORS
Tristan Carter, B.A. (U. Nottingham), Ph.D. (U. London)
Dawn Martin-Hill, B.A., M.A., Ph.D. (McMaster) / Director, IndigenousStudies Program
Tina Moffat, B.A. (Toronto), M.A., Ph.D. (McMaster)
HendrikPoinar, B.Sc., M.Sc. (California), Ph.D. (Germany)
Tracy Prowse, B.Sc., M.A. (Alberta), Ph.D. (McMaster)

ASSISTANT PROFESSORS
Andrew Gilbert, B.A. (U. California, Santa Cruz), M.A., Ph.D. (Chicago)
Andrew Roddick, B.A., M.A. (British Columbia), Ph.D. (California, Berkeley)
Kee Yong, M. Phil., Ph.D. (CUNY)

ASSOCIATE MEMBERS
Eduard G. Reinhardt, B.A., Ph.D. (Carleton) / School of Geographyand Earth Sciences
Celia Rothenberg, B.A. (Wellesley), M.A. (Oxford), Ph.D. (Toronto) / Religious Studies
Henry Schwarcz, B.A. (Chicago), M.S., Ph.D. (California Institute ofTechnology), F.R.S.C. / School of Geography and Earth Sciences

ADJUNCT MEMBERS
Christopher Ellis, B.A.(Waterloo), M.A. (McMaster), Ph.D. (Simon Fraser) / Anthropology, University of Western Ontario
Ronald Hancock, B.Sc., M.Sc. (New Zealand), Ph.D. (McMaster)

Andrew Martindale, B.A. (Toronto), M.A. (Trent), Ph.D. (Toronto)/ Anthropology, University of British Columbia
Trudy Nicks, B.A., M.A., Ph.D. (Alberta) / Curator, Royal Ontario Museum
Robert W. Park, B.A. (Toronto), M.A. (McMaster), Ph.D. (Alberta) / Anthropology, University of Waterloo
Larry Sawchuk, B.A., M.A. (Manitoba), Ph.D. (Toronto) / Anthropology, University of Toronto
Michael Spence, B.A., M.A. (Toronto), Ph.D. (Southern Illinois) / Anthropology, University of Western Ontario
Gary Warrick, B.A. (McMaster), M.A. (Simon Fraser), Ph.D. (McGill)/ Contemporary Studies, Wilfrid Laurier

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Areas of Specialization

Ph.D. students conduct fieldwork in many parts of the world. The study of European societies is a new area of interest in the Department. The Department's Ph.D. students have recently engaged in research in Spain, Western Samoa, Nepal, Mesoamerica, Italy, India, Mexico, Chile, Belize, Antigua, Uganda, Zimbabwe, Argentina, the Virgin Islands, Jamaica, as well as in various provinces of Canada.

The McMaster Anthropology Department offers degrees in Archaeology, Cultural Anthropology, Physical Anthropology, and the Anthropology of Health. More specially, it defines itself in terms of topical areas and issues that its faculty and graduate students investigate. The main fields of inquiry of members of the Department include: anthropology of health, applied anthropology, archaeological history, complex societies, ethno history, indigenous studies, material culture, molecular anthropology, osteology and socio-environmental studies.

The Anthropology of Health draws together core anthropology faculty and students interested in human biology, medical and physical anthropology. This program takes advantage of the many links to other health research areas at McMaster and beyond.

Admission and program requirements conform to the general University regulations at the front of this Calendar.

Upon arrival at McMaster a graduate student will either select or be tentatively assigned a faculty advisor from the Department. Together, the student and the advisor will determine the individual program of study to be followed. This program must be ratified by the Department Chair and the Graduate Committee.

M.A. Degree

The M.A. program is intended to be holistic in scope, but students may specialize in any of the major fields of Anthropology, including Cultural, Physical, Archaeology, Anthropology of Health, and Linguistic Anthropology.

Students admitted to the M.A. program have the option of doing coursework and then writing a comprehensive exam, writing a Major Research Paper (MRP), or writing a scholarly thesis which demonstrates ability to conduct original research. In consultation with his or her supervisor, an M.A. student must choose between these three options by January 15 of the year of initial registration as a graduate student.

Twelve months' residence or the equivalent in part-time study is required. While students taking their M.A. by examination or Major Research Paper can expect to fulfill all requirements within 12 months, those electing to write a thesis normally extend their period of residence to 24 months. All M.A. students are normally required to complete the department graduate research workshops.

A. M.A. with Thesis

Students who choose to write an M.A. thesis are required to take 4 half courses. Three of these courses must be selected from courses open only to graduate students (i.e. courses numbered 700). A minimum of 2 half courses should be taken in the student's sub-discipline. The thesis must be defended in an oral examination.

B. M.A. with Comprehensive Examination or MajorResearch Paper Option

Students who choose the comprehensive examination or Major Research Paper (MRP) option are required to take six half-courses. At least 4 of these courses must be selected from courses open only to graduate students (i.e. courses numbered 700). A minimum of two half courses should be taken in the student's sub-discipline.

Ph.D. Degree

The Department offers a Ph.D. degree in the fields of Cultural Anthropology, Archaeology, Physical Anthropology and Anthropology of Health.

Admission to the doctoral program is competitive and is normally also dependent upon completion of the requirements for the M.A. degree in Anthropology.

1. The Ph.D. student will be required to obtain a minimum average of B+ in all graduate coursework required for the Ph.D. The minimum course requirement for students entering with a completed M.A. in Anthropology is normally four graduate half-courses eyond the level of the M.A. Students promoted from within our M.A. program (after completing coursework but before completing the thesis, comprehensive examination or MRP), are required to take a total of eight half-courses in the program over thecourse of their enrolment. In the rare cases in which Ph.D. students are admitted directly from a Bachelor's degree, they will normally be required to take four half-courses at the graduate level.This course requirement will normally be met by taking seminars within the department. Reading courses or courses outside the

department may be substituted for seminars on the recommendation of the student's supervisor and approved by the Graduate Committee. All Ph.D. students are required to complete the department graduate research workshops.

2. There is no formal language requirement, but in cases where the student needs facility in a foreign language, either to read literature or for use in field research, the Supervisory Committee has the authority to require the student to demonstrate acceptable facility in that language. Students may demonstrate acceptable facility by obtaining a grade of B+ or better in a university course or an accredited language course in the language chosen. The Graduate Committee makes final decisions on what the department recognizes as an accredited non-university course.

3. Ph.D. candidates will take a Comprehensive Examination designed to test the breadth of their knowledge of the sub-discipline of anthropology in which they are conducting research. The examination has both a written and oral component and is intended to go beyond an assessment of the student's factual knowledge, to demonstrate ability in relational thinking at a general abstract level and preparedness to undertake dissertation research.

4. All Anthropology Ph.D. candidates are required to have exposure to field work.

5. Doctoral candidates will be required to submit a scholarly thesis on an approved subject and to defend it during a final oral examination.

Courses

Courses marked with an asterisk (*) are half courses. Any one reading course may not be taken more than twice. Candidates will consult the Department Chair concerning course offerings in any one year.

CROSS-FIELD COURSES
***703 /** Writing the Field

CULTURAL
***700 /** Problems in Contemporary Anthropological Theory
***701 /** Readings in Cultural Anthropology
***702 /** Contemporary Problems in Anthropology
****704 /** Introduction to the Anthropology of Religion (cross-listed as Religious Studies *781)*
***709 /** Medical Anthropology
***713 /** Contemporary Problems in the Anthropology of Health
***717 /** Readings in the Anthropology of Health
***719 /** Area Ethnology (Open)
****720** / Topics in Political Culture (Same as Globalization *720)*
***722 /** Research Design in Anthropology

***725 /** Seminar in Political Anthropology
***728 /** Applied Anthropology
***734 /** Indigenous Peoples within Nation States
****782 /** Diasporas, Transnationalism and Religious Identities (cross-listedas Globalization *782 and Religious Studies *782)*
****784 /** Anthropological Approaches to Catholicism (cross-listed as Religious Studies *783)*
****785 /** Myth and the Interpretation of Oral Tradition (cross-listed as Religious Studies *784)*
****786 /** Global Futures: Theory, Practice, and Possibility (cross-listed as Globalization *786)*
****788 /** Topics in Anthropological Approaches to Islam (cross-listed as Religious Studies *788)*
****796 /** Ritual and Symbolic Healing (cross-listed as Religious Studies *786)*
****799 /** Death: Rituals and Meanings in Cross-Cultural Context (cross-listed as Religious Studies *785)*

ARCHAEOLOGY
***710 /** Topics in Archaeology
***714 /** Readings in Archaeology
***730 /** Applied Archaeological Sciences
***731 /** Settlement Archaeology
***732 /** Analytical Methods in Archaeology
***736 /** Archaeological Research Design
***738 /** Archaeology and History
***742 /** Archaeologies of Identity
***787 /** Object Worlds: The Circulation and Value of Material Culture

PHYSICAL
***705 /** Advanced Skeletal Biology
***711 /** Advanced Topics in Physical Anthropology
***715 /** Readings in Physical Anthropology
***718 /** From Cradle to the Grave: Anthropological Demography
***721 /** Ancient Molecules and Preservation of the Past
***739 /** Anthropology of Infectious Disease
***740 /** Biocultural Synthesis
***741 /** Sunbathing and Scurvy: Bioarchaeological Approaches to Metabolic Bone Diseases

Other courses that might be of interest are the following:

HEALTH, AGING AND SOCIETY COURSES

***711 / The Health Care System and the Older Person**
This course provides an interdisciplinary analysis of priority issues relating to the health care system and the older person in the field of critical and social gerontology.

***713 / Critical Perspectives on Aging**
This course draws on perspectives in critical gerontology to explore issues related to the political, social, and cultural aspects of aging.

BIOCHEMISTRY

The Department of Biochemistry & Biomedical Sciences provides facilities for students intending to proceed to the M.Sc. and Ph.D. degrees in Biochemistry.

Enquiries: 905 525-9140 Ext. 22064
E-mail: bbsgrad@mcmaster.ca
Fax: 905 522-9033
Website: http://www.fhs.mcmaster.ca/biochem

Faculty / Fall 2012

PROFESSORS
David W. Andrews, B.Sc. (Ottawa), Ph.D. (Toronto) / Senior CanadaResearch Chair
Mickie Bhatia, B.Sc. (McMaster), Ph.D. (Guelph) / Canada ResearchChair
Eric D. Brown, B.Sc., M.Sc., Ph.D. (Guelph) / Chair / Canada Research Chair
Lori Burrows, B.Sc., Ph.D. (Guelph)
John P. Capone, B.Sc. (Western), Ph.D. (McMaster)
Radhey S. Gupta, B.Sc. (Agra), M.Sc. (New Delhi), Ph.D. (Bombay)
John A. Hassell, B.Sc. (New York), Ph.D. (Connecticut)
Paul G. Higgs, B.A., Ph.D. (Cambridge) / Joint appointment withPhysics and Astronomy / Senior Canada Research Chair
Yingfu Li, B.Sc. (Anhui), M.Sc. (Beijing Agriculture), Ph.D. (SimonFraser) / Joint appointment with Chemistry / Canada ResearchChair
Justin R. Nodwell, B.Sc., Ph.D. (Toronto)
Michael Surette, B.Sc. (Newfoundland), Ph.D. (Western) / Joint appointment with Medicine
Ray Truant, B.Sc., Ph.D. (Toronto)
Gerard D. Wright, B.Sc., Ph.D. (Waterloo) / Senior CanadaResearch Chair
Daniel S-C. Yang, B.Sc., M.Sc. (Alberta), Ph.D. (Pittsburgh)

ASSOCIATE PROFESSORS
Paul J. Berti, B.Sc. (Waterloo), M.Sc. (Ottawa), Ph.D. (McGill) / Jointappointment with Chemistry
Russell Bishop, B.Sc., Ph.D. (Alberta)
Brian Coombes, B.Sc., Ph.D. (McMaster) / Canada Research Chair
Cecile Fradin, B.Sc., M.Sc. (EcoleNormaleSupérieure, Paris, France), Ph.D. (Univ. Pierre et Marie Curie, Paris, France) / Jointappointment with Physics & Astronomy / Canada Research Chair
Alba Guarné, B.Sc., M.Sc., Ph.D. (Barcelona)
Murray S. Junop, B.Sc. (Ryerson), Ph.D. (Western)
Michelle MacDonald, B.Sc., Ph.D. (McMaster)
Giuseppe Melacini, B.Sc., (Milan), Ph.D. (California, San Diego) / Joint appointment with Chemistry
Joaquin Ortega, B.Sc. (Zaragoza), Ph.D. (Autónoma de Madrid)

Deborah Sloboda, Ph.D. (Toronto)
Greg Steinberg, B.Sc., Ph.D. (Guelph)
Bernardo L. Trigatti, B.Sc., Ph.D. (McMaster)
Geoff Werstuck, B.Sc., Ph.D. (McMaster) / Joint appointment withMedicine

ASSISTANT PROFESSORS
Bradley W. Doble, B.Sc., Ph.D. (Manitoba) / Canada Research Chair
Jonathan Draper, Ph.D. (Sheffield) / Joint appointment with Pathologyand Molecular Medicine
Kristin Hope, Ph.D. (Toronto)
Nathan Magarvey, B.Sc. (Dalhousie), Ph.D. (Minnesota)
Jonathan Schertzer, Ph.D. (Melbourne)
Karun Singh, Ph.D. (Toronto)
Felicia Vulcu, B.Sc., Ph.D. (McMaster)

ASSOCIATE MEMBERS
Kjetil Ask, B.Sc., Ph.D. (Bourgogne, France) / Medicine
Stephanie A. Atkinson, B.A. (Western), Ph.D. (Toronto) / Pediatrics
Jonathan L. Bramson, B.Sc., Ph.D. (McGill) / Pathology and Molecular Medicine
John D. Brennan, B.Sc., M.Sc., Ph.D. (Toronto) / CanadaResearch Chair / Chemistry
Marie Elliot, B.Sc., Ph.D. (Alberta) / Biology
Tim Gilberger, B.Sc., Ph.D. (Hamburg, Germany) / Pathology and Molecular Medicine
Thomas Hawke, B.Sc., Ph.D. (Guelph) / Pathology and Molecular Medicine
Stephen Hill, B.Sc., Ph.D. (Western) / Pathology and Molecular Medicine
Alison Holloway, Ph.D. (Guelph) / Obstetrics and Gynecology
Mark Larche, Ph.D. (London) / Medicine
Brian F. Leber, B.Sc., M.D., C.M. (McGill) / Medicine
Karen L. Mossman, B.Sc. (Guelph), Ph.D. (Alberta) / Pathology and Molecular Medicine
Ishac Nazi, B.Sc. (Guelph), Ph.D. (McMaster) / Pathology andMolecular Medicine / Part-time
HendrikPoinar, Ph.D. (Munich) / Anthropology
Sheila K. Singh, B.Sc. (McGill), M.D. (McMaster), Ph.D. (Toronto)/ Surgery
Jeffrey Weitz, B.Sc., M.D. (Ottawa) / Medicine

PROFESSOR EMERITUS
Richard M. Epand, A.B. (Johns Hopkins), Ph.D. (Columbia)

M.Sc. Degree

The general requirements for the M.Sc. degree appear under the Regulations for the Master's degree near the beginning of this Calendar. A candidate for the M.Sc. degree is required to spend at least one calendar year in full-time study at McMaster University.

The candidate must complete, with at least B- standing, at least one full, 700-level graduate course (or two half-courses), which must include at least one half, 700-level graduate course in

Biochemistry. The candidate is required to present a thesis in a final oral examination that embodies the results of their original research. All MSc students are required to present one public seminar in the Departmental seminar program. Meetings of the Supervisory Committee, consisting of the supervisor and two additional faculty members, will take place every 6 months.

Not sooner than two terms after initial registration in the Master’s program, students may request to be reclassified to the Ph.D. program. Students wishing to be transferred to the Ph.D. program prior to the completion of a Master’s degree must successfully pass the Transfer Examination (see Calendar Section 2.1.2 of the General Regulations of the Graduate School and refer to the appropriate section of the Program Handbook available from the Department of Biochemistry and Biomedical Sciences). The candidate must present requests for transfer to the supervisor and the Supervisory Committee and all must be in agreement to proceed with the transfer process. The Transfer Exam includes a written research proposal representing the student’s own original proposed work for Ph.D. studies and an oral defense. Details of the Transfer Exam and its administration are as outlined in the Program Handbook available from the Department of Biochemistry and Biomedical Sciences. Students enrolled in the Master’s program beyond 22 months must complete the degree requirements including the thesis prior to admission to the Ph.D. program. As such, all students seeking reclassification to the Ph.D. program from the M.Sc. program must successfully pass the Transfer Examination before going beyond 22 months following registration in the M.Sc. program. Approval to transfer will be determined at the meeting of the Transfer Committee following the oral defense.

Ph.D. Degree

A candidate for the Ph.D. degree must comply with the School of Graduate Studies Regulations for the Degree Doctor of Philosophy. There is no minimum course requirement for the completion of the Ph.D. degree, unless the student’s supervisory committee has made a specific recommendation for additional course work to supplement the student’s knowledge in their area of research. The candidate will be required to participate in the Departmental seminar program and meet at least annually with their Supervisory Committee. All Ph.D. candidates must pass a Comprehensive Examination, consisting of a public Department seminar based on their thesis research, followed by an oral examination by the Comprehensive Examination Committee. The Comprehensive Examination is designed to test students for breadth of knowledge and the ability to integrate ideas. The Comprehensive Examination typically takes place at 18 months after the student has begun Ph.D. studies, with an upper limit of 24 months. Candidates must present a thesis that embodies the results of original research and high scholarship. This thesis must be defended in a Final Oral Examination as outlined in the School of Graduate Studies Regulations for the Degree Doctor of Philosophy.

Qualification Exam

Direct-entry Ph.D. students are required to schedule their first Supervisory Committee Meeting within 6 months of initial registration. Students who enter our Ph.D. program directly with an M.Sc. from another McMaster Department or Institution, or with only a first degree (B.Sc.) are also required to pass the Qualification Exam within 9-12 months following registration. The Qualification Exam follows the guidelines and procedure as outlined for the Ph.D. Transfer Exam and involves a written submission and oral defense of a CIHR-style grant proposal on the student's proposed doctoral work. Please consult the Program Handbook for additional details related to the Qualifying Exam, available from the Department of Biochemistry and Biomedical Sciences. The Qualification Exam Committee consists of the members of the Supervisory Committee and the Exam Chair, who is appointed by the Program. The outcome of the exam will be Pass or Fail. If the candidate fails the Qualification Exam, The Exam Chair will notify the student whether the written, oral or both parts of the exam were insufficient and in need of a second attempt. The student will be allowed a second opportunity for re-examination, which must be successfully completed within 3 months of the first attempt. Students who entered the program with an M.Sc. Degree who fail their second attempt at the Qualification Exam are required to withdraw from the Ph.D. Program. Students who entered the program directly from a B.Sc. may be given the opportunity to re-register as a Master's student, provided that their work to date has met the standards for the Biochemistry Master's program.

Combined MD/Ph.D. Program

Students in the MD/Ph.D. program will complete both the MD curriculum requirements (eligible for MD residency programs), and the Ph.D. curriculum requirements in order to be eligible for particular academic placements across institutions. The program will seek to train individuals who will pursue research as a major priority and to prepare graduates for leadership roles in integrated research initiatives, particularly those involving interdisciplinary and translational health research endeavors. The program expects that McMaster MD/Ph.D. graduates will contribute significantly to the need for clinician scientists in a variety of roles. The MD/Ph.D. program is offered in an integrated format with specific blocks of time provided for activities either in full- or part-time studies in either program. There will be opportunity for flexibility in the arrangement of a student curriculum, if requested and/or deemed appropriate. These requests will be reviewed by the MD/Ph.D. program committee and the student's doctoral program, before making a recommendation to the Associate Deans. The Program utilizes theestablished MD curriculum and Biochemistry is one of the established graduate programs that participates in MD/Ph.D. training.

MD program fulfillment (in the MD/Ph.D. program): The new MD curriculum, electives and clerkship periods. Horizontal electives (optional in current MD program, not optional in the MD/Ph.D. program) must be completed during graduate research block (3 years). A minimum of 80 hours in horizontal electives must be completed satisfactorily. Ph.D. program fulfillment (in the MD/Ph.D. program): Time will be allowed for attendance at regular research group meetings while in the MD curriculum. Attendance at MD/Ph.D. program group meetings (faculty and students) will be held a minimum of 3 times annually. In addition, students must complete the requirements of their PhD program, as outlined in the relevant section of Graduate Calendar, including the comprehensive examination and the submission and defense of a research thesis (the research proposal should be completed as early as possible in the program).

Courses

The following 600-level courses offered for graduate credit consist of the corresponding 400-level undergraduate courses plus additional work, usually in the form of a written assignment. Courses marked with an asterisk (*) are half courses.

***6E03 / Gene Regulation and Stem Cell Development / B. Doble, M. Bhatia, J. Draper, S. Singh**

Mechanisms of gene regulation, emerging concepts in transcriptional regulation, fundamental aspects of stem cell biology, gene expression in cancer, clinical applications of human stem cells.

***6EE3 / Advanced Topics in Gene Expression / B. Trigatti,R. Truant**

A critical study of the literature from recent primary manuscripts on gene regulation and inter-related regulatory pathways. Emphasis is on the molecular and cellular biology of multiple pathways that interact to affect phenomena in biology and disease.

****6H03 / Molecular Biology of Cancer / Staff (cross-listed as Molecular Biology *6H03)***

Cancer at the molecular and cellular level. Topics include: properties of cancer cells; activation of proto-oncogenes; function of oncoproteins; transgenic mouse models; tumour viruses; and tumor suppressor genes.

****6J03 / Biochemical Immunology / M. McDermott (cross-listed as Medical Sciences *6J03 and Molecular Biology *6J03)***

This advanced course applies small group-based learning to immunological problems. Topics concern development of immunoassays, resistance to infection and immunity in health and disease.

***6N03 / Molecular Membrane Biology / R. Epand, R. Bishop**

Properties and structures of membranes, molecular components of biological membranes and their interactions, strategies for signal transduction cascades, hormones, receptors.

***6Q03 / Biochemical Pharmacology / R.S. Gupta**

Introduction to the basic concepts of pharmacology. Mechanisms of action of antibacterial, antiviral, antifungal and anticancer drugs, toxins and how cellular resistance to such agents develop. Applications of drug-resistant mutants for genetic, biochemical pharmacological and cell biological studies.

6S03 / Introduction to Molecular Biophysics / C. Fradin(cross-listed as Physics *6S03)
A presentation of recent contributions made to the fields of molecular and cell biology by the use of physical approaches. In particular, the following topics are discussed: physical properties of biomolecules, protein folding, molecular motors, cell motion and cell adhesion. Emphasis on the critical evaluation of current research literature.

6Y03 / Genomes and Evolution / P. Higgs (cross-listed as Computational Science and Engineering *6Y03)
Molecular evolution.Comparative analysis of genomes. Changes in gene content and gene order. Bacterial evolution and phylogenetics.Origins of organelles and their genomes.Comparison of the human genome with other species.Using microarrays and proteomics to study organisms at the whole genome level.

The following courses are restricted to graduate students:(**Note**: Not all courses are offered every year)

***707 / Mechanism of Enzyme Action / Staff**
Sequence of molecular events occurring during catalysis by enzymes. Nature of intermediates and active site residues. Possible factors involved in rate-acceleration. Enzyme kinetics.

709 / Signal Transduction: Dynamic Mechanisms of Action of Growth Factors and Nuclear Receptors / Staff (cross-listed as Medical Sciences *708)
The topics covered will include: Ras and GTP binding protein families, MAP kinase cascades; T-cell and B-cell activation; nuclear receptors for steroid and thyroid hormones. The course will be based on recent review articles and important current papers.

***710 / Special Topics in Proteins / Staff**
Topics in areas of advanced proteins will be discussed.

***711 / Special Topics in Biomolecular Sciences / Staff**
Topics in biomolecular sciences will be examined using current research papers.

***712 / Special Topics in Membrane Biochemistry / Staff**
Topics in areas of advanced membrane biochemistry will be discussed.

***713 / Enzyme Catalytic Mechanisms / Staff**
An examination of enzymes' catalytic strategies, including strategies for promoting catalysis, enzymatic intermediates, co-factors, as well as the methods used to probe mechanism. Examples from the current literature will be used to demonstrate each concept.

***720 / Biochemistry Colloquium / B. Coombes, A. Guarné**
Students present a major seminar dealing with their research and write a review article that illustrates its contribution to the current state of their field.

***723 / Topics in Molecular Biology / Staff**

Critical examination of classic and current papers in molecular biology with the object of giving students practice in presenting and discussing research material. (Given in alternate years with Biology *723.)

***725 / Molecular Mechanisms of Membrane Functions / Staff**

The molecular basis of the biological activity of membranes at an advanced level. Topics include: bioenergetics, transport, membrane biogenesis and turnover, signal transduction, cell surface interactions and membrane disorders.

***726 / Biophysical Chemistry of Membrane Structure / Staff**

The emphasis of this course will be on biophysical aspects of membrane structure and function.

***727 / Proteins / Staff**

The structure of proteins, primary to quaternary will be discussed. Topics include: physico-chemical basis of higher orders of structure and techniques of studying proteins.

****730 / Computational Biochemistry / B. Zhorov(cross-listed as Computational Science and Engineering *738)***

The course will provide a brief introduction to biochemical databases, biological data mining and tools for sequences analysis. This will be followed by more detailed description of computational methods of molecular modeling, ligand docking, and analysis of ligand-receptor interactions. Facilities of the Educational Computing Lab will be used to train students on applying WWW resources of biological information and molecular modeling software in a biomedical lab.

***731 / Stem Cells and Regenerative Medicine / J. Draper**

Stem cells hold immense experimental potential as model systems for human disease and development that are difficult to ascertain in cell lines or in the mouse. Arguably, the most impactful role of human stem cells is for tissue repair that becomes damaged from diseases or injury; examples include diabetes and spinal cord injury. This utility of stem cells is heavily seeded in new approaches to the clinic called “regenerative medicine.” However, there are many stem cell types that may be specific to certain applications, and new technologies involved with stem cell delivery and differentiation that require elucidation before these stem cell-based replacement therapies can be robustly brought to the bedside. The underlying biology that defines stem cells, and their potential applications to human health, will be discussed broadly to better define the current successes and future limitations of regenerative medicine using human stem cells.

The following course is available to graduate students for credit:

Education *750 - Principles and Practices of University Teaching is a graduate level credit course offered three times a year. The focus is on honing essential pedagogical and practical teaching skills. This includes sessions on curriculum design, teaching strategies (e.g., Inquiry and Problem-Based Learning), assessment strategies, developing a teaching dossier, and research on teaching and learning.

In addition, courses in other departments/programs, notably Biology, Chemistry, Medical Sciences, and Physics and Astronomy, may be allowed for graduate credit. Candidates should consult the Graduate Chair of the department or their research supervisor concerning such courses.

Research in Biochemistry

Our research encompasses all the major areas of modern biomedical research. Particular strengths include the molecular genetics of stem cells (including human and mouse embryonic stem cells), eukaryotic cell biology, antimicrobial research and structural biology. We have an exceptionally sophisticated equipment base in Canada which includes the first and only high throughput screening laboratory in Canada (http://hts.mcmaster.ca/Home.html), the Biophotonic imaging facility (http://www.macbiophotonics.ca) and the Canadian Centre for Electron Microscopy (http://www.science.mcmaster.ca/biochem/faculty/Ortega/ccem.html). These centralized facilities provide unique avenues for addressing important biomedical questions. Our faculty are supported by more than $16 million in peer-reviewed research grants.

A detailed description of the research and recent publications of each faculty member is available on our website (http://www.fhs.mcmaster.ca/biochem/).

BIOLOGY

Facilities are available in the Department of Biology for students proceeding to the M.Sc. and Ph.D. degrees.

Enquiries: 905 525-9140 Ext. 23546
E-mail: biolgrad@mcmaster.ca
Website: http://www.biology.mcmaster.ca/

Faculty / Fall 2012

DISTINGUISHED UNIVERSITY PROFESSOR
Christopher M. Wood, B.Sc., M.Sc. (British Columbia), Ph.D. (East Anglia) / Tier I Canada Research Chair, F.R.S.C.

PROFESSORS
André Bédard, B.Sc. (Montreal), Ph.D. (McGill)
Ana R. Campos, B.A., M.Sc. (Rio de Janeiro), Ph.D. (Brandeis)
Patricia Chow-Fraser, B.Sc., M.Sc. (Waterloo), Ph.D. (Toronto)/ Director, Life Sciences Program
Juliet M. Daniel, B.Sc. (Queen's), Ph.D. (British Columbia)
Turlough M. Finan, M.Sc. (National), Ph.D. (Guelph)
G. Brian Golding, B.Sc. (Dalhousie), Ph.D. (Alberta) / Tier I CanadaResearch Chair
John A. Hassell, B.Sc. (Brooklyn, N.Y.), Ph.D. (Connecticut) / Joint appointment with Biochemistry and Pathology and Molecular Medicine
J. Roger Jacobs, B.Sc. (Calgary), M.Sc., Ph.D. (Toronto)
JurekKolasa, M.Sc., Ph.D. (Poznan)
Brian E. McCarry, B.Sc. (British Columbia), Ph.D. (Stanford), F.C.I.C. Stephen A. Jarislowsky Chair In Environment and Health / Acting Chair
Colin A. Nurse, B.E.Sc. (Western), Ph.D. (Harvard)
Michael J. O'Donnell, B.Sc., Ph.D. (Toronto)
James S. Quinn, B.Sc. (Queen's) M.Sc., (Brock), Ph.D. (Oklahoma)
C. David Rollo, B.Sc., M.Sc. (Guelph), Ph.D. (British Columbia)
Herbert E. Schellhorn, B.Sc., M.Sc. (Guelph), Ph.D. (N. CarolinaState)
Rama S. Singh, B.Sc. (Agra), M.Sc. (Kanpur), Ph.D. (California) / Associate Chair, Research
Elizabeth A. Weretilnyk, B.Sc., Ph.D. (Alberta)
JianpingXu, B.Sc. (Jiangxi Agricultural University), M.Sc. (Nanjing Agricultural University), M.Sc., Ph.D. (Toronto)

ASSOCIATE PROFESSORS
Robin Cameron, B.Sc. (Waterloo), Ph.D. (McGill) / Associate Chair, Undergraduate
Susan A. Dudley, B.Sc., M.Sc. (McGill), Ph.D. (Chicago)
Jonathan Dushoff, B.A. (Pennsylvania), Ph.D. (Princeton)
Marie Elliot, B.Sc., Ph.D. (Alberta)

Ben Evans, B.Sc. (Tufts), M.Sc., M.Phil., Ph.D. (Columbia)
Bhagwati P. Gupta, B.Sc. (Banaras Hindu University, India), M.Sc.(Jawaherlal Nehru University, New Delhi, India), Ph.D. (Tata Institute of Fundamental Research, India) / Associate Chair, Graduate
Suleiman A. Igdoura, B.Sc. (Victoria), M.Sc. (Western), Ph.D. (McGill)
Grant McClelland, B.Sc. (Ottawa), Ph.D. (British Columbia)
Jonathon Stone, B.Sc., M.Sc., Ph.D. (Toronto)
Joanna Y. Wilson, B.Sc. (McMaster), M.Sc. (Victoria), Ph.D. (Woods Hole Oceanographic Institute/Massachusetts Institute of Technology)
Xu-Dong Zhu, B.Sc. (Nanjing), M.Sc. (Regina), Ph.D. (Toronto)

ASSISTANT PROFESSOR
Graham R. Scott, B.Sc. (McMaster), M.Sc., Ph.D. (British Columbia)

ASSOCIATE MEMBERS
SigalBalshine, B.Sc. (Toronto), Ph.D. (Cambridge) / Psychology,Neuroscience and Behaviour
ReuvenDukas, Ph.D. (North Carolina) / Psychology, Neuroscienceand Behaviour
David J.D. Earn, B.Sc., M.Sc. (Toronto), Ph.D. (Cambridge) / Mathematics and Statistics
Margaret Fahnestock, B.Sc. (Stanford), Ph.D. (Berkeley) / Psychiatry and Behavioural Sciences
Deda Gillespie, B.Sc. (Yale), Ph.D. (California) / Psychology, Neuroscience and Behaviour
Ashok K. Grover, B.Sc., M.Sc. (Delhi), Ph.D. (Calgary) / Medicine
Paul Higgs, B.A., Ph.D. (Cambridge, U.K.) / Physics and Astronomy
Hendrik N. Poinar, B.Sc., M.Sc. (California Polytechnic StateUniversity), Ph.D. (Ludwig Maximillians University, Munich) /Anthropology
ElyanneRatcliffe, B.Sc. , Medical Program (McMaster), MedicalCouncil of Canada Qualifying Exam Parts I and II, Residency,University of Toronto / Pediatrics
Henry Szechtman, B.Sc. (McGill), Ph.D. (University of Pittsburgh) / Psychiatry and Behavioural Neurosciences
Eva S. Werstiuk, B.Sc., Ph.D. (London, U.K.) / Medicine

ADJUNCT MEMBERS
AdaltoBianchini, B.Sc., M.Sc. (Brazil), Ph.D. (Belgium) / UniversidadeFederal do Rio Grande, Brazil
Gary Chiang, B.Sc., M.Sc., Ph.D. (Toronto)
Tom Edge, B.Sc. (Guelph), M.Sc. (Ottawa), Ph.D. (Carleton) / National Water Research Institute-Environment Canada
David Galbraith, B.Sc., M.Sc. (Guelph), Ph.D. (Queen's) / RoyalBotanical Gardens
Patricia Gillis, B.Sc., M.Sc. (Guelph), Ph.D. (Waterloo) / NationalWater Research Institute-Environment Canada
Pierre Laurent, D.Sc. (France) / Centre National de la Recherche Scientifique, France
James C. McGeer, B.Sc., M.Sc., (British Columbia), Ph.D. (Scotland)/ Wilfrid Laurier University
James Pringle, M.Sc. (New Hampshire), Ph.D. (Tennessee) / RoyalBotanical Gardens
Glen VanDerKraak, B.Sc., M.Sc. (Manitoba), Ph.D. (British Columbia)/ University of Guelph

PROFESSORS EMERITI
Douglas Davidson, B.Sc. (Durham), D.Phil. (Oxford)
Richard A. Morton, M.S., Ph.D. (Chicago)
Andrew J. Rainbow, B.Sc.(Manchester), M.Sc. (London), Ph.D. (McMaster)

M.Sc. Degree

The requirements for the M.Sc. degree appear under the Regulations for the Master's degree near the beginning of this Calendar. A candidate for the M.Sc. degree in Biology is required to spend at least one calendar year in full-time graduate study at McMaster University. Completion of the M.Sc. degree, however, typically requires two years of full-time study.

The M.Sc. candidate is required to complete satisfactorily not fewer than one full course in Biology or related fields, of which at least one half course must be at the 700 level. If a 600-level course is taken, it must be in Biology. The candidate is also required to present a thesis which demonstrates the ability to do original research. The candidate will be required to defend his/her thesis in the final oral examination. The Department may require the student to take additional graduate or undergraduate courses to remove program deficiencies.

Students in the M.Sc. program can be considered for transfer to a Ph.D. program after one year. The transfer exam must be completed by 22 months after the start of the M.Sc. program. Prior to transfer, the candidate must have completed a minimum of one graduate half course and obtained the average grade of B+ or better. Transfer from M.Sc. to Ph.D. will be initiated by a mutual agreement between the student and supervisor. Enrolment in the Ph.D. program is dependent upon the successful completion of the transfer examination. The format of this examination shall follow exactly the procedure established for the comprehensive examination. The result of said examination will be valid as the required Ph.D. comprehensive examination.

(**Note**: Candidates for the M.Sc. degree who wish to complete the requirements in time for a particular convocation, should submit their theses to the Department a full two weeks ahead of the date given elsewhere in the calendar, in order to give their examiners adequate time to review their theses.)

Ph.D. Degree

For students entering the Ph.D. program with a M.Sc. degree there is no minimum course requirement but all students must complete a thesis. Students with a B.Sc. degree are required to complete a minimum of two 700-level half courses, plus a thesis. The Department may require students enrolled in the doctoral program to take graduate or undergraduate courses to remove program deficiencies. Candidates are required to plan their course requirements in consultation with their supervisory committee. There is no departmental foreign language requirement for Ph.D. candidates. Candidates for both M.Sc. and Ph.D. degrees are expected to participate regularly in departmental programs and activities (e.g. seminars). The candidate for the Doctoral degree must pass a Comprehensive Examination within the time limits required by the University. Graduate students entering the final year of the Ph.D. degree are required to present the results of their research project to the department during a public supervisory committee meeting. At this meeting students will present a comprehensive overview of the field of investigation in the form of a written report submitted to the supervisory committee and a 50-minute oral presentation describing the rationale, experimental approaches, and outcomes of their research project. A question period follows the presentation. In the Final Oral Examination, the candidate will be expected to defend his/her thesis which embodies the results of original research. The general requirements concerning the thesis appear earlier in this Calendar.

Courses

Courses marked with an asterisk (*) are half courses. Not all courses are offered every year.

The following 600-level courses are offered for graduate credit and are available to senior undergraduate students. <u>In each case, graduate students will have an extra required component in addition to the work required of undergraduate students.</u> This extra required component will consist of seminar presentations, laboratory projects, oral critiques, and grant proposals, the particular nature varying amongst the various courses.

***6B03 / Plant Metabolism and Molecular Biology / E.A. Weretilnyk**
Analysis of plant cell metabolism and the regulation of metabolism at the biochemical and molecular genetic level.

***6DD3 / Molecular Evolution / G.B. Golding, B. Evans, J. Stone**
The study of how molecules change over time within and between species. The experimental data, techniques, and theories will be examined.

***6E03 / Population Genetics / R. Singh**
Fundamentals of theoretical population genetics and their practical applications to understanding genomics, molecular evolution, human evolution, speciation and conservation biology.

***6EE3 / Human Diversity and Human Nature / R.S. Singh**
The nature of genetic diversity in humans; the nature versus nurture debate in relation to genetic determinism and biological basis of behaviour.

6H03 / Molecular Biology of Cancer / A. Bédard(cross-listed as Biochemistry *6H03)
Cancer at the molecular and cellular level. Topics include: properties of cancer cells; activation of proto-oncogenes; function of oncoproteins; proliferative signal transduction; transgenic mouse models of human cancer; and tumour viruses.

***6P03 / Medical Microbiology / J.P. Xu**
Microbial infectious diseases of humans: ecology, evolution, epidemiology, immunity, pathogenesis and the treatments of these diseases.

***6T03 / Neurobiology / C.A. Nurse, M. Fahnestock**
Selected topics in neurobiology at the molecular and cellular level including growth factors and neuronal development, ion channels, neurotransmitter functions, learning and memory and neurological disorders.

***6X03 / Environmental Physiology / M.J. O'Donnell,G. McClelland**
Advanced physiology of animals with an emphasis on interactions with an adaptation to the environment.

***6YY3 / Ecology and Management of Coastal Waters / P. Chow-Fraser**
Understanding key ecological processes to manage coastal waters sustainably. Topics include use of physical and biotic indicators to assess impacts of human activities.

700-level courses are restricted to graduate students.

***707 / Ecological Statistics / S. Dudley, J. Dushoff**
This graduate course in statistics will introduce common multivariate methods used in ecology and to develop basic computer and interpretation skills necessary for their use. Students participate in teaching through analysis of data sets and individual presentations.

***708 / Quantitative Methods in Ecology and Evolution/ J. Dushoff, B. Bolker**
This new course focuses on realistic quantitative modeling of lab and field data. The main activity is learning to fit models to data using a statistical package and programming language called R. In this applied context, the course will visit a variety of philosophic topics: parsimony vs. realism, Bayesian vs. frequentist statistics, estimation vs. hypothesis testing. The course will enhance your ability to ask interesting biological questions with a quantitative flavour; and to construct, parameterize, and test models for your own data.

***709 / Special Topics in Biology / Staff**
Studies requiring selection from specialized areas of research as approved by the Department.

***715 / Topics in Evolutionary Genetics / B. Evans, B. Gupta,G.B. Golding, R.S. Singh**
An advanced treatment of population, evolutionary, and quantitative genetics including theoretical and experimental results, and focusing on geographic variation, divergence and speciation.

***716 / Advanced Topics in Ecology I / J.S. Quinn**
Advanced topics in Behavioural Ecology, Landscape Ecology, or Conservation Biology, will be examined through a series of readings, lectures, seminars and discussions. Within disciplines the participants will tackle a focal theme reflecting current research in the area. Focus will be determined by the teaching staff. Topics will cycle depending upon interest among graduate students and availability of faculty.

***717 / Advanced Topics in Ecology II / S. Dudley, J. Stone,G.B. McClelland**
Advanced topics in one of the following areas: Evolutionary Ecology and Development or Physiological Ecology will be examined through a series of readings, lectures, seminars and discussions. Within disciplines the participants will tackle a focal theme reflecting current research in the area. Focus will be determined by the teaching staff. Topics will cycle depending upon interest among graduate students and availability of faculty.

****720 / Bioinformatics / (cross-listed as Computational Science and Engineering *720)***
This course will introduce students to the basics of elementary sequence analysis. This will include DNA/protein database design and access; homology detection; sequence alignment; phylogeny reconstruction; pattern analysis and other topics in computational biology.

***721 / Topics in Molecular Evolution / R.S. Singh, B.P. Gupta**
A molecular approach to problems of the origin of life, evolution of cells, diversity and phylogeny of modern organisms, and dynamics of genes in populations.

***723 / Topics in Molecular Genetics / J.R. Jacobs, R. Cameron, E. Weretilnyk**
The emphasis in Topics in Molecular Genetics is on novel control mechanisms of gene expression, cell signaling and cell differentiation. Recent developments in the field of genomics/proteomics and signal transduction are examples of topics discussed in this course. This year, the emphasis will be on molecular aspects of polarized cell signaling, relating to morphogenesis in animals, and to plant-environment interactions.

***724 / Molecular Ecology / J.P. Xu, B. Evans**
This course will survey current topics on the use of molecular genetic techniques to study aspects of population biology and ecology. Staff lectures, student presentations, and joint discussions of the current literature will be used.

***726 / Integrative Physiology / G.B. McClelland, C.M. Wood, M.J. O'Donnell, C.A. Nurse**
This course will be a mixture of formal lectures, discussion groups and student presentations examining the integration of physiological and biochemical processes from the level of genes, cells, organs, systems and whole organisms.

***727 / Cellular and Molecular Physiology / C.A. Nurse, M.J.O'Donnell**
This course will combine formal lectures, discussion groups and student presentations to examine membrane transport processes, and mechanisms of intracellular homeostasis using various techniques including patch clamp electrophysiology, heterologous expression systems, single cell spectrofluorometry, and Ussing chambers.

***728 / Environmental Physiology / C.M. Wood**
This course, in lecture, seminar, and discussion format, will examine the influence of natural and anthropogenic environmental stressors on the physiology of aquatic and terrestrial animals, with an emphasis on homeostasis, acclimation, and adaptation at all levels from the gene to the whole organism.

***730 / Management of Aquatic Ecosystems and Resources/ P. Chow-Fraser**
Emerging issues in the management of water and aquatic resources are complex and include problems of supply and demand, water quality for human consumption and recreational use, contaminant loading of aquatic biota, maintenance of ecosystem integrity, and the competing and sometimes conflicting riparian land use. Because these issues are cross-disciplinary, traditional single-discipline approaches are inappropriate. This course adopts an "ecosystem approach" towards management of aquatic resources and will consider the main socio-economic, physico-chemico-biological factors that affect aquatic ecosystems.

***731 / Microbial Pathogenesis, Symbiosis and HostInteractions / R. Cameron, T. Finan**
Analysis of the molecular basis of pathogenic and symbiontic interactions requires an understanding of the contributions from both host and microbe. The course will discuss current research on the interactions of microbes (bacteria, fungi, protozoa) and viruses with their animal and plant hosts.

***742 / Molecular and Metabolomic Responses of Plants toEnvironmental Perturbations / R. Cameron,E. A. Weretilnyk**
This new course will examine how plants respond to various environmental stresses, both biotic and abiotic. The molecular perception and signalling pathways involved and the metabolomic changes that allow the plant to adapt to, tolerate or resist a particular perturbation will be discussed (examples - disease, cold, drought). This course will also address an emerging and important topic in plant biology, the ability of plants to respond to multiple stresses.

***762 / Developmental Biology / J.R. Jacobs, A.R. Campos, B.P. Gupta**
Recent progress in cellular and molecular aspects of metazoan development will be examined in lecture and seminar format. Particular emphasis will be placed on current controversies in the molecular basis of induction, signal transduction and genetic regulation of development in Caenorhabditis, Drosophila, and mouse models.

***775 / Molecular Microbiology and Microbial Genomics/ M. Elliott, T. Finan**
Topics of this course are current research on bacteria and fungi using molecular genetic, biochemical, bioinformatics, and genomic methods to study natural biodiversity, cell structure, cell-cell interactions and metabolism in laboratory model organisms and natural ecosystems.

The following course is available to graduate students for credit:

Education *750 - Principles and Practices of University Teaching is a graduate level credit course offered three times a year. The focus is on honing essential pedagogical and practical teaching skills. This includes sessions on curriculum design, teaching strategies (e.g., Inquiry and Problem-Based Learning), assessment strategies, developing a teaching dossier, and research on teaching and learning**.**

(**NOTE:** Students should consult the Biochemistry, Mathematics, Medical Physics and Applied Radiation Sciences, and the Medical Sciences graduate sections of this Calendar for additional course selections.)

Facilities for Research

In addition to general research facilities in Biology, the Department has available: facilities for use of radio-isotopes, tissue culture laboratories, constant temperature rooms, growth chambers, a research greenhouse, an aquatic facility, and animal rooms. The laboratories are equipped with advanced instrumentation, including analytical and preparative ultracentrifuges, confocal and electron microscopes, interference and fluorescence microscopes, radio-isotope counting facilities, a microspectrophotometer, recording spectrophotometer, etc. The Institute for Molecular Biology and Biotechnology provides oligonucleotide synthesis products, sequencing and other services. Research opportunities are augmented by the Computing and Information Services, a 200 curie Caesium-137 gamma source, collaboration with the National Water Research Institute (Canada Centre for Inland Waters) and by the Royal Botanical Gardens whose 1880 acres of varied lands and water areas adjoin the McMaster University campus.

A detailed description of the research and recent publications of each faculty member is available on our website (see above) and in a brochure which may be obtained by writing to the Chair, Department of Biology, McMaster University, 1280 Main Street West, Hamilton, Ontario, Canada, L8S 4K1.

BIOMEDICAL ENGINEERING

The recently created McMaster School of Biomedical Engineering (MSBE) offers programs leading to the M.A.Sc. and Ph.D. in Biomedical Engineering. The mandate of the school is to conduct interdisciplinary research and educational programs of internationally recognized excellence within a unique collaborative environment that leverages our existing expertise in medical sciences and engineering and that links current and emerging areas of molecular, medical and engineering research. The School is an equal partnership between the Faculties of Engineering and Health Sciences and also involves the Faculty of Science.

Students will be accepted into the program from both engineering/physical science and life/health sciences backgrounds. Students from engineering/physical science backgrounds require 4 year degree or equivalent with a minimum B+ average in their final 2 years of study (B.Sc., B.Eng., B.A.Sc.). Students from life/health sciences backgrounds require 4 year degree or equivalent with a minimum B+ average in their final 2 years of study (B.Sc., B.H.Sc., D.D.S., M.D.).

Enquiries: 905 525-9140 Ext. 23486
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Faculty / Fall 2012

DISTINGUISHED UNIVERSITY PROFESSORS

John B. Bienenstock, M.B., B.S. (U.K.), M.R.C.P., F.R.C.P.(C),F.R.C.P., F.R.S.C. / Pathology and Molecular Medicine
John L. Brash, B.Sc., Ph.D. (Glasgow), P.Eng.,D.Hon.Caus. (ParisNord), F.B.S.E., F.R.S.C. / Chemical Engineering
Simon S. Haykin, B.Sc., Ph.D., D.Sc. (Birmingham), F.I.E.E.E.,F.R.S.C. / Electrical and Computer Engineering
John F. MacGregor, B.Eng. (McMaster), M.S., Ph.D. (Wisconsin),FASA, P.Eng., F.C.A.E. / Chemical Engineering
Henry P. Schwarcz, B.A. (Chicago), M.S., Ph.D. (California Institute ofTechnology), D.Sc. (McMaster), F.R.S.C. / Geography and Earth Sciences

PROFESSORS

David W. Andrews, B.Sc. (Ottawa), Ph.D. (Toronto) / Biochemistryand Biomedical Sciences
MehranAnvari, M.B.B.S. (Newcastle, U.K.), Ph.D. (Adelaide),F.R.C.S.C., F.A.C.S. / Surgery
Gary M. Bone, B.Sc. (Queen’s), M.Eng., Ph.D. (McMaster), P.Eng./ Mechanical Engineering
Gianluigi Botton, B.Eng., Ph.D. (ÉcolePolytechnique de Montreal) / Materials Science and Engineering
Michael A. Brook, B.Sc. (Toronto), Ph.D. (McGill) / Chemistry
Anthony K.C. Chan, M.B.B.S. (Hong Kong), F.R.C.P.(C) / Pediatrics

M. Jamal Deen, B.Sc. (Guyana), M.S., Ph.D. (Case Western Reserve), F.R.S.C., F.C.A.E., F.I.E.E.E., F.A.P.S. F.E.C.S.,F.A.A.A.S / Canada Research Chair in Information Technology/ Electrical & Computer Engineering
William M. Farmer, B.A. (Notre Dame), M.A., M.S., Ph.D. (Wisconsin-Madison) / Computing and Software
ChristophFusch, M.D. (Germany),Ph.D. (Switzerland), Certified Neonatologist (Germany), Pediatric Intensivist (Germany), Laboratory Medicine in Pediatrics (Germany), FRCPC / Pediatrics
Jan D. Huizinga, B.Sc., M.Sc., Ph.D. (Groningen) / Medicine
Rafael N. Kleiman, S.B. (M.I.T.), Ph.D. (Cornell) / Engineering Physics
Thomas Maibaum, B.Sc. (Toronto), Ph.D. (London) / Computing andSoftware
Carmel E. Mothersill, B.Sc., Ph.D. (University College Dublin)/ Medical Physics and Applied Radiation Sciences
Kathryn M. Murphy, B.A. (Hons.) (Western), M.A., Ph.D. (Dalhousie)/ Psychology, Neuroscience and Behaviour
Justin R. Nodwell, B.Sc., Ph.D. (Toronto) / Biochemistry andBiomedical Sciences
Michael S. Patterson, B.Sc. (Queen's), M.Sc. (McMaster), Ph.D. (Toronto) / Medical Physics and Applied RadiationSciences
Colin B. Seymour, DCR (RT) (Guy's Hospital), B.L. (King's Inn), Ph.D. (Trinity College Dublin) / Medical Physics and Applied Radiation Sciences
Heather Sheardown, B.Eng. (McMaster), Ph.D. (Toronto), P.Eng./ Chemical Engineering
William P. Sheffield, B.Sc., Ph.D. (McGill) / Pathology and MolecularMedicine
Jeffrey I. Weitz, M.D. (Ottawa), F.R.C.P.(C), F.A.C.P. / Medicine
Judith West-Mays, H.B.Sc. (Wilfrid Laurier), M.Sc., Ph.D. (Waterloo)/ Pathology and Molecular Medicine / Co-Director
Gerard D. Wright, B.Sc., Ph.D. (Waterloo) / Biochemistry andBiomedical Sciences
Igor Zhitomirsky, M.Sc. (Kalinin), Ph.D. (Moscow) / Materials Science and Engineering
Shiping Zhu, B.Eng. (Zhejiang), Ph.D. (McMaster), P.Eng. / Chemical Engineering

ASSOCIATE PROFESSORS

Anthony Adili, B.Eng. Mgt., M.D. (McMaster), F.R.C.S.(C), P.Eng./ Surgery
Christopher Anand, B. Math (Waterloo), M.Sc., Ph.D. (McGill) / Computing and Software
Ian C. Bruce, B.Eng., Ph.D. (Melbourne). P.Eng / Electrical and Computer Engineering
Hubert de Bruin, B.Eng., M.Eng., Ph.D. (McMaster), P.Eng. /Electrical and Computer Engineering
Carlos Filipe, B.S. (Escola Superior de Biotecnologia, Portugal), Ph.D. (Clemson) / Chemical Engineering
Cecile Fradin, B.Sc., M.Sc. (EcoleNormaleSupérieure, Paris), Ph.D. (Pierre et Marie Curie, Paris) / Biochemistry and Biomedical Sciences
Raja Ghosh, B.S., M.S. (Jadavpur), D.Phil. (Oxford) / Chemical Engineering
AmmarGilani, F.Sc. (Sahiwal), M.B.B.S. (Punjab) / Medicine
Gary Hasey, M.D. (Alberta), F.R.C.P.(C.), M.Sc. (Toronto)/ Psychiatry and Behavioural Neurosciences
Joseph E. Hayward, B. Eng., M. Eng., Ph.D. (McMaster)

Gonzalo Hortelano, B.Sc. (Basque), M.Sc. (Witwatersand), Ph.D.(Wollongong) / Pathology and Molecular Medicine
AleksandarJeremic, Dipl.Ing. (Belgrade), M.S., Ph.D. (Illinois)/ Electrical and Computer Engineering
Kim Jones, B.A.Sc. (Waterloo), M.Sc. (Guelph), Ph.D. (Toronto)/ Chemical Engineering
Markad V. Kamath, B.Eng. (Mysore), M.S., Ph.D. (I.I.T., Madras), Ph.D. (McMaster), P.Eng. / Medicine
Anil Kapoor, Dipl. Eng., M.D. (Dalhousie), F.R.C.S.(C) (Manitoba),DABU (Cleveland Clinic Foundation) / Surgery
Ray R. LaPierre, B.Sc. (Dalhousie), M.Eng., Ph.D. (McMaster)/ Engineering Physics
Mark Lawford, B.Sc. (Queen's), M.A.Sc., Ph.D. (Toronto), P.Eng./ Computing and Software
Yingfu Li, B.Sc. (Anhui), M.Sc. (Beijing Agriculture), Ph.D. (Simon Fraser) / Biochemistry and Biomedical Sciences
Gerald R. Moran, B.Sc. (McMaster), Ph.D. (Guelph) / MedicalPhysics and Applied Radiation Sciences
Michael D. Noseworthy, B.Sc., M.Sc., Ph.D. (Guelph), P.Eng. / Electrical and Computer Engineering
PonnambalamSelvaganapathy, B.S. (Madurai Kamaraj), M.S., Ph.D. (Michigan) / Mechanical Engineering
ShahinSirouspour, B.Sc., M.Sc. (Sharif), Ph.D. (UBC), P.Eng / Electrical and Computer Engineering
Martin von Mohrenschildt, Dipl. Math., Dr.s.c.Math. (ETH-Zürich)/ Computing and Software
Alan Wassyng, B.Sc. (Hons.), M.Sc., Ph.D. (Witwatersrand)/ Computing and Software

ASSISTANT PROFESSORS
Nicholas Bock, B.Sc. (Western), Ph.D. (Toronto) / Medical Physics
Wael El-Dakhakhni, B.Sc. (Ain Shams), M.Sc., Ph.D. (Drexel),P. Eng. / Civil Engineering
Qiyin Fang, B.S. (Nankai), M.S., Ph.D. (East Carolina) / EngineeringPhysics
Troy Farncombe / B.Sc.,(Calgary), M.Sc., Ph.D. (British Columbia)/ Radiology
Deda C. Gillespie, B.Sc. (Yale), Ph.D. (California-San Francisco)/ Psychology, Neuroscience and Behaviour
Geoffrey B. Hall, B.Sc., M.Sc. (Guelph), Ph.D. (McMaster) / Psychiatry and Behavioural Neurosciences
Todd Hoare, B.Sc. (Queen's), Ph.D. (McMaster) / Chemical Engineering
AlexandruPatriciu, B.Sc., M.Sc. (Univ. Graiova, Romania), M.Sc.Mech. Eng., Ph.D. (Johns Hopkins) / Electrical and ComputerEngineering
HaoPeng, B.Sc., M.Sc. (Wuhan), Ph.D. (Western) / Medical Physics
Cheryl Quenneville, B.A.Sc. (Queen's), M.Sc., Ph.D. (Western) / Mechanical Engineering
LeylaSoleymani, B.Eng. (McGill), M.Sc. (Southern California), Ph.D. (Toronto) / Engineering Physics
Stephen Tullis, B.Sc., M.S. (Queen's), Ph.D. (Cambridge), P.Eng. / Mechanical Engineering
Gregory R. Wohl, B.Sc., M.Sc., Ph.D. (Calgary), P.Eng. / Mechanical Engineering

ASSOCIATE CLINICAL PROFESSORS
Myrna Dolovich, B.Eng. (McGill), P.Eng. / Medicine
Dinesh Kumbhare, B.Sc., M.D. (Dalhousie), M.Sc. (McMaster), FRCPC/ Rehabilitation Medicine
Noam Soreni, B.A., M.D. (Jerusalem) / Psychiatry and Behavioural Neurosciences

ASSISTANT CLINICAL PROFESSOR
Justin de Villiers de Beer, Ch. B., M.B. (Cape Town)/ Radiology

ADJUNCT MEMBERS
Shelley Boyd, B.Sc., M.Sc., M.D. (Toronto)
Tim Fielding, B.Eng. (Western), M.A.Sc. (Toronto) / MDA Toronto
Mark Haacke, B.Sc., M.Sc., Ph.D. (Toronto) / Wayne State University
Lyndon Jones, B.Sc. (Wales), Ph.D. (Ashton), FCOptom, DipCLP, DipOrth, FAAO (DipCL), FIACLE / Western Ontario
John Lymer, B.A.Sc. (Toronto), M.A.Sc. (Toronto) / MDA Toronto
Kamran Sartipi, B.Sc., M.Sc. (Tehran), M. Math., Ph.D. (Waterloo), P.Eng. / Ontario Institute Of Technology
Michael Schmidt, B.Eng. (Ryerson) / MDA Toronto

M.A.Sc. Degree

A candidate is required to complete successfully at least three one-term courses, present a departmental seminar, and present a thesis embodying an original contribution to biomedical engineering. The thesis must be defended in an oral examination.

Ph.D. Degree

The general regulations for the Degree Doctor of Philosophy appear earlier in the Calendar. The minimum course requirement for this degree is at least six half courses beyond the baccalaureate degree orthree half courses beyond the M.A.Sc. degree. A candidate is also required to present a departmental seminar and pass the Ph.D. Comprehensive Examination, which is designed to test breadth of knowledge and ability to synthesize and integrate ideas from within and peripheral to the candidate's research area. The Comprehensive Examination will normally take place between 6 and 15 months after the candidate first registers in the Ph.D. program. The candidate must present a thesis embodying original contribution to biomedical engineering. A supervisory committee determines when a candidate is ready to write the thesis and ascertains whether the quality is satisfactory. The candidate must defend the thesis at a Final Oral Examination.

The School of Biomedical Engineering has a series of seminars given by outside speakers as well as speakers from McMaster. Attendance of students (both Master's and Ph.D.) at these seminars is required.

Courses

All graduate courses offered by the School of Biomedical Engineering are one term courses (half courses). Please note that not all courses are offered each academic year. It is advised that students speak with their graduate supervisor concerning the appropriateness of their background for any course in which they are interested. One-term courses (half courses) are indicated by an asterisk (*). Half-term (quarter courses or modules) are indicated by a pound (#) sign.

***701 / Biomedical Engineering (Core)**
An introduction to biomedical engineering. The biological, chemical, electrical, and mechanical principles involves the design and operation of medical devices and bioprocesses. The research themes of the School of Biomedical Engineering are emphasized: biomaterials and tissue engineering; biomedical imaging; biomedical technology (e.g. biophotonics and medical robotics); bioprocessing.

****702 / Medical Imaging Systems II / M.Noseworthy, N. Brock (cross-listed as Electrical and Computer Engineering *780 and Medical Physics *702)***
This course will compliment Medical Imaging Systems I. In this course imaging methods that rely on non-ionizing radiation will be discussed. The course content focuses on magnetic resonance imaging (MRI), in vivo nuclear magnetic resonance (NMR), ultrasound (US), and optical imaging methods. Advanced concepts such as multi-modality imaging appraches, image fusion, and functional medical image processing will be discussed.

***703 / Analysis, Calibration and Correction of Artifacts inMagneticResonance Imaging / C. Anand**
Incorporation of systematic errors in the standard model of Magnetic Resonance Imaging.Analysis of the resulting artifacts, methods of calibration and correction.

****704 / Gene Therapy for Bioengineers / G. Hortelano (cross-listed as Chemical Engineering *784)***
An analysis of the technology of gene therapy, specifically intended to students with a bioengineering background. The principles of gene delivery, and specific targeting of genetic material to different organs through the use of viral and non-viral vectors will be covered. Particular emphasis will be given to the use of polymers to develop DNA formulations suitable for gene therapy. The application of various gene therapy strategies in selected individual diseases of big impact to the health care systems will be discussed. This course will be based on review articles and original papers.

***705 / Medical Imaging for Physical Scientists / M. Noseworthy**
Each week in this course an invited radiologist will speak on the current state of the art in a particular area of diagnostic medical imaging (e.g., musculoskeletal radiology, neuroradiology, interventional radiology, etc.). They will outline the approaches they use to diagnose and grade disease and the limitations of the technology, as they see it from a clinical perspective. This

presentation will be followed (on a different day) by a synopsis and open discussion on how the technology is used, the limitations, and potential avenues or approaches on how students would improve the technology for better assessing disease.

706 / Biomedical Engineering II (Core) / H. Sheardown, M. Noseworthy, P. Margetts, G. Hortelano, J. West-Mays (cross-listed as Chemical Engineering *781)

An introduction to biomedical engineering with a health science focus. The biological and chemical concepts involved in the design and operation of medical devices and biological processes will be discussed. The following research themes will be emphasized: cell biological responses to biomaterials, toxicity / pharmacokinetics, tissue and genetic engineering, gene therapy, biotechnology physiological response to biomaterials.

765 / Advanced Functional Brain Imaging / M. Noseworthy (cross-listed as Medical Sciences *765)

Functional brain imaging using magnetic resonance techniques (MIR, and in vivo NMR) will be thoroughly discussed. Advantages and disadvantages, relative to other brain imaging modalities (CT, PET, SPECT, NIRS, US) will be discussed where appropriate. This course will provide students with an appropriate, yet complete, understanding of the underlying physics surrounding magnetic resonance and its relevance to neuroscience for the design of functional brain imaging experiments.

***799 / Independent Study in Biomedical Engineering / Staff**

This course allows students to undertake advanced study in selected topics relevant to their thesis research. The student identifies a topic and studies under the guidance of a faculty member who has the relevant expertise. The pertinent literature is examined critically.

The following courses are cross-listed under other departments/programs.

6BC4 / *Modeling of Biological Systems (cross-listed as Electrical and Computer Engineering *6BC4)*
6BE4 / *Medical Robotics (cross-listed as Electrical & Computer Engineering *6BE4)*
6I03 / *Introduction to Biophotonics(cross-listed as Engineering Physics *6I03)*
6TN3 / *Image Processing (cross-listed as Electrical & Computer Engineering *6TN3)*
6T03 / *Applications of Chemical Engineering in Medicine(cross-listed as Chemical Engineering *6T03)*
6U03 / *Unit Operations and Processes in EnvironmentalEngineering (cross-listed as Chemical Engineering *6U03 andCivil Engineering *6U03)*
6Z03 / *Interfacial Engineering (cross-listed as Chemical Engineering *6Z03)*
715 / *Biomechanics of Injury and Prevention (cross-listed Mechanical Engineering *715)*
730 / *Fluid Mechanics (cross-listed as Chemical Engineering *730)*
#731 / *Introduction to Electron Microscopy (cross-listed as Materials Science and Engineering #731)*
#732 / *Analytical Electron Microscopy (cross-listed as Materials Science and Engineering #732)*

***733 /** *Computational Fluid Dynamics (cross-listed as Chemical Engineering *733)*
***742 /** *Membrane Based Bioseparations(cross-listed as Chemical Engineering *742)*
***764 /** *Computational Vision (cross-listed as Electrical & Computer Engineering *764)*
***766 /** *Pattern Recognition (cross-listed as Electrical and Computer Engineering *766)*
***770 /** *Medical Imaging Systems I (cross-listed as Medical Physics *770)*
***780 /** *Biomaterials and Tissue Engineering (cross-listed as Chemical Engineering *780)*
***791 /** *Sensory and Neuromuscular Engineering (cross-listed as Electrical and Computer Engineering *791)*
***792 /** *Medical Visualization (cross-listed as Electrical and Computer Engineering *792)*
***793 /** *Cardiopulmonary Engineering (cross-listed as Electrical and Computer Engineering *793)*
***796 /** *Models of the Neuron (cross-listed as Electrical and Computer Engineering *796 and Computational Engineering and Science *796)*

Additional courses that are relevant to Biomedical Engineering are offered by the following departments/programs.

Biochemistry Courses
***6E03 /** Gene Regulation and Stem Cell Development
***6EE3 /** Advanced Topics in Gene Expression
***6H03 /** Molecular Biology of Cancer
***6J03 /** Biochemical Immunology
***6Y03 /** Genomes and Evolution
***707 /** Mechanism of Enzyme Action
***710 /** Special Topics in Proteins
***711 /** Special Topics in Biomolecular Sciences
***712 /** Special Topics in Membrane Biochemistry
***723 /** Topics in Molecular Biology
***725 /** Molecular Mechanisms of Membrane Functions
***726 /** Biophysical Chemistry of Membrane Structure
***727 /** Proteins

Biology Courses
***6T03 /** Neurobiology
***720 /** Bioinformatics

Computing and Software Course
***757 /** Modern Software Technology for eHealth

Engineering Physics Course
***719 /** MEMS Devices: Design, Fabrication, and Applications

Medical Physics Courses
***770 /** Medical Imaging Systems I
***772 /** Medical Health Physics

Medical Sciences Courses
***703 /** Gene Therapy
***704 /** Cell Physiology
***705 /** Neurochemistry
***713 /** Integrated Systems in Gastrointestinal Health and Disease I
***715 /** Advanced Immunobiology I
***716 /** Advanced Immunobiology II
***719 /** Electrophysiology of Excitable and Non-ExcitableMembranes
***732 /** Vascular Diseases, Haemostatis and Thrombosis I
***733 /** Vascular Diseases, Haemostatis and Thrombosis II
***742 /** Topics in Respiratory Physiology
***756 /** Human Nutrition and Metabolism
***758 /** Smooth Muscle Structure and Function I
***765 /** Advanced Functional Brain Imaging

Physics and Astronomy Courses
***6S03 /** Introduction to Molecular Biophysics

Research in Biomedical Engineering

Research in the School of Biomedical Engineering and its M.A.Sc.and Ph.D. programs has four main themes:

<u>Biomaterials and Tissue Engineering</u>

Research is ongoing in cardiovascular materials, ocular materials, biosensors, antibacterial materials, and bone-interfacing materials. Work in tissue engineering involves physiologic responses to biomaterials including inflammation, immunologic responses, coagulation, fibrosis, cell differentiation and infection. The use of encapsulation to isolate implanted cells from the host's immune system is also under investigation.

<u>Biomedical Imaging</u>

Biomedical imaging research covers imaging of organs, tissues, cells and molecules in biological systems. Tissue and organ imaging research includes CT, SPECT, MRI, PET, and optical imaging of animals, tissues and cells. Facilities for animal imaging include SPECT/CT and PET for small animal imaging, and a small-bore MRI that can be used for clinical studies. Facilities for imaging of cells include: microscopes for confocal, spectral and time resolved imaging as well as fluorescence fluctuation analysis and high content screening.

Biomedical Technology

This field groups together a number of activities encompassing medical instrumentation (including software aspects), medical devices (hearing, orthopedics), biosensors, biophotonics, BIOMEMS, and medical robotics (including telerobotics).

Bioprocessing

Bioprocessing relates to the science and technology associated with the large scale production of pharmaceuticals, vaccines, food and other bioproducts. Activities include genetic engineering, reactor design, and downstream processing operations such as separation and purification.

World class facilities are available in the conduct of this research. These include the facilities of the following Centres and Institutes at McMaster: Antimicrobial Research Centre, Institute for Molecular Medicine and Health, Institute for Molecular Biology and Biotechnology, Centre for Minimal Access Surgery, Brain-Body Institute, Henderson Research Centre, Juravinski Cancer Centre, Brockhouse Institute for Materials Research, Centre for Electrophotonic Materials & Devices, McMaster Manufacturing Research Institute, McMaster Institute for Applied Radiation Sciences, McMaster Institute for Polymer Production Technology, The McMaster Biophotonics Facility.

BUSINESS ADMINISTRATION

The DeGrooteSchool of Business offers programs leading to the M.B.A. and Ph.D. in Business Administration. In collaboration with other faculties, the School offers an M.Sc. in eHealth, and a Master of Health Management. For more information on these collaborative programs, see the degree programs under those names. The DeGroote School also offers a Graduate Diploma in the Management of Innovation and New Technology. See the Diploma section of the calendar for more information.

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Faculty/ Fall 2012

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Norman P. Archer, B.Sc. (Alberta), Ph.D. (McMaster), M.S. (New York) / Information Systems

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MBA Degree

Students interested in the MBA program can obtain full particulars on regulations, as well as full course descriptions, from the MBA Academic Calendar, available on the DeGroote School of Business MBA webpage at http://www.degroote.mcmaster.ca/MBA/registration.html.

MBA Courses

<u>Year 1 Courses</u>

***A600 /** Financial Accounting and Reporting
***A610 /** Managerial Accounting
***B600/** Organizational Behaviour
***E600/** Economics
***F600/** Managerial Finance
***H600/** Human Resources Management
***K603/** Information Systems in Business
***M600/** Marketing Concepts and Applications
***O600 /** Operations Management
***Q600 /** Applied Business Statistics

<u>Year 2 Courses</u>

Accounting and Financial Management Services
***A701 /** Intermediate Financial Accounting I
***A702 /** Intermediate Financial Accounting II

***A703 /** Advanced Financial Accounting
***A717/** Seminar in Accounting Theory
***A718/28/38/48**/ Selected Topics in Accounting
***A721/** Management Accounting Information for Strategic Development
******A722 /** *Market Trading and Risk Management (cross-listed as Business *F722)*
***A723 /** Accounting Information Systems
****A727 /*** *Financial Fraud and Market Surveillance(cross-listed as Business *F737)*
***A730 /** Canadian Taxation I *(Antirequisite: A732)*
***A732 /** Canadian Income Tax Fundamentals *(Antirequisite: A730 and A733)*
***A733 /** Canadian Taxation II*(Antirequisite: A732)*
***A740 /** Strategic Management Accounting
***A745 /** Assurance
****A750 /*** *Financial Statement Analysis (cross-listed as Business *F717 and *V701)*

Organizational Behaviour
***B712 /** Managerial Negotiations
***B715 /** Leadership
***B716 /** Strategic Organizational Change
***B717 /** Management Development
***B730/** Strategic Management of Technology
***B718/28/38/48/**Selected Topics in Organizational Behaviour

Health Services Management
***C700 /** Introduction to Health Management
***C711 /** Health Economics and Evaluation
***C721/** Health Policy Analysis
***C722 /** Management of Population Health
***C726 /** Critical Issues in Health Services Management
***C727 /** Pharma/Biotech Business Issues
***C736 /** Quality Management in Health Services
****C741 /*** *Health Care Marketing (cross-listed as Business *M722)*

***D700 /** Case Analyses and Presentations

Business Economics
***E714** / Business and Economic Forecasting

Finance
***F710/** Financial Economics and Quantitative Methods
***F711/** Financial Institutions
***F712 /** Applied Corporate Finance
***F713/** Security Analysis
***F714/** Options and Futures: Theory and Applications
***F715/** Portfolio Theory and Management

***F716/** International Financial Management
****F717 /*** *Financial Statement Analysis (cross-listed as Business *A750 and *V701)*
***F718/28/38/48/58 /** Selected Topics in Finance
***F720 /** Small Business/Entrepreneurial Finance
***F721 /** Mergers, Acquisitions and Corporate Control
****F722 /*** *Market Trading and Risk Management (cross-listed as Business *A722)*
***F723 /** Fixed Income Analysis
****F724 /*** *Venture Capital (cross-listed as Business *V705)*
***F725 /** Personal Financial Management
****F726 /*** *Behavioural Finance (cross-listed as Business *V702)*
***F727 /** Working Capital Management
***F730 /** Pension, Retirement and Estate Planning
***F731 /** Insurance and Risk Management
***F732 /** Personal Financial Planning and Advising
***F733 /** Financial Risk Management
***F734 /** Real Estate Finance and Investment
****F735 /*** *Financial Modelling and Valuation (cross-listed as *V703)*
***F736 /** Ethics and Professional Practice in Finance
****F737 /*** *Financial Fraud and Market Surveillance (cross-listed as Business *A727)*
***F740 /** Islamic Finance

Human Resources and Management
***H721/** Recruitment and Selection
***H723/** Compensation / Reward Systems
***H718/28/38/48/**Selected Topics in Human Resources

International Business
***I731/** International Business
***I732/** Japanese Business

Management Information Systems
***K718/28/38/48 /** Selected Topics in Management Information Systems
***K723 /** Data Mining and Business Intelligence
***K724 /** eBusiness Strategies
***K725 /** Business Process Management
***K731 /** Project Management
***K735 /** Managing the Implementation of Enterprise Systems
***K736 /** Management Issues in eHealth
***K737 /** Cases in eBusiness, Innovation and Entrepreneurship

Strategic Marketing
***M713 /** International Marketing Management
***M718/28/38/48 /** Selected Topics in Marketing
***M721 /** Business Marketing

M722 / *Health Care Marketing (cross-listed as Business *C741)
***M724 /** Innovation and New Products
***M727 /** Marketing Communication
***M731 /** Marketing Research
***M732 /** Consumer Behaviour
***M734 /** Strategic Marketing Analysis
***M736 /** Services Marketing
***M740 /** Corporate Reputation and Brand Management
***M750 /** Consultative Selling
***M751 /** Sustainability and Corporate Social Responsibility

Supply Chain Management
***O701/** Operations Modeling with Spreadsheets
***O711/** Risk Models in Operations Management
***O715 /** Simulation of Manufacturing and Service Systems
***O718/28/38/48/** Selected Topics in Operations Management
***O721/** Inventory Management and Production Planning
***O722/** Modern Manufacturing Strategy
***O725 /** Business Logistics
***O726/** Methods for Quality Management
***O727/** Service Operations Management
***O734/** Supply Chain Management

Business Environment and Policy
***P700 /** Business, Government and the Global Environment
***P714/** Total Quality Management
***P715 /** Entrepreneurship
***P720 /** Strategic Management
***P722/** Legal Aspects of Business
***P727 /** Strategic Knowledge Management
***P731 /** Crisis Management and Communications
***P732 /** Strategic Public Relations Management
***P734/** Current Issues in the Management of Innovation and NewTechnology
***P737/** Profiting from Intellectual Property
***P745 /** Corporate Governance

Strategic Business Valuation
***V700 /** Strategic Business Analysis and Valuation
****V701 /** Financial Statement Analysis (cross-listed as Business *A750 and *F717)*
****V702 /** Behavioural Finance (cross-listed as Business *F726)*
****V703 /** Financial Modeling and Valuation (cross-listed as *F735)*
***V704 /** Advanced Strategic Business Valuation
****V705 /** Venture Capital and Private Equity (cross-listed as Business *F724)*

The MBA program consists of 20 courses; ten in year one and ten in year two. Twelve of the 20 courses are core courses, which all students are required to take. In year two, students must select a specialization and complete courses required for that specialization. They may also elect to take minors in certain subject areas. For specific information, see the MBA Academic Calendar.

The above and following information relates to the program in effect in the Fall 2012. Any questions relating to program requirements in effect before September 2011 may be directed to the Manager, MBA Programs in the Ron Joyce Centre, RJC-316.

Topics covered in the Selected Topics courses will vary depending on recent developments in the subject area and the research interests of the instructor(s).

There is no thesis requirement for graduation in the MBA program. However, a student in the second year may, with the prior approval of the appropriate instructor, Area Chair, and the Director of the MBA Program, undertake an original paper, research study or project in an area directly associated with his/her program of study. Credit for one second-year course will be granted upon satisfactory completion of the project.

In addition to the elective courses listed, students in Year 2 who wish to take graduate courses in other departments of the University as part of their MBA program may do so provided they secure approval from the particular department concerned and the Manager, MBA Programs, DeGroote School of Business.

Graduate students not registered in the Faculty of Business may enroll in MBA courses only with the prior approval of the Faculty of Business and their home department. Enquiries should be directed to the Manager, MBA Programs, DeGroote School of Business.

Ph.D. Degree

The Faculty of Business offers a program leading to the Ph.D. in Business Administration, with fields in Accounting, Finance, Information Systems (IS), Management of Organizational Behaviour and Human Resources (MOBHR), Management Science (MS), and Marketing.

The **Accounting** field of study is designed to prepare students who are planning to assume an academic career in a university setting to become excellent accounting researchers and educators. The program of study provides students an exposure to issues and techniques of various research methods and designs in the context of accounting research. Typically, successful applicants will have a university degree in accounting or related fields. Applicants with other university programs of study, including economics, finance, computer science, engineering, engineering and management, and mathematics may also be qualified.

The **Finance** field of study is designed to prepare and graduate students with theoretical and empirical training that is required to conduct significant academic research in finance. The topics of study include, but are not limited to, the pricing of securities, investment and risk management, corporate finance, and other financial decisions of individuals and firms. This field of study is intended for individuals who are interested in the field of Finance and in a career in university teaching and research, as well as research-based careers in the financial services sector. These may include fund management and investment banking. Typically, successful applicants will have a Master's degree in Business Administration, Economics, Finance, Mathematics or a related field.

The **IS** field of study concerns the management, use and impact of information technologies in organizations. It is a multidisciplinary field by nature and draws upon theory and research from a wide variety of disciplines such as Organizational Behaviour, Strategy, Marketing, Psychology, Computer Science, and Information Studies. Recognizing the breadth of the field, students are free to adopt either qualitative or quantitative approaches to their research, as appropriate. The program is intended for students with a strong background and interest in information technology and an avid interest in managerial and behavioural aspects as opposed to technical orientations. It is intended for students with a Master's degree in Business Administration, Computer Science, and/or Information Systems.

The **MOBHR** field is broad in scope and is concerned with all aspects of the employment relationship. The field has a strong research emphasis and is designed to prepare highly motivated individuals for academic careers as scholars in Organizational Behaviour, Human Resource Management, and/or Industrial Relations. A major strength of the field is that students can draw upon diverse faculty interests to develop a research program that suits their own objectives. It is intended for students with a Master's degree in business administration or in disciplines such as psychology, economics and sociology.

The **MS** field is concerned with the development and application of quantitative modeling and systematic approaches to the solution of management problems. Areas of application for these techniques include operations management, logistics, and supply chain management. The field has a strong research emphasis and is designed to prepare highly motivated and capable individuals for making significant advances in management science knowledge. It is intended for students with Master's degrees in Business Administration or in disciplines such as Mathematics, Engineering, Science, and Computer Science.

The **Marketing** field of study is designed to prepare graduate students with a solid foundation in theoretical and empirical methodologies focusing largely on firm level research in the discipline of marketing. The doctoral student will work closely with the supervisor to conduct leading edge research in the discipline of marketing, which explores the processes and mechanisms by which value is created and delivered to the customer. The expectation is that this research will be published in top journals prior to graduation. The program is designed for students who have an interest in pursuing an academic career.

Application

Requests for application material should be sent to the attention of the Ph.D. Administrative Coordinator, DeGroote School of Business, McMaster University, Hamilton, Ontario, Canada, L8S 4M4 or by email to phdinfo@mcmaster.ca. Information is also available on the website: www.degroote.mcmaster.ca/phd/index.html. Admission decisions are based on previous academic performance, Graduate Management Admission Test (GMAT) or Graduate Record Examination (GRE) results, references, research interests and other relevant information.

Applicants whose native language is not English will be required to demonstrate English language proficiency by providing a valid TOEFL test score at the time of application. Successful applicants will normally achieve a score of at least 100 and a minimum of 22 in the reading component, 22 in the listening component, 26 in the speaking component and 24 in the writing component on the Internet-Based Test (IBT); or 600 on the Paper-Based Test (PBT); or 250 on the Computer-Based Test (CBT). We may also consider the equivalent score on other recognized tests.

Applicants may be exempted from this requirement if they have completed a university degree where English was the language of instruction.

Applicants are responsible for making all arrangements regarding writing of the TOEFL test or other recognized tests and for ensuring the official score report is forwarded to the DeGroote School of Business in a timely manner.

Qualification Requirements

Admission to the Ph.D. program will be granted in accordance with the general regulations of the School of Graduate Studies as specified in the front of this calendar. Applicants normally must have a Master's degree with at least B+ standing and a minimum GMAT score of 600. In lieu of a GMAT score, a comparable GRE score will be considered. Admission decisions are based on past academic performance, GMAT or GRE score, the strength of reference letters, the quality of the applicant’s statement of research interests and goals, and matching of the applicants’ research interests with the research expertise and interests of the faculty members.

Accounting candidates must demonstrate proficiency in various subject areas of business management, including accounting and economics. They must also possess strong quantitative skills, including calculus and linear algebra. Highly qualified candidates with background in other fields such as economics, finance, mathematics, engineering, engineering and management, or computer science are encouraged to apply.

Finance candidates must demonstrate competence in business management, finance, mathematics and economics.

IS candidates must demonstrate proficiency in business management and information systems. Students must also demonstrate proficiency in statistics at a level sufficient forstudy and research in the IS field.

MOBHR candidates must demonstrate competence in at least one of the following related subject areas in business management: organizational behaviour, human resources management, labour relations, industrial and organizational psychology and economics.

MS candidates must demonstrate proficiency in various subject areas in business management, including operations management and economics. They must also demonstrate proficiency in calculus, probability, matrix algebra, statistics and computer programming at a level sufficient for study and research in the MS field.

Marketing candidates must have demonstrated proficiency in any area of the natural sciences, social sciences or humanities. They are encouraged to demonstrate some competence in areas of business management and marketing. Students must also have demonstrated proficiency in mathematics or statistics at a level sufficient for study and research in the Marketing field.

Program Requirements

Because of the differing backgrounds of students entering the program and the differing areas of dissertation research, there will be variations in the course programs that students follow. A program of study will be chosen by the student with the approval of the student's supervisor and the Area Chair. This program will be chosen to prepare the student for the comprehensive examinations and to provide appropriate background for the planned dissertation research. Most of the courses and seminars will be taken within the School of Business. Where appropriate, and with the approval of the student's supervisor, courses from other departments within the University or from other universities may be taken; such courses normally will be graduate courses. Graduate courses offered in other university departments are described elsewhere in this calendar.

Students must take a minimum of 6 to a maximum of 12 one-term courses. The exact number and mix of courses will depend on the background and research interests of the student as assessed by the student’s supervisor. Students can receive exemptions for courses (if qualified) or take additional courses as long as the total number does not exceed 12 courses.

In order to remain in the program, students must maintain a grade point average of at least B+ in their course work with no more than one failing grade (below B-) in a prescribed course. The student will be required to withdraw from the program if he/she receives a second failing grade.

All students in the program, regardless of field of study, take one common seminar course (*B790).

For the **Accounting** field, three accounting Ph.D. seminar courses (*A771, *A772 and *A773)must be taken. In addition, the following courses from the Department of Economics must be taken: *721, *722, *761, *762 and *765. Candidates who do not have sufficient background in accounting, microeconomics and/or econometrics will be required to take specific courses in accounting, microeconomics and/or econometrics for credit, normally in the coursework phase of the Ph.D. program, up to a maximum of 12 one-term courses for credit in the program.

For the **Finance** field, the five finance Ph.D. courses (*F770, *F771, *F772, *F773 and *F774) must be taken. In addition the following courses from the Department of Economics must be taken: *721, *722, *723, *761 and *762. Students are also required to take one additional 700-level course in Business, Economics or Mathematics, to be determined in consultation with their supervisor.

For the **IS** field, the two Ph.D. seminar courses (*B793, *B794), two IS Ph.D. courses (chosen from *K778, *K779, *K791, *K792, *K793 and *K794), and three MBA information systems courses (chosen from *K723, *K724, *K725, *K731, *K735, *K736, and *K737) must be taken.

For the **MOBHR**field, the Ph.D. seminar courses (*B790, *B791, *B792, *B793, *B794, *B795, *B796, *B797, *B798) must be taken.

For the **MS** field, the five MS Ph.D. courses (*Q771, *Q773, *Q780, *Q781 and* Q790), two MBA courses (*O701, *O711), and your choice of two MBA or Ph.D. courses (chosen from *O715, *O721, *O722, *O725, *Q772, *Q774, *Q778, *Q791, *Q792, *Q793, *Q794 and *O734) must be taken.

For the **Marketing** field, the two Ph.D. seminar courses (*B793, *B794), the four marketing Ph.D. courses (*M771, *M772, *M773, *M774), and two MBA marketing courses (chosen from *M724, *M731, *M732, *M734 and *M736) must be taken.

Comprehensive Examination

All doctoral candidates must pass a comprehensive examination in their chosen field of study to demonstrate knowledge of the field and preparation for research. The comprehensive examination will test each student's knowledge of core material, familiarity with the relevant literature and knowledge of methodology required to do research in the field. The comprehensive examination in the MOBHR field includes a written examination followed by an oral examination. The comprehensive examination in all other fields includes only a written examination.

In addition to the comprehensive examination, students must pass an oral defence of their dissertation proposals. The dissertation examination will take place in accordance with the regulations of the School of Graduate Studies.

Courses

With the permission of the Associate Dean (Graduate Studies & Research), a limited number of MBA or other graduate students may take any of the Ph.D. courses listed below.

Common Course

***B790 / Management Theory**
The seminar provides a broad overview of the role of theory and theory building in management. The student will engage in systematic scientific inquiry pertaining to different schools of management relevant to business. The underlying theory of management driving each school of thought will be the focus of analysis. An attempt will be made to integrate the diverse schools of thought toward an inclusive theory of management that would serve as the backdrop for future management research and practice.

Accounting

***A771 / Seminar in Research Methods and Design in Accounting Research**
This seminar provides an exposure to issues and techniques of various research methods and designs in the context of accounting research. A research proposal by the end of the course is required.

***A772 / Seminar in Financial Accounting Research**
This seminar provides a broad overview of contemporary empirical research in financial accounting. Most of the research relies on archival data utilizing accounting and stock market databases. Topics include the impact of accounting information on security prices, post-earnings announcement drift and other market anomalies, voluntary firm level disclosure policy, accounting policy choices and earnings management, earnings/returns associations, market response to accounting data, stock analyst, corporate governance, cost of capital, etc.

***A773 / Seminar in Managerial Accounting Research**
This seminar provides a broad overview of contemporary analytical research in accounting. Emphasis is placed on competing theories of the role of management accounting in organizations and society, as well as the issues and problems surrounding the implementation of management accounting techniques in practice. Topics include agency models of performance evaluation and compensation contracts; decentralization, planning and control; financial and non-financial information for performance measurement and transfer pricing.

Finance

***F770 / Financial Economics and Quantitative Methods**
This course explores the theoretical and conceptual foundations of finance. Among the theories, upon which modern finance is built are utilitytheory, stochastic dominance, state-preference theory, mean-variance portfolio theory, the capital asset pricing model, the

arbitrage pricing theory,Modigliani-Miller and information theories of capital structure, risk sharing theories, and principal-agent theories. The course also includesquantitative methods for testing some basic propositions in finance.

***F771 / Financial Economics I**

This course is an advanced course on financial- and capital-markets theory with an emphasis on discrete-time models. Topics include the expected-utility hypothesis, the state-preference framework, security-pricing models, portfolio theory and market efficiency.

***F772 / Financial Economics II**

This course extends Business F771 to include continuous-time models of security valuation and, especially, models for the pricing of derivative securities. The course will also discuss issues related to the non-arbitrage condition in asset pricing, models of the term structure of interest rates and default risk models.

***F773 / Empirical Methods in Finance**

This course examines empirical methods employed by researchers to test financial theories. Topics include the testing of asset-pricing models, the event-study methodology and the distribution of security returns.

***F774 / Seminar in Finance**

This course exposes students to a wide range of topics in the finance literature. All Finance Ph.D. students are required to attend, but only those in their second year take it for credit. The course allows students to develop ideas for their dissertations. Students will present papers related to their own interests as well as critical evaluation of the extant literature.

Management of Organizational Behaviour and Human Resources

***B791 / Field Surveys: Organizational Behaviour and Organizational Theory**

This seminar focuses on the theoretical foundations necessary for advanced research in organizational behavior (OB) and organizational theory (OT). Key theories and models will be discussed and contrasted, and empirical support examined. Students will undertake in-depth and critical analyses of the relevant literature, focusing in particular on recent reviews and primary studies published in the top journals in the fields. The overall objectives of this seminar are to provide a fundamental understanding of theoretical frameworks in the OB and OT fields and to develop their abilities to critically assess and conduct research.

***B792 / Field Surveys: Human Resources and Industrial Relations**

This seminar focuses on the theoretical foundations necessary for advanced research in human resources (HR) and industrial relations (IR). Key theories and models will be discussed and contrasted, and empirical support examined. Students will undertake in-depth and critical analyses of the relevant literature, focusing in particular on resent reviews and primary studies published in the top journals in the field. The overall objectives of this seminar are to provide students a fundamental understanding of theoretical frameworks in the HR and IR fields and to develop their abilities to critically assess and conduct research.

***B793 / Applied Multivariate Statistics**

This course will introduce students to a variety of multivariate data analysis techniques that they are likely to use in analyzing data from their own research. The focus will be on issues related to the application of these techniques rather than their mathematical foundations. Topics to be covered include multiple regression, MANOVA, exploratory factor analysis, and structural equation modeling. A graduate level course in introductory/univariate statistics (e.g., Sociology *6Z03), or equivalent, would be a prerequisite to this course.

***B794 / Research Methods and Design**

This seminar provides an exposure to issues and techniques of questionnaire and survey development, instrument design and selection, psychometrics, and qualitative and quantitative methods in the context of a research project. A research proposal by the end of course is required.

***B795 / Research Issues: Organizational Behaviour and Organizational Theory**

This seminar focuses on current research issues in organizational behavior (OB) and organizational theory (OT). It will require students to apply the knowledge gained in the OB/OT Field Survey seminar in examining the emerging research issues in the field. Students will perform in-depth and critical analyses of relevant journal articles and book chapters, and develop their ability to assess research design, methodology, interpretation, and overall contributions to the field. The objective of this seminar is to enable students to gain a rich and deep understanding of the pressing issues and topics that pre-dominate the current OB and OT literatures from which they might build their own program or research. Prerequisite: *B791

***B796 / Research Issues: Human Resources and Industrial Relations**

This seminar focuses on current research issues in human resources (HR) and industrial relations (IR). It will require students to apply the knowledge gained in the HR/IR Field Survey seminar in examining the emerging research issues in the field. Students will perform in-depth and critical analyses of relevant journal articles and book chapters, and develop their ability to assess research design, methodology, interpretation, and overall contributions to the field. The objective of this seminar is to enable students to gain a rich an deep understanding of the pressing issues and topics that pre-dominate the current HR and IR literatures from which they might build their own program of research. Prerequisite: *B792

***B797 / Research Course I**

This course provides students with an opportunity to conduct original empirical research with the guidance of a faculty member. The objective of this course is to develop student competence in conducting independent research that has the potential to advance knowledge and be disseminated to the scientific community. During the course, the student is expected to formulate a research question, design a study or studies, obtain and analyze data, and write a manuscript in APA format reporting the results of the study (studies) that may have the potential to be submitted to a scholarly journal or conference.

***B798 / Research Course II**

This course is an extension of Research Course I and has as its objective the development of student competence in conducting independent research that has the potential to advance knowledge and be disseminated to the scientific community. With the guidance of a faculty member, the student is expected to design and conduct a study (or studies) that may build on the study (studies) conducted in Research Course I, collect new or additional data, and write a manuscript in APA format that reports the results of this study and that may have the potential to be submitted to a scholarly journal or conference. Prerequisite: *B797

***B799 / Selected Topics in Management of OrganizationalBehaviour and Human Resources**

This course will provide students with an opportunity to study selected topics in MOBHR, which are not covered in currently available courses. Topics will depend on the research interests and availability of faculty. The format of the course might be directed readings or in-class instruction, depending on the number of interested students.

<u>Information Systems</u>

***K778 / Selected Topics in Information Systems I**

From time to time selected topics courses may be offered to take advantage of the research experience of a faculty member or a visiting scholar, where a similar course is not available on this topic area elsewhere at the University. Topics will be announced for the session they are offered.

***K779 / Selected Topics in Information Systems II**

From time to time selected topics courses may be offered to take advantage of the research experience of a faculty member or a visiting scholar, where a similar course is not available on this topic area elsewhere at the University. Topics will be announced for the session they are offered.

***K791 / Knowledge Management Systems**

The objective of this Ph.D. seminar course is to look at the state of the art in assessing, capturing and sharing organizational knowledge resources through information systems. The business environment is increasingly competitive and the rate of innovation is rising. Companies compete with each other in ways different from before. To this end, knowledge plays a unique role in building and conserving an organization’s core competencies through knowledge networking. Knowledge management can be defined as a formal, directed process of determining what knowledge individuals within a company have that could benefit others in the company, then devising ways of making it easily available through knowledge-based systems.Prerequisite: K603 or permission of the instructor

***K792 / Security, Privacy and Trust in eBusiness**
This course discusses important security, privacy, and trust issues and addresses them from business, technology, and government regulation perspectives. Students are required to make seminar presentations and write a research paper on selected topics.
Prerequisite: K603 or permission of the instructor

***K793 / Mobile Commerce: Technology, Theory, and Applications**
Mobile commerce is a new form of electronic commerce. This advanced Ph.D. course is designed for discussing research issues on m-commerce. Students will learn the technologies, the theories, and the applications of mobile commerce through paper reading, seminar presentation, and class discussion. Writing a research paper is required for this course.

***K794 / Advances in Information Systems Research**
The objective of this course is to present and discuss some of the latest advances and issues in information systems research. This will give students an opportunity to examine a number of opportunities for advanced research. A variety of the latest research topics will be presented by IS faculty members, visiting researchers, and by Ph.D. students taking the course. Learning will be from assigned readings, presentations, in-class discussions, and through the preparation of individual presentations and term papers.

Management Science

***Q771 / Stochastic Processes with Business Applications**
Stochastic processes and their applications in modeling the business environment. Emphasis is on understanding and applying the concepts in modeling, rather than on a strictly mathematical approach. Markov chains, Poisson processes, "birth" and "death" processes, queuing systems, elementary renewal theory, and diffusion processes are discussed. Individual student participation is also required in selecting, researching and presenting topics on stochastic process applications. Prerequisite: O711 or permission of the instructor.

***Q772 / Networks and Graphs in Operations Research**
An advanced course dealing with the optimization of network and graph models as well as their application to problems in transportation, location, inventory control, and distribution. Prerequisite: O711 or permission of the instructor.

***Q773 / Optimization I**
The course will cover topics in linear, integer and nonlinear programming. Concepts to be covered include convexity, duality, Karush-Kuhn-Tucker conditions, complexity and different algorithmic and heuristic approaches to solving optimization problems. A selection of application and theory papers will also be discussed. Software implementation issues will be highlighted via the use of a popular package called the General Algebraic Modeling System (GAMS).

***Q774 / Optimization II**

The course deals with constrained and unconstrained nonlinear optimization. After an introduction to basic methodology, advanced topics will be selected from: fractional programming, multi-criteria programming, non-differentiable optimization, Lagrangean relaxation, geometric programming, optimal control, stochastic programming, trajectory methods, and other techniques. The emphasis will be on the application of these methods in research studies. Prerequisite: Q773 or permission of the instructor.

***Q778 / Selected Topics in Management Science/Systems**

From time to time selected topics courses may be offered to take advantage of the research experience of a faculty member or a visiting scholar, where a similar course is not available on this topic area elsewhere at the University. Topics will be announced for the session they are offered.

***Q780 / Management Science Research Issues I**

This course provides an exposure to the core readings and emerging issues in management science. It is intended to bring Ph.D. students to the frontiers of knowledge in important topics in the management science field. In addition to the core readings, specific technical topics (e.g., discrete optimization, dynamic programming, game theory and scheduling) and new application areas (e.g., supply chain management and revenue management) that coincide with the research interests of the students will be discussed.

***Q781 / Management Science Research Issues II**

This course builds on the material covered in MS1. However, in this course the primary emphasis will be on developing Ph.D. students' research skills in their particular area of interest. This will be achieved by focussing on an in-depth study of specific management science technique(s) (e.g., game theory or dynamic programming) as applied to the solution of problems in an area of application (e.g., revenue management) that may be of interest to the student.

***Q790 / Advanced Operations Management I**

The first of two courses focusing on the use of operations research methodology to solve problems faced by operations managers. Three broad areas are covered: forecasting, single stage inventory systems (single and multi-item deterministic demand problems, single item stochastic demand problems), and deterministic production planning and control systems (MRP, JIT, theory of constraints, job shop scheduling). Prerequisite: enrolment in the MS/S field of the Ph.D. Program or permission of the instructor.

***Q791 / Advanced Operations Management II**

Three broad areas are covered: design of production lines, multi-stage production and distribution problems (including facilities location), and (stochastic) models dealing with the effect of variability in the production environment. The emphasis of the course might vary depending on the instructor. Examples of major subtopics are: assembly line balancing, design and performance evaluation of traditional versus flexible production lines and applications of queuing theory to production-inventory problems. Prerequisite: Q790.

***Q792 / Statistical Methodologies for Quality Control**
This course deals with a variety of statistical methodologies for quality control, assurance, and reliability. After a review of relevant statistical concepts, topics include process capability analysis, various forms of control charts, acceptance control, reliability concepts, and experimental design methods. The goal of the course is to give a solid introduction to current statistical methodology for quality control. Prerequisite: Permission of the instructor.

***Q793 / Sequencing and Scheduling**
This course deals with topics arising in operations management and control, typically in situations where scarce resources have to be allocated to activities over time. It concentrates on deterministic scheduling models. Main topics include complexity results and optimization and approximation algorithms for problems on single machines, parallel machines, open shops, flow shops, job shops, and resource-constrained project scheduling. Prerequisite: O600 or permission of the instructor.

***Q794 / Inventory Theory**
In-depth reviews are conducted on a number of important inventory models. These include models with: known and constant demand; known and time varying demand; continuous review with stochastic demand; periodic review with stochastic demand; single period models; and dynamic inventory models with stochastic demand. Prerequisite: O701 and O711 or permission of the instructor.

Marketing

***M771 / Marketing Foundations**
This seminar will examine the extant research in the area of marketing management and marketing decisions. The course will cover among others issues such as market structure, competitive strategy, market analysis, contracts, attitudinal theories, marketing communication, firm performance and innovation.

***M772 / Marketing Models and Modeling**
This seminar will examine the theoretical models in marketing phenomena and techniques to develop analytical and empirical models explaining marketing decision making will be discussed and critiqued. The modeling techniques that will be discussed include Bass model, marketing channels, strategy and performance, innovation, new products, SEM, Conjoint, Panel Data, Diffusion, etc.

***M773 / Inter-Organizational Research in Marketing**
This seminar will focus on inter-organizational networks, relations and strategy. It will study these from an efficiency perspective with special attention to the behavioural, transaction cost and relational contracting schools of thought. The topics covered will incorporate the spectrum of institutional, analytical and methodological traditions in the area.

***M774 / Special Topics in Marketing Strategy**
This seminar will focus on specific areas in marketing strategy with an emphasis in form level analysis. Topics will vary.

CHEMICAL BIOLOGY

The Chemical Biology Program provides facilities for students intending to proceed to the M.Sc. and Ph.D. degrees.

Chemical Biology utilizes chemical tools and techniques to answer biological questions. Students in the program will receive multi-disciplinary training at the interface between chemistry and biology. Working with faculty with broad-ranging expertise, students will learn skills in both the chemical and life-sciences areas, and appreciate how these complement each other to allow new insights into biological processes and systems.

The Chemical Biology program is administered by the Departments of Chemistry and Biochemistry & Biomedical Sciences and includes faculty members from the Departments of Biology, Physics & Astronomy, Medical Physics & Applied Radiation Sciences and Molecular Medicine & Pathology. The program offers degrees at the M.Sc. and Ph.D. level.

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Faculty / Fall 2012

PROFESSORS
John D. Brennan, B.Sc., M.Sc., Ph.D. (Toronto)
Michael A. Brook, B.Sc., Ph.D. (McGill)
Eric D. Brown, B.Sc., M.Sc., Ph.D. (Guelph)
Lori Burrows, B.Sc., Ph.D. (Guelph)
Turlough M. Finan, M.Sc. (National), Ph.D. (Guelph)
Radhey S. Gupta, B.Sc. (Agra), M.Sc. (New Delhi), Ph.D. (Bombay)
Adam P. Hitchcock, B.Sc. (McMaster), Ph.D. (British Columbia),F.C.I.C.
Yingfu Li, B.Sc. (Anhui), M.Sc. (Beijing), Ph.D. (Simon Fraser)
Brian E. McCarry, B.Sc. (British Columbia), Ph.D. (Stanford), F.C.I.C.
Justin R. Nodwell, B.Sc., Ph.D. (Toronto)
Lesley A. Warren, B.Sc., Ph.D. (Toronto)
Elizabeth A. Weretilnyk, B.Sc., Ph.D. (Alberta)
Gerard D. Wright, B.Sc., Ph.D. (Waterloo)
Daniel S-C. Yang, B.Sc., M.Sc. (Alberta), Ph.D. (Pittsburgh)
Boris S. Zhorov, Ph.D. (Pushchino), D.Sc. (Kiev)

ASSOCIATE PROFESSORS
Alex Adronov, B.Sc. (McMaster), Ph.D. (Berkeley)
Paul W. Ayers, B.Sc. (Lipscomb), Ph.D. (UNC Chapel Hill)
Paul J. Berti, B.Sc. (Waterloo), M.Sc. (Ottawa), Ph.D. (McGill)
Russell Bishop, B.Sc., Ph.D. (Alberta)
Philip Britz-McKibbin, B.Sc. (Toronto), Ph.D. (British Columbia)
Alfredo Capretta, B.Sc., Ph.D. (McMaster) / Director
Brian Coombes, B.Sc., Ph.D. (McMaster)
Cecile Fradin, B.Sc., M.Sc. (ÉcoleNormaleSupérieure, Paris,France), Ph.D. (Univ. Pierre et Marie Curie, Paris, France)
Alba Guarné, B.Sc., M.Sc., Ph.D. (Barcelona)
Paul H.M. Harrison, B.A. Hons. (Oxford), Ph.D. (Alberta), M.C.I.C.
Murray S. Junop, B.Sc. (Ryerson), Ph.D. (Western)
James McNulty, B.Sc., M.Sc., Ph.D. (Toronto)
Giuseppe Melacini, B.Sc. (Milano), Ph.D. (Milano, U. California SanDiego)
Joaquin Ortega, B.Sc. (Zaragoza), Ph.D. (Autónoma de Madrid)
Bernardo L. Trigatti, B.Sc., Ph.D. (McMaster)
Ray Truant, B.Sc., Ph.D. (Toronto)
John F. Valliant, B.Sc., Ph.D. (McMaster)
Geoff Werstuck, B.Sc., Ph.D. (McMaster)

ASSISTANT PROFESSORS
Nathan A. Magarvey, B.Sc. (Dalhousie), Ph.D. (Minnesota)
Jose M. Moran-Mirabal, B.Sc., M.Sc. (TESM, Mexico), Ph.D. (Cornell)

PROFESSOR EMERITUS
Richard M. Epand, A.B. (Johns Hopkins), Ph.D. (Columbia)

Admission into the Program

Students entering the Chemical Biology program may be admitted from a number of suitable undergraduate degrees (including the Life Sciences, Chemistry and Biophysics). Students with undergraduate degrees in other disciplines are also encouraged to apply although the Director of the Chemical Biology Program, in conjunction with the Admissions Committee, will be required to judge the candidate's suitability. A minimum B+ average (equivalent to 8.5/12) in the final two years of a four-year undergraduate degree is required for admission into our M.Sc. program. Students holding a B.Sc. with a minimum A- average (10.0/12) or already holding a M. Sc. degree may be admitted directly into our Ph.D. program but are required to pass a qualifying exam in the first year of study and a comprehensive examination in the second year of study.

M.Sc. Degree

Note that the Department of Biochemistry & Biomedical Sciences and other affiliated departments offer 12-week courses that are equivalent to one half of a full graduate course while the Department of Chemistry offers 6-week modules that are equivalent to one-quarter of a full graduate course. In addition to Chemical Biology courses (equivalent to one-half of a full graduate course), a mixture of courses from participating departments is encouraged.

A candidate for the M.Sc. degree is required to spend at least one calendar year in full-time study at McMaster University. The candidate is required to complete satisfactorily not fewer than one full graduate course which must be at the 700-level. All M.Sc. students must take CHBY *700 as a core course, and must also enroll in the CHBY *701 colloquium course, which must be completed within 20 months of registration. In addition to CHBY courses, other courses and/or modules may be selected from any of the participating departments. Other courses will be defined in consultation with the student's research supervisor, supervisory committee, and/or the Program Director. The minimum passing grade for any module or course is B-.

The candidate must also present a thesis which will embody the results of original research. The thesis must be defended in an oral examination. The candidate will be required to participate in the departmental seminar program.

Transfer to Ph.D. from the M.Sc. Program

Students who have satisfactorily completed the course requirements for the M.Sc. degree and have made satisfactory progress in their research may apply to the Program Director for transfer to Ph.D. studies, without first satisfying the M.Sc. thesis requirement. This is normally done by submission of a report detailing the student's research progress, projected research goals and successful completion of an oral examination.

Ph.D. Degree

Candidates for the Ph.D. degree must complete the CHBY *700 course if this course was not completed at the M.Sc. level. There are no other formal course requirements. All Ph.D. students must also enroll in either the CHBY *701 or CHBY *702 colloquium course. The supervisory committee has the right to assign other courses if these are deemed necessary, and this will be done in consultation with the student's research supervisor, supervisory committee, and/or the Program Director. Such courses and/or modules may be selected from any other the participating departments. The candidate will be required to participate in the Chemical Biology seminar program. Every candidate must pass a Comprehensive Examination, normally taken between 18 and 20 months after beginning Ph.D. work at McMaster. The Comprehensive Examination will consist of a seminar and oral defence. Candidates must present a thesis which will embody results of original research and give evidence of high scholarship. The candidate will be required to defend the thesis in a final oral examination.

Chemical Biology Program Colloquia and Seminars

All graduate students are expected to attend all program colloquia and seminars. M.Sc. students must register in one of the Chemical Biology Graduate Colloquium courses: CHBY *701 or CHBY *702. CHBY *701 is a non-credit course requiring students to present a seminar without an associated review, while CHBY *702 is a credit course (one half of a full course credit) involving both a seminar and an associated review.

Students enrolled in CHBY *701 will be given a PASS or FAIL grade for their colloquia. In cases involving a FAIL grade, students must repeat the colloquia, and in some cases extra work may be assigned to cover areas of weakness. CHBY *702 will be graded using the standard letter-grade format.

Students entering the Ph.D. program with an external M.Sc. degree must present one seminar during their second year of study (CHBY *701) and a second seminar at the time of the thesis defence. Ph.D. students who transfer from the M.Sc. program are required to take a total of two seminar courses (one prior to transfer and one at the time of their defence), but may take CHBY *702 only once.

Courses

The Chemical Biology program offers a number of unique courses that are designed to foster interdisciplinary and independent learning. All courses will be taught in the inquiry style, and will focus heavily on examination of the current literature at the interface of Chemistry, Biochemistry and Biology. All courses will be administered by a minimum of two faculty members from different departments involved in the program in an effort to provide complementary viewpoints on a given topic.

The Chemical Biology program offers graduate courses in the form of both “courses” (which are the formal equivalent of one-half of a full graduate course) and “modules” (which are the formal equivalent of one-quarter of a full graduate course). 600-level half courses are also available as non-credit courses, but should only be taken after obtaining approval from the supervisory committee and Program Director.

In addition to the Chemical Biology graduate courses listed below, students enrolled in the program may take courses offered by affiliated departments. Please see the Director of the program for course options and suitability.

<u>List of 700-level graduate courses and modules</u>: Courses marked with a (+) sign may be taken more than once.

+*700 / Topics in Chemical Biology
This course will set the tone for the Chemical Biology program and will be team taught by at least two instructors. The course will use topics from the current literature to provide an overview of Chemical Biology and will demonstrate the integration of chemical, biochemical and biological approaches to the solution of current problems of relevance to medicine, the environment and drug design. The focus of this course will vary from year to year; the integrative approach to chemical biology will remain the course goal each year.

+*701 / Chemical Biology Colloquium A
Students will prepare and present a seminar concerning a detailed examination of their own area of research. Participants will be required to provide a suitable background to the work and critically discuss salient aspects of the field. A question period will follow in order to provide a forum for discussion of the material presented. This is a non-credit course.

***702 / Chemical Biology Colloquium B**
Students will present a seminar concerning a detailed examination of their own area of research and also prepare a review article describing the current state of their field. The review must provide suitable background to the area, the current state of the research within the field and an appraisal of possible future trends and directions. Students are encouraged to provide critical assessment of thematerial presented and use the format employed by the journal "Trends in Biochemical Sciences" or "Accounts of Chemical Research". Students will receive credit for this course.

Research in Chemical Biology

The Chemical Biology Program focuses its resources on understanding the role that biomolecular interactions play in the control of biological function. Research carried out by faculty members in the program centers on: examining the biological significance of biomolecular complexes and interactions and their role in biochemical regulation and control of biochemical pathways; the development and use of small molecules to probe biological function; and the development and use of physiocochemical, computational and high throughput assay methods for studying biological systems.

The research interests of current faculty members include: protein targeting and apoptosis (D.W. Andrews); theoretical chemistry and electronic structure theory (P.W. Ayers); transition state analysis in biochemical systems (P.J. Berti); Biogenesis of the gram-negative cell envelope (R. Bishop); high-throughput fluorescence and mass spectrometric assay methods (J.D. Brennan); bioanalytical chemistry, metabolomics, cellulomics (P. Britz-McKibbin); novel therapeutic targets in antibacterial research (E.D. Brown); Bacterial adhesions and bio-film formation (L. Burrows); organic and medicinal chemistry, drug discovery (F. Capretta); Microbiological biochemistry and antimicrobial research, cell biology and gene regulation (B. Coombes); relationship between membrane properties and biological function (R.M. Epand); microbial genetics and genomics of soil microorganisms (T. Finan); dynamics of single molecules inside biological systems (C. Fradin); structural and functional studies of DNA mismatch repair proteins and DNA segregation proteins (A. Guarne); molecular sequences and the early history of life (R.S. Gupta); bio-organic chemistry and biosynthesis (P.H.M. Harrison); analysis of bulk and surfaces using electron beam and synchrotron radiation based spectroscopies and microscopes (A.P. Hitchcock); X-ray crystallographic studies of DNA double strand break repair proteins (M.S. Junop); molecular evolution of functional nucleic acids (Y. Li); natural product biosynthesis & drug discovery, metabolomics, small molecule/chemical signalling (N. Magarvey); environmental analytical chemistry, metabolomics and genotoxicology (B.E. McCarry); organic synthesis, chemical biology, anticancer drugs (J. McNulty); biological NMR, protein structure and dynamics, biomolecular interactions (G. Melacini); bacteria as multi-cellular organisms (Jose M. Moran-Mirabal); bioanalytical chemistry, high resolution fluorescence microscopy, micro and nanofabrication (J.R. Nodwell); protein quality control systems, electron microscopy studies of the HtrA family of proteases (J. Ortega); targeted genetic approaches to studying lipid transport and its role in complex disease (B.L. Trigatti); polyglutamine expansion diseases (R. Truant); medical applications of radioisotopes (J. Valliant); Microbial-Geochemical linkages (L.A. Warren); identification of physiological and metabolic traits associated with environmental stress tolerance in plants using genomics and metabolomics approaches (E. Weretilnyk); Diabetes mellitus; cardiovascular disease (G. Werstuck); microbiological biochemistry and antimicrobial research (G.D. Wright); protein crystallography, protein engineering, structure and function of anti-freeze and ice nucleation proteins (D.S-C. Yang); computer-based molecular modeling (B. Zhorov). A more detailed description of current research projects for each faculty member and a list of their recent publications are available on individual websites.

Facilities for Research

Recent acquisitions funded by both the provincial and federal governments have provided state-of-the-art facilities for research in chemical biology and include the Centre for Microbial Chemical Biology (fhs.mcmaster.ca/cmcb); the McMaster Biophotonics and Imaging Facility (www.macbiophotonics.ca); the Biointerface Institute; the Magnetic Resonance Facility, the Regional Centre for Mass Spectrometry, and the Single Crystal X-ray Facility in addition to protein preparation and purification facilities, cell culture facilities, computational facilities and extensive optical spectroscopy resources. More information about our research facilities is available on individual departmental websites.

The chemical biology graduate program is the academic home for students participating in two NSERC CREATE training programs. The CREATE program in Molecular Imaging Probes (http://www.createprobes.ca/) involves the development and evaluation of new molecular imaging probes for diseases such as cancer, rheumatoid arthritis and infection. The CREATE program in Biointerfaces examines the design, preparation and screening of new bioactive and stealth interfaces for biosensing, bioseparations and ophthalmic materials. Both programs are centered around Focus Groups, an interdisciplinary mix of researchers each bringing their unique skill set to tackle a broad research problem. For more information, please contact the Director of the chemical biology graduate program.

CHEMICAL ENGINEERING

The Department of Chemical Engineering offers complete facilities to students seeking the M.Eng., M.A.Sc. or Ph.D. degrees and for post-doctoral research. Part-time Ph.D. studies in Chemical Engineering are permissible.

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Faculty / Fall 2012

DISTINGUISHED UNIVERSITY PROFESSORS
John L. Brash, B.Sc., Ph.D. (Glasgow), D.Hon.Caus. (Paris Nord),F.R.S.C., P.Eng. / Emeritus
John F. MacGregor, B.Eng. (McMaster), M.S., Ph.D. (Wisconsin), FASA, P.Eng., F.C.A.E. / Emeritus

PROFESSORS
James M. Dickson, B.A.Sc., M.A.Sc. (Waterloo), Ph.D. (VirginiaPolytech.Inst. and State Univ.). P.Eng.
RafikLoutfy, B.Sc., M.Sc. (Ain Shams University), Ph.D. (Western),M.B.A. (Toronto)
Vladimir Mahalec, Dipl. Ing. (U. of Zagreb, Croatia), Ph.D. (Houston)
Robert H. Pelton, B.Sc., M.Sc. (Guelph), Ph.D. (Bristol)
Heather Sheardown, B.Eng. (McMaster), Ph.D. (Toronto), P.Eng.
Christopher L.E. Swartz, B.Sc. (Cape Town), Ph.D. (Wisconsin-Madison), P.Eng. / Associate Chair (Graduate Program)
Philip E. Wood, B.A.Sc. (Waterloo), Ph.D. (Caltech.), F.C.I.C., P.Eng.
Shiping Zhu, B.Eng. (Zhejiang), Ph.D. (McMaster), P.Eng. / Chair

ASSOCIATE PROFESSORS
Carlos Filipe, B.S. (Escola Superior de Biotecnologia, Portugal),Ph.D. (Clemson University) / Associate Chair (Undergraduate Program)
Raja Ghosh, B.S., M.S. (Jadavpur University, India), D.Phil. (Oxford)
Kim Jones, B.A.Sc. (Waterloo), M.Sc. (Guelph), Ph.D. (Toronto)
PrashantMhaskar, B.T. (Indian Institute of Technology), M.S.(Louisiana State), Ph.D. (University of California, Los Angeles)
Michael Thompson, B.Sc., B. Eng., M. Eng. (McMaster), Ph.D.(Waterloo)

ASSISTANT PROFESSORS
Thomas A. Adams II, B.S. (Michigan State), Ph.D. (Pennsylvania)
Emily D. Cranston, B.Sc., Ph.D. (McGill)
Todd Hoare, B.Sc. (Queen’s), Ph.D. (McMaster)

David Latulippe, B. Eng., M.A.Sc. (McMaster), Ph.D. (Pennsylvania)
Jie Yu, B.S., M.S.E. (Zhejiang), M.S.E., Ph.D. (Texas at Austin)

ASSOCIATE MEMBERS

John Brennan (Chemistry)
Michael A. Brook (Chemistry)
David Potter, B.Sc., Ph.D. (Waterloo) / Walter G. Booth School for Engineering Practice

ADJUNCT MEMBERS

Benoit Chachuat, B. Eng. (ENGEES, France), M.A.Sc. (Louis Pasteur University), Ph.D. (INPL, France)
Santiago Faucher, B.Sc. (Queen's), Ph.D. (McMaster)
Andrew N. Hrymak, B.Eng. (McMaster), Ph.D. (Carnegie Mellon), P.Eng., F.C.I.C.
Lyndon Jones, B.Sc. (U. of Wales), Ph.D. (Aston)
Qiang Liu, B.S., M.S. (East China University of Science & Technology), Ph.D. (Laval)
VenkatMahendraker, M.A.Sc. (Regina), Ph.D. (U.B.C.)
GuerinoSacripante, B.Sc., Ph.D. (McGill)
Yiliang Wu, B.Sc. (Sichuan Univ.), M.Sc. (University of Science & Technology of China), Ph.D. (Tokyo Institute of Technology)

PROFESSORS EMERITI

Malcolm H.I. Baird, B.Sc. (Glasgow), Ph.D. (Cambridge), F.C.I.C.,P.Eng.
Cameron M. Crowe, B.Eng. (McGill), Ph.D. (Cambridge), F.C.I.C.
Irwin A. Feuerstein, B.Chem.Eng. (City College of N.Y.), M.S.(Newark College of Eng.), Ph.D. (Massachusetts)
Alvin E. Hamielec, B.A.Sc., M.A.Sc., Ph.D. (Toronto), F.R.S.C., F.C.I.C., P.Eng., Honorary Doctor of Engineering (Waterloo)
Thomas E. Marlin, B.S. (SUNY at Buffalo), M.S. (Dayton), Ph.D.(Massachusetts)
Paul A. Taylor, B.Sc., Ph.D. (Wales), P.Eng.
John Vlachopoulos, Dipl.Chem.Eng. (National Tech. Univ. of Greece),M.S., D.Sc. (Washington, St. Louis), F.C.I.C., F.S.P.E., P.Eng.
Donald R. Woods, B.Sc. (Queen's), M.Sc., Ph.D. (Wisconsin), D.Sc.(Queen's, Guelph, McMaster), F.C.I.C., F.A.I.Ch.E., P.Eng.

M.Eng. andM.A.Sc. Degrees

There are three programs available to candidates for the M.Eng. andM.A.Sc. degrees:

A. Project Program (M.Eng.)

A candidate is required to complete successfully at least six one-term courses. A major study report must be presented which demonstrates the ability to carry out independent study in design, analysis or experimentation and to reach a satisfactory conclusion in a reasonable time.

B. Research Program (M.A.Sc.)

A candidate is required to complete successfully at least four one-term courses, at least three of which should be at the 700-level. Students are required to present a thesis, which constitutes an original contribution to chemical engineering. The thesis must be defended in an oral examination. Completion of the M.A.Sc.degree typically requires five terms of full-time study.

C. Internship Program (M.Eng. or M.A.Sc.)

The normal course requirement for research project internship is six one-term courses plus a research project carried out in industry or at least four half courses plus thesis carried out in industry. The thesis must be defended in an oral examination.

Full-time candidates for the M.Eng. or M.A.Sc.degrees are required to spend at least one academic year of graduate study at McMaster University. Part-time studies are also possible.

The Department encourages interdisciplinary research that is related to the broad interests of chemical engineering. Students should be aware that many graduate courses offered in other departments may be taken for credit in their program.

Ph.D. Degree

The general Regulations for Degree Doctor of Philosophy appear earlier in the Calendar. The minimum course program for this degree is at least seven half courses, at least five of which should be at the 700-level, beyond the baccalaureate degree or three half courses, at least two of which should be at the 700-level, beyond the M.A.Sc. degree. A candidate is also required to take the Ph.D. Comprehensive Examination which is designed to test the breadth of knowledge and the ability to synthesize and integrate ideas from within and peripheral to the candidate's research area. The Comprehensive Examination will normally take place between 6 and 18 months after the candidate initially registers in the Ph.D. program. A supervisory committee monitors the progress of a Ph.D. candidate and determines when he/she is ready to write the thesis. The student is required to defend the thesis at a Final Oral Examination.

The Department of Chemical Engineering arranges a series of seminars; graduate students are required to attend and participate in these seminars. Ph.D. students must present one seminar on their research work before they graduate.

Courses

The following courses are offered by the Department. Not all courses are available each year. Courses marked with an asterisk (*) are one-term (half) courses. Course marked with a pound (#) sign are quarter courses (modules). The following 600-level courses are offered for graduate credit and are also available to senior undergraduate students:

***6B03 / Polymer Reaction Engineering / Staff**
Kinetics of polymerization: step growth and chain-growth (free-radical, anionic, anionic coordination and cationic). Polymerization processes: solution/bulk, suspension, emulsion, gas-phase, slurry and reactive processing. Principles of polymer process and reactor design, optimization and control.

****6C03 / Statistics for Engineers / Staff(cross-listed as School of Engineering Practice *6C03)***
Linear regression analysis in matrix form, nonlinear regression, multiresponse estimation, design of experiments including factorial and optimal designs.Special emphasis on methods appropriate to engineering problems.

***6E03 / Digital Computer Process Control / Staff**
This course addresses key aspects of implementing control via discrete calculations using digital computers. Topics include discrete-time dynamic models, system identification, analysis of discrete-time systems, design of digital control systems, and model predictive control.

***6K03 / Reactor Design for Heterogenous Systems / Staff**
Catalytic kinetics, mass transfer limitations, packed and fluidized bed reactors, two-phase reactors.

****6T03 / Applications of Chemical Engineering in Medicine/ T. Hoare***
(cross-listed as Biomedical Engineering *6T03)
Applications of chemical engineering principles to biological systems and medical problems including examples from hemodynamics, blood oxygenation, artificial kidney systems, controlled drug release, biosensors and biomaterials.

***6X03 / Polymer Processing / M.R. Thompson**
An introduction to the basic principles of polymer processing, stressing the development of models.Rheology of polymers, extrusion, molding, films, fibers, and mixing.Reactive processing.

6Z03 / Interfacial Engineering / R.H. Pelton(cross-listed as Biomedical Engineering *6Z03)
The physics and chemistry at the "nano" scale including interactions forces, colloids, surface active systems, wetting, adhesion, and flocculation.

The following courses are offered for graduate credit only:

#702 / Special Topics in Chemical Engineering
Topics in emerging and specialized areas of Chemical Engineering.

***704 / Current Topics in Chemical Engineering / Staff**
These topics differ from year to year depending on student interest.

706 / Advanced Heat Transfer / R. L. Judd(cross-listed as Mechanical Engineering *706)
Steady and transient conduction stressing formulation and approximate solution techniques. Convection heat transfer including compressible and incompressible flow. Radiation heat transfer including gray body radiation and radiation from gases and vapours.

707 / Analytical Solutions in Transport Phenomena / S. Shankar
(cross-listed as Mechanical Engineering *707)
Solution of boundary value problems in conduction heat transfer; mass transfer analogy to heat transfer, ablative cooling; theory of solidification; boiling heat transfer.

730 / Fluid Mechanics / Staff(cross-listed as Biomedical Engineering *730)
Vectors, tensors, dyadics, Cartesian index notation, stress analysis. The conservation of mass, momentum and energy.Constitutive equations.Boundary layer flow theory.Potential flow.Stokes flow.Turbulence.

733 / Computational Fluid Dynamics / Staff** ***(cross-listed as Biomedical Engineering *733)
The solution of the Navier-Stokes equations using finite volume and finite element methods. Primitive-variable formulations are presented and applied to the solution of incompressible flows. Example problems include boundary layer and internal flows with recirculation. Advanced topics include guiding strategies and boundary fitted coordinates. Extensions of basic methods to complex problems, which include a feature from the following list: turbulence, non-newtonian rheology and free surfaces (depending on class interest).

742 / Membrane Based Bioseparations / R. Ghosh
(cross-listed as Biomedical Engineering *742)
Overview of bioseparation processes; introduction to membrane technology; principles of microfiltration; microfiltration based bioseparation processes; theory of ultrafiltration; ultrafiltration based bioseparation processes; nanofiltration--theory and applications; bioseparation using membrane adsorbers; dialysis--theory and applications; integrated processes e.g. membrane bioreactors; use of membranes in analytical biotechnology; membrane based drug delivery systems; biomimetic membranes.

750 / Advanced MEMS Fabrication and Microfluidics / R. Selvaganapathy (cross-listed as Mechanical Engineering *752 and Engineering Physics *752)

Introduction, Microfabrication and micromachining, Surface and bulk micromachining, non-conventional machining, Microfluidics, Microchannels, Microvalves, Micromixers, Micropumps, Droplet actuation, Integrated Systems.

***751 / Advanced Mathematics in Chemical Engineering / Staff**

Finite difference methods for solving parabolic elliptic and hyperbolic partial differential equations.Convergence and stability of these methods.Methods of weighted residuals, including collocation, introduction to the finite element method.Applications to current chemical engineering problems.

752 / Optimization of Chemical Processes / C. Swartz (cross-listed as ComputationalScience and Engineering *752)

Numerical techniques for achieving optimal performance of a chemical process. Topics in numerical linear algebra; optimality conditions; algorithms for unconstrained optimization; application to solution of nonlinear equation systems and least-squares problems; linear programming; algorithms for constrained optimization; dynamic optimization; interior-point methods; mixed-integer programming; global optimization. Application to process design, control, operation and scheduling.

753 / Process Modeling and Optimization / V. Mahalec(cross-listed as School of Engineering Practice *752)

Architecture of simulation programs, solution algorithms, integration of simulation models from different simulators. Steady-state and dynamic simulation via sequential modular and equation-oriented algorithms.Optimization of steady-state and dynamic performance, sensitivity of the optimum, multi-objective optimization.Analysis of plant data, gross error detection, parameter estimation to match the plant performance.On-line monitoring and optimization of process performance.

754 / Process Design and Integration for Minimal Environmental Impact / M. Sorin (cross-listed as School of Engineering Practice *754)

The course focuses on integration of process units and on the design of Energy Utility Systems, Heat Exchanger Networks (HEN) and Water Distribution Systems and presents methodologies that lead to energy efficient, water saving and economically attractive designs. Methods for heat integration (HEN, utility selection, heat engines, heat pumps, refrigeration cycles, and pinch analysis), cogeneration and integrations with industrial sites, water and cooling minimization and their applications.

***755 / Dynamic Optimization / Staff**

This course addresses key aspects of dynamic optimization, in the context of optimizing the performance of transient process systems in Chemical Engineering. Topics covered include: Continuous-time dynamic systems; Optimal control theory; Direct and indirect solution methods; Real-time dynamic optimization; Integrated design and control under uncertainty.

***761 / Multivariable, Stochastic and Adaptive Control ofChemical Processes / P. Mhaskar**
Introduction to control of multivariable chemical processes. Topics usually covered: dynamic-stochastic models, minimum variance and adaptive controllers, multivariable optimal control, nonlinear control, constraint handling for chemical process control and optimization, observers and inferential control.

***762 / Time Series Analysis and Process Identification/ Staff**
Methods for modeling the dynamic-stochastic behaviour of a process and its disturbances using data collected from the process. Traditional methods for impulse and frequency response identification. Discrete transfer function and ARIMA time series models. Statistical methods for structure determination, parameter estimation, model validation, design of experiments, and analysis of closed-loop data. Use of models for forecasting, analysis, and control.

***764 / Process Control Design / Staff**
Techniques for designing control system structures; including modeling, flexibility, controllability, integrity, reliability, interaction and performance metrics, economic performance, and robustness. The key affect of process dynamics on performance is presented. Both decentralized multiloop and centralized model-predictive control are considered. Techniques are applied to selected process equipment and processes.

***765 / Multivariate Statistical Methods for Process Analysis and Monitoring / Staff**
This course is based around multivariate latent variable models which assume low dimensional latent variable structures for the data. Multivariate statistical methods including Principal Component Analysis (PCA), and Partial Least Squares (PLS) are used for the efficient extraction of information from large databases typically collected by on-line process computers. These models are used for the analysis of process problems, for on-line process monitoring, and for process improvement.

***770 / Selected Topics in Polymer Science and Engineering / S. Zhu**
Introduction and discussion of hot research topics and recent advances in the areas of polymer science and engineering, such as controlled/living radical polymerization, single site type of catalysts in olefin polymerization, polymer gels and network formation, etc., study of chemical engineering principles pertinent to these topics; and examination of industrial perspectives of the resulting polymer materials. Development of chemical engineering modeling and proposal writing skills and application to the polymer processes related to student's research work.

***772 / Polymer Rheology / Staff**
Rheology of thermoplastic melts, conservation, and constitutive equations. Viscoelasticity. Complex flows, die swell, melt flow instability. Continuum and molecular theories including reptation.The role of rheology in processing.

***773 / Advanced Concepts of Polymer Extrusion/ M. Thompson**
Fundamental mechanics of solids-conveying, melting, pumping and mixing in extrusion.Modeling and practical topics in single-screw and twin-screw extrusion.Coverage of the application areas of extrusion as they exist at the present. Screw design principles, metallurgical concerns and manufacturing methods are discussed. Introduction to special topics in the field of extrusion.

***774 / Advances in Polymeric Materials / M. Thompson**
This course examines the growing field of polymer alloys, blends and composites. The student is introduced to the current principles and practice behind these advanced polymeric materials, looking at techniques of characterization as well as the properties generated in such materials. Often linked with both polymer blends and composites is the field of reactive processing, a maturing research area with much commercial utilization that uses polymer processing equipment (typically an extruder) as a reactor for the chemical modification of polymers.

****780 / Biomaterials and Tissue Engineering / H. Sheardown, K. Jones***
(cross-listed as Biomedical Engineering *780)
This course will provide an overview of the challenges and issues relating to the use of materials (primarily polymeric materials) in medical applications. The particular emphasis will be on the interface between the material and the native tissue. Surface characterization and modification of the materials will be discussed. Molecular biological techniques used in tissue engineering, tissue structure and biomimickry will also be covered. Tissue response to implanted biomaterials and tissue engineered constructs will be discussed.

****781 / Biomedical Engineering II / Staff (cross-listed as Biomedical Engineering *706)***
An introduction to biomedical engineering with a health science focus. The biological and chemical concepts involved in the design and operation of medical devices and biological processes will be discussed. The following research themes will be emphasized: cell biological responses to biomaterials, toxicity / pharmacokinetics, tissue and genetic engineering, gene therapy, biotechnology physiological response to biomaterials.

***782 / Biopharmaceuticals / R. Ghosh**
The term biopharmaceuticals usually refers to peptide, protein and nucleic acid based therapeutic products such as insulin, monoclonalantibodies and interferon. The product and process development, manufacturing, formulation and analytical technologies involved withsuch products are significantly different from those for low molecular weight pharmaceuticals. This course aims to introduce students tosome of the technological aspects related to biopharmaceuticals.

784 / Gene Therapy for Bioengineers / G. Hortelano (cross-listed as Biomedical Engineering *704)

An analysis of the technology of gene therapy, specifically intended to students with bioengineering background. The principles of gene delivery, and specific targeting of genetic material to different organs through the use of viral and non-viral vectors will be covered. Particular emphasis will be given to the use of polymers to develop DNA formulations suitable for gene therapy. The application of various gene therapy strategies in selected individual diseases of big impact to the health care systems will be discussed. This course will be based on review articles and original papers.

***790 / Selected Topics in Colloid and Surface Science / R. Pelton**

This course is an in-depth analysis of an aspect of colloid and surface science of current interest. Topics from previous years include latex preparation and characterization, adhesion fundamentals, and hydrogels. Ideally, students should have taken at least one course in polymers as well as an interfacial engineering or interfaces course. Potential students with other backgrounds should consult the instructor. The learning experience will include analysis of recent papers, review lectures by the students and the development of a research proposal.

***791 / Nanotechnology in Chemical Engineering / T. Hoare**

Fundamentals of the design, preparation, and properties of nanomaterials are discussed from a chemical engineering perspective.Emphasis will be placed on how physical properties of materials change on the nanoscale, top-down (chemical patterning/lithographytechniques) versus bottom-up (self-assembly) approaches to nanostructure preparation, nanoparticle design, characterization ofnanoscale structures, nanofluidics and nanomachines (including microelectromechanical systems), and nanobiomaterials (drug andgene delivery, biosensors, and bioseparations).

Research in Chemical Engineering

The Department of Chemical Engineering has world class research programs in the areas of process control, process design and optimization, polymer production technology, polymer processing and rheology, pulp and paper technology, membrane separation processes, mass transfer, fluid mechanics, bioengineering and biomedical engineering including biomaterials. The Department has institutes for advanced process control, polymer production technology, polymer processing, and pulp and paper research, all of which have significant industrial involvement and support. The Department plays an active role in Materials and Manufacturing Ontario (MMO), one of the Centres of Excellence of the Province of Ontario. Members of the department also participate in the McMaster Manufacturing Research Institute, through the polymer processing group, CAPPA-D.

The Department's facilities include a large unit operations laboratory, a number of research laboratories and a machine shop. Research equipment includes: a twin-screw extruder, specialized rheometers, particle image velocimetry, a laser doppler anemometer, high speed photographic equipment, gel permeation chromatographs, an automated Zeiss image analyzer, a micro electrophoretic device, gas-liquid chromatographs, membrane separation equipment, radioactivity counting equipment, an ellipsometer, and particle characterization equipment.

Specialized equipment utilized by members of the Process Control group includes many PC's in an integrated network. Commercial and university-developed software is used to facilitate research in simulation, control, design, statistical process diagnostics and optimization.

The McMaster Institute for Polymer Production Technology operates within the Department and has facilities for the study of polymerization reactions in continuous systems, including state of the art polymer characterization equipment.

Other specialized facilities used in our research are available on campus in the Brockhouse Institute for Materials Research, and in the departments of Chemistry and Biology, e.g., scanning and transmission electron microscopes, electron microprobe analyzers, a scanning transmission EM (STEM), and environmental scanning EM, and an atomic force microscope.

The Chemical Engineering Laboratories occupy 1,560 square metres in the Engineering Building. They are located in close proximity to the facilities of other engineering departments, e.g., the mechanical testing equipment in Materials Engineering, and the fluid mechanics laboratories in Mechanical Engineering. Some of the Department's research in Biomedical Engineering is conducted in the Health Sciences Building close by.

CHEMISTRY

The Department of Chemistry and Chemical Biology provides facilities for students intending to proceed to the M.Sc. and Ph.D. degrees as described in the information below. The Department is also a participant in the interdisciplinary graduate program in Chemical Biology described earlier in this section of the Calendar.

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Faculty / Fall 2012

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Michael A. Brook, B.Sc. (Toronto), Ph.D. (McGill), M.C.I.C.
Adam P. Hitchcock, B.Sc. (McMaster), Ph.D. (British Columbia),F.R.S.C., F.C.I.C. / Senior Canada Research Chair
William J. Leigh, B.Sc., Ph.D. (Western), F.C.I.C.
Brian E. McCarry, B.Sc. (British Columbia), Ph.D. (Stanford), F.C.I.C.Stephen A. Jarislowsky Chair in Environment and Health / Chair
Gary J. Schrobilgen, B.Sc. (Dubuque, Iowa), M.Sc. (Brock), Ph.D.(McMaster), F.R.S.C.
HaraldD.H. Stöver, B.Sc. (Darmstadt), Ph.D. (Ottawa), M.C.I.C.

ASSOCIATE PROFESSORS
Alex Adronov, B.Sc. (McMaster), Ph.D. (Berkeley)
Paul W. Ayers, B.Sc. (Lipscomb), Ph.D. (UNC Chapel Hill)/ Canada Research Chair
Paul J. Berti, B.Sc. (Waterloo), M.Sc. (Ottawa), Ph.D. (McGill) / Joint appointment with Biochemistry
Philip Britz-McKibbin, B.Sc. (Toronto), Ph.D. (British Columbia)
Alfredo Capretta, B.Sc., Ph.D. (McMaster)
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James McNulty, B.Sc., M.Sc., Ph.D. (Toronto)
Giuseppe Melacini, B.Sc. (Milan), Ph.D. (California-San Diego)/ Joint appointment with Biochemistry
YurijMozharivskj, B.Sc. (Lviv), Ph.D. (Iowa State) / Canada Research Chair
KalaichelviSaravanamuttu, B.Sc., Ph.D. (McGill)

John F. Valliant, B.Sc., Ph.D. (McMaster) / Joint appointment with Medical Physics and Applied Radiation Sciences
Ignacio Vargas-Baca, B.Sc., M.Sc. (UNAM), Ph.D. (Calgary)

ASSISTANT PROFESSOR
Jose M. Moran-Mirabal, B.S., M.S. (InstitutoTechnologico y de Estudios de Monterrey), M.S., Ph.D.

ASSOCIATE MEMBERS
Raman Chirakal (Radiology), B.Sc. (Kerala), M.Sc. (Brock), Ph.D.(McMaster)
Richard M. Epand (Biochemistry), A.B. (Johns Hopkins), Ph.D.(Columbia)
Robert H. Pelton (Chemical Engineering), B.Sc., M.Sc. (Guelph), Ph.D. (Bristol)
Gerard D. Wright (Biochemistry), B.Sc., Ph.D. (Waterloo)
Daniel S-C. Yang (Biochemistry), B.Sc., M.Sc. (Edmonton),Ph.D. (Pittsburgh)
Shiping Zhu (Chemical Engineering/Materials Science), B.Eng.(Zhejiang), Ph.D. (McMaster)

ADJUNCT MEMBER
Yuning Li, B.Sc., M.Sc. (Dalian), Ph.D. (Japan Advanced Institute of Science and Technology) / Chemical Engineering, University of Waterloo

PROFESSORS EMERITI
Jacques Barbier, Dipl. Ing. Chimiste (Paris), M.Sc. (Toronto), Ph.D. (A.N.U.)
Alexander D. Bain, B.Sc. (Toronto), M.Sc. (British Columbia), Ph.D.(Cambridge), M.C.I.C. *(Research Active)*
Russell A. Bell, M.Sc. (Wellington), M.S. (Wisconsin), Ph.D. (Stanford), F.C.I.C. *(Research Active)*
Arthur N. Bourns, O.C., B.Sc., D.Sc. (Acadia), Ph.D. (McGill), D.Sc.(Acadia, McGill, New Brunswick, McMaster), LL.D. (Brock), F.R.S.C., F.C.I.C.
Ronald F. Childs, B.Sc. (Bath University of Technology), Ph.D., D.Sc.(Nottingham), F.C.I.C.
Peter T. Dawson, B.Sc. (Birmingham), Ph.D. (Cambridge)
Ronald J. Gillespie, B.Sc., Ph.D., D.Sc. (London), F.R.S., F.R.S.C.,F.R.S.C. (U.K.), F.C.I.C.
John E. Greedan, B.A. (Bucknell), Ph.D. (Tufts), F.C.I.C. *(ResearchActive)*
Orville E. Hileman, Jr., B.S.Ed. (Bowling Green State), Ph.D.(Case Institute of Technology), F.C.I.C.
David A. Humphreys, B.Sc., M.Sc. (London), Ph.D. (McMaster),F.C.I.C.
Joseph D. Laposa, B.Sc. (St. Louis), M.S. (Chicago), Ph.D. (Loyola)
Michael J. McGlinchey, B.Sc., Ph.D. (Manchester), F.C.I.C.
Ian D. Spenser, B.Sc. (Birmingham), Ph.D., D.Sc. (London, McMaster), F.R.S.C., F.R.S.C. (U.K.), F.R.I.C., F.C.I.C.
Johan K. Terlouw, B.Sc., M.Sc., Ph.D. (Utrecht)*(Research Active)*
Richard H. Tomlinson, B.Sc. (Bishop's), Ph.D. (McGill), F.C.I.C.
John Warkentin, B.Sc., M.Sc. (Manitoba), Ph.D. (Iowa State), F.C.I.C.
Nick H. Werstiuk, B.Sc. (Alberta), M.A., Ph.D. (Johns Hopkins),F.C.I.C. *(Research Active)*

M.Sc. Degree

Course Requirements

The minimum course requirement for the M.Sc. degree is four graduate modules or the equivalent, selected from any of the offered Chemistry modules, 600-level courses (one module credit each), or extra-departmental graduate courses (usually two module credits each). The minimum passing grade for any course is B-. Students are strongly encouraged to complete a minimum of two prescribed modules within their sub-discipline (see below). A maximum of one 600-level course may be included in the minimum course requirement. Additional courses beyond the minimum requirement may be recommended by the supervisory committee.

Colloquium

M.Sc. candidates must present a departmental research colloquium (see below).

Thesis and Defence

A thesis embodying the results of original research must be defended in a final oral examination.

Transfer to Ph.D.

Students who have satisfactorily completed the requirements for the M.Sc. degree and have made satisfactory progress in their research may apply to the department for transfer to the Ph.D. program, without first satisfying the M.Sc. thesis requirement. The transfer must occur within 22 months of starting the M.Sc. degree. The transfer examination involves the submission and defence of a report detailing the student's research progress and a comprehensive proposal for future research.

Ph.D. Degree

Course Requirements

The minimum course requirement for the Ph.D. degree varies with sub-disciplines as follows:

Analytical, Organic, Physical, and Theoretical Chemistry: There is no course requirement at the Ph.D. level for students who have completed the M.Sc. requirements (listed above). Students with direct entry into the Ph.D. program (without first completing an M.Sc.) must complete a minimum of two prescribed modules within their sub-discipline (see module list below), and must present a departmental research colloquium. However, in all cases, additional courses may be recommended by the supervisory committee.

A student who enters the Ph.D. program in these sub-disciplines with an appropriate M. Sc. degree from another university must complete a minimum of two prescribed modules, or the equivalent, and present a departmental research colloquium (see below). Additional courses may be recommended by the supervisory committee in cases where background is deemed inadequate for the research being undertaken.

Inorganic Chemistry: The minimum course requirement for students in this sub-disciplined is two graduate modules or the equivalent beyond the requirements for the M.Sc. degree. Students with direct entry into the Ph.D. program (without first completing an M.Sc.) must complete a minimum of two prescribed modules within this sub-discipline (see module list below), and must present a departmental research colloquium. However, in all cases, additional courses may be recommended by the supervisory committee.

A student who enters the Ph.D. program in this sub-discipline with an appropriate M.Sc. degree from another university must complete a minimum of two prescribed modules, or the equivalent, and present a departmental research colloquium (see below). Additional courses may be recommended by the supervisory committee in cases where background is deemed inadequate for the research being undertaken.

Comprehensive Examination

All Ph.D. candidates must pass a Comprehensive Examination, taken within the first 20 months after beginning Ph.D. work that tests breadth of knowledge within the student’s major field of study. The Comprehensive Examination will require the submission of a document that provides a review of a relevant, current field of research, along with an original proposal for research. The defence will consist of a brief presentation, followed by an oral examination.

Thesis, Seminar and Defence

A thesis embodying the results of original research must be defended in a final oral examination. Prior to the defence, Ph.D. students must present a departmental seminar describing the contributions made as a result of graduate research.

Departmental Colloquia and Seminars

The departmental colloquium program is a mandatory component of the M.Sc. program, designed to provide students with the opportunity to develop scientific presentation and critical thinking skills. All students must present a colloquium describing their own research during the second year of graduate studies. Colloquium presenters are expected to provide detailed, professional presentations of their research progress. Regular attendance at departmental colloquia is expected from all graduate students, and is mandatory for M.Sc. students and direct-entry Ph.D. students during the first two years of their program. Students attending the colloquia are expected to ask critical questions of the presenter.

Attendance at departmental seminars is expected of all students within the department. These seminars comprise a combination of externally invited speakers, faculty members from McMaster, and senior Ph.D. students who are nearing the Ph.D. defence.

Courses

The Department of Chemistry and Chemical Biology offers graduate courses in the form of "modules," which are the formal equivalent of one-quarter of a full graduate course. 600-level half courses are also available for credit, to a maximum of one half course (equivalent to one module credit).

Modules marked with a plus sign (+) may be taken more than once for credit, as long as the content is different each time the course is taken. Brief descriptions of all graduate modules are available on the departmental website (http://www.chemistry.mcmaster.ca/graduate). Not all graduate courses are offered in a given year—please consult the website for current courses. Student are free to include Education *750 (Principles and Practice of University Teaching) in their program, but this cannot be counted towards their course requirements for the degree.

Prescribed Courses in Analytical Chemistry
#708 / Analytical Separation Science
#711 / Chemometrics
#737 / Mass Spectrometry
+#799 / Special Topics

Prescribed Courses in Inorganic Chemistry
#716 / Transition Metal Chemistry
#717 / Main Group Chemistry
#725 / Group Theory
#727 / Symmetry & Properties of Solids
#730 / X-Ray Theory
#736 / X-Ray Structure Determination
#743 / Inorganic Problems
+#799 / Special Topics

Prescribed Courses in Organic Chemistry
#753 / Organic Photochemistry
#754 / Physical Organic Chemistry
#758 / Bio-Organic Chemistry
#760 / Principles of Organic Synthesis
#765 / Advanced Polymer Chemistry
+#799 / Special Topics

Prescribed Courses in Physical Chemistry
#703 / Numerical Methods and Computational Chemistry
#725 / Group Theory
#727 / Symmetry and Properties of Solids
#749 / Introduction to BiomolecularNMR
#770 / Molecular Electronic Structure Theory

#776 / Spectroscopy
#778 / Solid State Surface Science
#784 / Physical Chemistry of Materials
+#799 / Special Topics

Other Available Courses
#730 / X-Ray Theory
#736 / X-Ray Structure Determination
#737 / Mass Spectrometry
#740 / Basic Theory of 1D & 2D NMR Spectroscopy

600-Level Courses
***6OA3 /** Natural Products
***6OB3 /** Polymers and Organic Materials
***6IC3 /** Solid State Chemistry
***6II3 /** Transition Metal Organometallic Chemistry and Catalysis
***6PA3 /** Molecular Driving Forces
***6PB3 /** Computational Models for Electronic Structure andChemical Bonding

Service Modules

The following modules will be offered as student demand dictates.These are technique-oriented modules for which no formal credit is offered.

A. Modern Techniques in Handling Air-Sensitive Compounds
B. Rudimentary Glassblowing

Research in Chemistry

The Department of Chemistry and Chemical Biology provides opportunities for research in a broad range of fundamental and applied research topics in six fields of Chemistry: Analytical and Environmental, Biological, Inorganic, Materials, Organic, Physical and Theoretical.

The research interests of current faculty members include: design, synthesis and study of functional polymers and carbon nanotubes (A. Adronov); theoretical chemistry and electronic structure theory (P.W. Ayers); theory and application of pulsed NMR experiments (A.D. Bain); transition state analysis in biochemical systems (P.J. Berti); biosensors, sol-gel biomaterials (J.D. Brennan); bioanalytical chemistry, metabolomics, cellulomics (P. Britz-McKibbin); silicon chemistry, silicone polymers and biomaterials (M.A. Brook); organic and medicinal chemistry, drug discovery (A. Capretta); quantum molecular dynamics and NMR spectrum simulation (R.S. Dumont); inorganic synthesis, redox chemistry, ligand design (D. Emslie); applications of advanced solid-state NMR techniques (G.R. Goward); structure-properties relations in metal oxides (J.E. Greedan); bio-organic chemistry and biosynthesis (P.H.M. Harrison); synchrotron radiation based spectromicroscopy of soft matter, environmental and biological samples; quasi-elastic and inelastic electron scattering of gases (A.P. Hitchcock); surface science of electronic materials, scanning probe microscopy and dissipative nanopatterning (P. Kruse); organic and organometallic photochemistry and Group 14 reactive intermediates (W.J. Leigh); DNA catalysis (Y. Li); environmental analytical chemistry and genotoxicology (B.E. McCarry); organic synthesis, chemical biology, anticancer drugs (J. McNulty); biological NMR, protein structure and dynamics, biomolecular interactions (G. Melacini); the study of biomolecular interactions through micropatterning and high-resolution fluorescence microscopy (J.M. Moran-Mirabal); magnetocaloric and thermoelectric inorganic solids, ferromagnetic shape memory alloys (Y. Mozharivskyj); fundamentals and applications of nonlinear photochemical processes (K. Saravanamuttu); main group inorganic chemistry (G.J. Schrobilgen); polymer and colloid synthesis (H.D.H. Stöver); gas-phase ion chemistry (J.K. Terlouw); medical applications of radioisotopes (J.F. Valliant); main group inorganic and materials chemistry (I. Vargas-Baca).

A more detailed description of current research projects for each faculty member and a list of their recent publications is available on our departmental website (http://www.chemistry.mcmaster.ca/research/index.html).

Research in Chemical Biology

This interdisciplinary area of research is jointly supported by the Departments of Chemistry and Chemical Biology, Biochemistry & Biomedical Sciences and Biology. It is described earlier in this section of the Calendar.

Research in Chemical Physics

This interdisciplinary area of research is jointly supported by the Departments of Chemistry and Physics & Astronomy. It is described in section 11 of the Calendar.

Facilities for Research

The Department of Chemistry and Chemical Biology maintains four excellent research facilities with instruments that are available to all graduate students and researchers: the Magnetic Resonance Facility, the Regional Centre for Mass Spectrometry, the McMaster Analytical X-ray (MAX) Diffraction Facility and the Optical Spectroscopy Facility. In addition, individual faculty maintain a wide variety of minor research equipment in their own laboratories. Members of the Department also have access to a well-equipped machine shop, a glassblowing shop and a student machine shop for do-it-yourself projects.

The Magnetic Resonance Facility houses eight instruments including 700 MHz (x2), 600 MHz, 500 MHz (x2), 300 MHz and 200 MHz (x2) NMR spectrometers with a variety of probes for solid and liquid samples at variable temperature. Both 700 MHz NMR spectrometers are equipped with cryoprobes for a six-fold increase in sensitivity. Students are trained to record their own NMR data, and all McMaster students and staff may use one of the BrukerTopSpin software licenses to process the NMR data on their own computer. The McMaster Regional Centre for

Mass Spectrometry houses six instruments covering a wide range of ionization sources (EI, CI, MALDI and ESI) and mass measurement techniques (sector, triple quadruple and time-of-flight), as well as GCMS and LCMS instrumentation. The McMaster Analytical X-ray (MAX) Diffraction Facility houses one Bruker SMART APEX2 system with a Mo sealed-tube source and low (88 K) - high (370 K) temperature capability; one Bruker SMART6000 system with a Rigaku Cu rotating-anode source; one Stoe Image Plate system with a Mo sealed-tube source, a RigakuRAXIS-IV++ image plate protein diffractometer with focused Osmic optics, and a Bruker D8 Discover 2D powder diffractometer with a Vantec500 area detector (and optional point detector), three sample rotation axes, Co and Cu sources, RT to 900C sample chamber, and an x-y mapping stage . There are also two high- and low-resolution Cu powder diffractometers plus one PANalyticalX'Pert system with monochromatic Cu Ka1 and Co sealed-tube sources. The X-ray Facility is run from a user friendly control room, so students can participate in or run their own structural analyses. The Combustion Analysis and Optical Spectroscopy Facility houses a selection of instruments, primarily optical spectrometers including a Raman spectrometer with two lasers, two infrared spectrometers (one a Fourier transform instrument), two UV-VIS spectrometers, a spectrofluorimeter, a polarimeter, and a ThermofisherFlashEA 1112 Combustion Analyzer.

A number of faculty in the Department are members of the Brockhouse Institute for Materials Research and, as such, have access to the extensive instrument facilities in that institute. They include the Canadian Centre for Electron Microscopy (high-resolution transmission and scanning electron microscopes, plus a scanning tunneling microscope and two atomic force microscopes), the Thermal Analysis laboratory, the Crystal Growth facility and the Materials Preparation facility. More information is available on the BIMR website (www.science.mcmaster.ca/bimr/). Several faculty in the Department (Hitchcock, Kruse, Stöver, Britten) are also active users of the Canadian Light Source Synchrotron Facilities in Saskatoon.

More information and a downloadable brochure about our research facilities, as well as virtual tours, are available on our departmental website http://www.chemistry.mcmaster.ca/ facilities/index.html).

CIVIL ENGINEERING

The Department of Civil Engineering provides facilities for students seeking the degree M.A.Sc., M.Eng. or Ph.D., and for post-doctoral research.

Enquiries: 905 525-9140 Ext. 24287
Fax: 905 529-9688
E-mail: civil@mcmaster.ca
Website: http://www.eng.mcmaster.ca/civil/

Faculty / Fall 2012

PROFESSORS
Brian W. Baetz, B.A.Sc., M.A.Sc. (Toronto), Ph.D. (Duke), P.Eng., F.C.S.C.E./ Chair
Samir E. Chidiac, B.Eng., M.Eng., Ph.D. (McMaster), P.Eng. / Chair in Effective Design of Structures
Gail Krantzberg, B.Sc. (McGill), M.Sc., Ph.D. (Toronto)
Stan Pietruszczak, B.Eng., M.Sc. (Warsaw), Ph.D. (Polish Academyof Science)
GhaniRazaqpur, B.Sc. (American University of Beirut), M.Sc.(Hawaii), Ph.D. (Calgary), P.Eng., F.C.S.C.E.
K.S. Sivakumaran, B.Sc. (C.Eng.) (Sri Lanka), M.Eng.(Asian Instituteof Technology), Ph.D. (Calgary), P.Eng.
Dieter F.E. Stolle, B.Eng., M.Eng., Ph.D. (McMaster), P.Eng.
Ioannis K. Tsanis, Dipl.Eng. (Thessaloniki), M.A.Sc., Ph.D. (Toronto),P.Eng.
John C. Wilson, B.Eng., M.Eng. (McMaster), Ph.D. (Caltech.), P.Eng.

ASSOCIATE PROFESSORS
PaulinCoulibaly, B.A.Sc., M.A.Sc. (Nice), Ph.D. (Laval), P. Eng.
Sarah Dickson, B.A.Sc., Ph.D. (Waterloo), P.Eng.
Wael El-Dakhakhni, B.Sc. (Ain-Shans), M.Sc., Ph.D. (Drexel), P.E., P. Eng. / Martini, Mascarin and George Chair in MasonryDesign
PeijunGuo, B.Sc., M.Sc., Ph.D. (SWJTU), Ph.D. (Calgary), P. Eng.
YipingGuo, B.Sc. (Zhejiang), M.A.Sc., Ph.D. (Toronto), P. Eng.
Michael Tait, B.E.Sc., Ph.D. (Western), P. Eng. / Joe Ng/JNE Consulting Chair in Design, Construction and Management in Infrastructure Renewal

ASSISTANT PROFESSORS
Cameron Churchill, B.Eng., M.Eng. (McMaster)
Younggy Kim, B.S., M.S. (Korea), Ph.D. (Texas)
Dimitrios A. Konstantinidis, B.S., M.S., Ph.D. (UC Berkeley)
Saiedeh N. Razavi, B.Sc. (Sharif, Iran), M.Sc. (Iran), Ph.D. (Waterloo) / Chair in Heavy Construction

ASSOCIATE MEMBERS
AltafArain (School of Geography and Earth Sciences)
Carlos Filipe (Chemical Engineering)
James Smith (School of Geography and Earth Sciences)
Spencer Smith (Computing and Software)
Antonio Paez (School of Geography and Earth Sciences)

ADJUNCT MEMBERS
ZafarAdeel, B.Sc. (Lahore), M.Sc. (Ames), Ph.D. (Carnegie Mellon)
John Emery, B.A.Sc., Ph.D. (British Columbia)
Jon K. Glasworthy, B.E.Sc., Ph.D. (Western), P.Eng.
Shesha H. Jayaram, B.E., M.A.Sc. (Bangalore), Ph.D. (Waterloo), P.Eng., F.I.E.E.E.
Waleed F. Mekky, B.Sc., M.Sc. (Cairo), Ph.D. (McMaster), P.Eng.
Leila Raki, B.Sc., M.Sc. (Hassan II), Ph.D. (Ottawa)

PROFESSOR EMERITUS
Robert G. Drysdale, B.Sc. (Manitoba), M.A.Sc., Ph.D. (Toronto), P.Eng., F.C.S.C.E., F.C.A.E.

Applications from candidates holding degrees in Civil Engineering, Chemical Engineering, Mechanical Engineering, or Science (Honours) may be considered by the Department for graduate study and research in the areas of departmental interest.

On-line application available at:
http://www.eng.mcmaster.ca/civil/academicrequirementsgs.htm

Applicants must comply with the general regulations of the School of Graduate Studies as well as specific departmental regulations. The minimum academic requirement for admission to an M.A.Sc.degree and an M.Eng. degree is normally an average of B in the last two years of an applicant's undergraduate program.

Master’s Degree

A candidate for the Master’s degree may proceed by either a thesis (M.A.Sc.) or project (M. Eng.) program. In each case the candidate is required to spend at least one calendar year in full-time graduate study, or the equivalent in part-time graduate study at McMaster University. All full-time Master’s candidates must register, attend and participate in CIV ENG 761—Civil Engineering Seminars for the first 6 terms (24 months) of study. Regulations for Master’s examinations are available from the Department.

M.A.Sc. Degree

Candidates will be required to complete satisfactorily the equivalent of at least two full courses, of which at least one must be from within the Department of Civil Engineering at McMaster University. Additional course work may be prescribed if deemed necessary by the candidate's research supervisor. In addition to the above course requirements, all full-time Master's candidates must register, attend and participate in CIV ENG 761- Civil Engineering Seminars for the first 6 terms (24 months) of study. A dissertation must be presented which will embody the results of an original investigation; the dissertation is to be defended in an oral examination. This program is intended mainly for full-time candidates but may be taken on a part-time basis.

M. Eng. Degree

Candidates will be required to complete satisfactorily the equivalent of at least three full courses, of which at least 1.5 must be from within the Department of Civil Engineering at McMaster University. Additional course work may be prescribed if deemed necessary by the candidate's project supervisor. In addition to the above course requirements, all full-time Master's candidates must register, attend and participate in CIV ENG 761 –Civil Engineering Seminars for the first 6 terms (24 months) of study. A report must be presented on a project which demonstrates ability to carry out independent study and reach a satisfactory conclusion. The report must be approved by the department and presented orally to the department. This program is primarily intended for part-time M. Eng. candidates, but may be taken by full-time students.

Ph.D. Degre

Candidates will be required to complete satisfactorily the equivalent of at least two full courses in addition to the course requirement for an M.A.Sc. Degree, of which at least one must be from within the Department of Civil Engineering at McMaster University. Additional course work may be presented if deemed necessary by the candidate's research supervisor. In addition to the above course requirements, all full-time Ph.D. candidates must register, attend and participate in CIV ENG 761–Civil Engineering Seminars for the first 12 terms (48 months) of study.

The Ph.D. candidate will be evaluated by the Ph.D. Supervisory Committee after two academic terms in the Ph.D. program. This will be based on an evaluation of the candidate's ability to think, intellectual background, and general caliber as a doctoral student. The candidate must also pass a Comprehensive Examination which is normally taken in the second year of the doctoral program. The purpose of this examination is to test the candidate's acquisition of knowledge and maturity of approach to problems in the major field of study, as well as in appropriately chosen cognate subject areas. The detailed regulations governing these examinations may be obtained from the Department.

Part-time doctoral studies are permissible. Graduate students will also be required to present seminars related to their research topics.

Courses

Many courses in the Department are quarter courses (6 weeks) and are identified by a pound (#) sign. There are also several 700-level half courses (12 weeks) listed, identified by an asterisk (*). The quarter courses are designed to permit students to acquire a greater breadth of advanced level knowledge than would be possible where selections are limited to full or half courses. In addition, specialized advanced level material is made available to permit in-depth studies of particular subject areas. Students are also encouraged to include minor areas of study in addition to their major area.

600-level half courses are offered for graduate credit, and are also available to senior undergraduate students. A student will normally not be permitted to take more than two 600-level courses beyond a Bachelor's degree.

***6CM4 /   Advanced Construction Management / S. Razavi**
Fundamentals of project planning and scheduling; advanced scheduling techniques; improving schedules; time-cost trade-offs; resource levelling; project acceleration; productivity management; construction materials management; Building Information Modeling; automated data acquisition technologies; decision analysis; infrastructure asset management.

***6G04 /   Pavement Materials and Design / Staff**
Components of highway pavements; ground water and drainage for highway facilities; soil compaction and stabilization; aggregates; bituminous and concrete materials, flexible pavement design; concrete pavement design; interlocking pavement structures.

6K04 /   Modern Methods of Structural Analysis / Staff
Stiffness method; development and applications in structural analysis.Introduction to finite element method. Influence lines, elastic stability analysis of frames with and without sway effects. Application of computer programs.

6L04 /   Design of Water Resources Systems / Staff
Investigation, planning, analysis, and design of water resources systems. Frequency analysis, design storms, urban drainage and analysis, floodplain analysis and flood control.

****6M03 /   Hydrologic Modeling / P. Coulibaly(cross-listed as Earth Sciences *6W03)***
Principles of numerical modeling and examination of selected hydrologic models.

***6SD4 /   Structural Dynamics and Earthquake Engineering / D. Konstantinidis**
Introduction to linear elastic structural dynamics and its application to earthquake engineering.Single Degree of Freedom Systems: formulation of equations of motion; viscous

damping; undamped and damped free-vibration response; forced-vibration response to harmonic and pulse excitation; response to arbitrary (earthquake) excitation; response spectrum for earthquake excitation. Multi-Degree of Freedom Systems: formulation of matrix equations of motion; viscous damping; modal analysis and use of response spectrum; example applications. Selected topics in seismic analysis and design: modelling, reduction of degrees of freedom, condensation, building code provisions, seismic hazard mitigation techniques.

***6V04 / Biological Aspects of Wastewater Engineering / Y. Kim**

Process, capabilities, hardware, and design equations for the biological processes used in design of wastewater treatment plants. Emphasis on processes such as bio-oxidation, clarification, sludge treatment and disinfection. Leading-edge processes are introduced and design software is used.

The following courses are offered for graduate credit only:

#702 / Rehabilitation of Structures / Staff

Evaluation of the load carrying capacity of existing structures.Identification of the deficiencies in design and deterioration of structures.Criteria for selection and design of the most suitable rehabilitation system. Design details of selected rehabilitation system.

****703 / Finite Element Method / D.F. Stolle(cross-listed as Computational Science and Engineering *783)***

Theory of finite element method; formulation of finite elements; applications to solid mechanics, field and plate bending problems; algorithms for transient and nonlinear problems; introduction to hybrid and mixed finite elements; development of a finite element code.

***704 / Specialized Studies in Civil Engineering / Staff**

Studies selected from specialized areas of research or representing special areas of expertise available from visiting professors or others approved by the Department.

#705 / Specialized Studies in Civil Engineering / Staff

Studies of specialized research topics in the areas of structural engineering, computational mechanics, water and environmental engineering.

***714 / Advanced Structural Mechanics / K.S. Sivakumaran**

2-D and 3-D analyses of stresses and strains. Principal stresses and maximum shear stress. Differential equations of equilibrium, compatibility conditions.Bending of unsymmetrical members. Shear centre. Shearing stresses due to bending in thin-walled open and closed members. Torsion of closed and open sections, warping, non-uniform torsion and warping stresses. Theory of plates– Rectangular and circular plates problems. Buckling of elastic columns.Flexural-Torsional buckling of beams.Axial-torsional buckling of columns.Plate buckling (local buckling), shear of buckling of plates.

#716 / Structural Dynamics / M. Tait
Formulation of equations of motion; one degree-of-freedom systems: undamped, damped, free vibration, forced vibration, nonlinear systems; numerical techniques: time domain, frequency domain.

#717 / Dynamics of Structural Systems / Staff
Multi-degree-of-freedom systems: modal analysis, characteristics of Eigenvalue problems, applications; continuous systems; dynamic loads: earthquake and wind loading, vibrating machines, moving loads.

#718 / Random Vibrations / M. Tait
This course focuses on random processes and the application of random vibration theory to the field of Civil Engineering. Characterization of random processes and the input-response of linear structural systems subjected to stationary excitation will be investigated. Frequency domain analysis techniques using the power and cross spectral density functions will be discussed. Response of single/multi degree of freedom structures will be examined. A basic understanding of structural dynamics is recommended.

#720 / Behaviour and Design of Masonry Components/ W. El-Dakhakhni
Introduction to masonry including properties and manufacture of materials, behaviour of masonry assemblages, design of plain and reinforced walls, columns and beams, design to avoid moisture problems.

#722 / Design and Construction of Masonry Buildings / W. El-Dakhakhni
This course deals with the overall design of masonry buildings including planning and selection of suitable layouts and consideration of construction requirements. Other topics: design of veneer walls, special requirements for ties and anchors, and integration of floor and wall systems.

***724 / Tall Building Analysis and Design / Staff**
The course covers the structural engineering aspect of tall building analysis and design. The main emphasis is to discuss the behaviour of different frame systems under lateral loadings. The approach is to use approximate methods to illustrate the behaviour, and use computer modeling to verify the accuracy of the approximate methods.

***726 / Advanced Analysis of Reinforced Concrete Structures / A.G. Razaqpur**
Fundamental concepts and theories behind the serviceability and strength analysis and design of reinforced concrete structures under flexure, shear, torsion, axial load or their combinations.The foundation of the current Canadian and some international concrete design codes and their limitations.

#728 / Introduction to Wind Engineering / M. Tait
This course will cover the basic concepts in wind engineering. Topics include: characteristics of wind; wind climatology; wind loading on structures; wind-induced building vibrations; code provisions for wind loading. A basic understanding of structural dynamics is recommended.

***730 / Earthquake Engineering / J.C. Wilson**
Engineering seismology; seismic design principles applied to building structures, and special facilities, code provisions for earthquakes; seismic design of concrete structures, special provisions; elastic and inelastic static and dynamic modeling.

***732 / Concrete Structures - Materials, Maintenance and Repair / S.E. Chidiac**
Portland Cement and its constituent phases; role of water in hydrated cement systems, hydration parameters, limiting hydration, state of water, porosity, engineering properties; structural models for C-S-H; hydration mechanisms: through solution, solid state; pore structure determination; engineering properties; role of admixtures and supplementary cementing materials; analysis of fresh and hardened concrete; durability; transport properties, relationships between transport properties and durability; in-situ evaluation of concrete structures; materials and techniques for repair; service life/durability design of concrete structures.

***734 / Advanced Prestressed Concrete: Analysis and Design/ A. G. Razaqpur**
Analysis and design of (prestressed pre- and post-tensioned) structures, including statically indeterminate beams and frames, composite structures and time-dependent analysis. Serviceability and strength of structures under flexure, shear and torsion are presented. Prestress losses due to creep, shrinkage and relaxation are covered in detail.

***738 / Seismic Behaviour, Analysis and Design of Masonry Structures / W. El-Dakhakhni**
The course presents a comprehensive in-depth treatment to seismic principles, procedure and philosophies with a focus on masonry structures. The course includes a good balance between practical design consideration, theoretical background, design code philosophies, component behavior and system-level seismic performance; all applied to typical masonry structures in North America. The course covers force-, and displacement- and performance-based seismic design principles.

***742 / Experimental Soil Mechanics / D.F. Stolle**
Concepts in classical and contemporary soil mechanics are reviewed for purposes of interpreting experimental results. Students are to conduct their own tests and interpret their findings.

***743 / Fundamentals of Soil Behaviour / P. Guo**
An understanding of soil behaviour is a fundamental requisite to a wide variety of geotechnical engineering applications, such asfoundation design, soil-structure interaction and geotechnical earthquake engineering. Appropriate numerical modelling also highlydepends on a better

understanding of soil behaviour. This course, which focuses on the behaviour of soils under various conditions,their theoretical descriptions and laboratory testing, will provide students the knowledge and understanding of fundamental soilbehaviour and of the underlying scientific principles.

***744 / Soil Dynamics / P. Guo**

Elastic-wave propagation in soils; representation of stress-strain relations in cyclic loading; laboratory and *in-situ* tests of dynamic soil properties; dynamic earth pressure on retain walls; dynamic bearing capacity of shallow foundations; liquefaction of saturated sand.

***746 / Theory of Plasticity / S. Pietruszczak**

Basic concepts of plasticity: yield criteria; isotropic and kinematic hardening; flow and deformation theories; fundamental postulates of plasticity; uniqueness of the solution. Elastic-perfectly plastic formulations: failure criteria (metals/ frictional materials); derivation of constitutive matrix. Isotropic strain- hardening models for cohesive-frictional materials: concepts of volumetric and deviatoric hardening. Modelling of the behaviour of brittle-plastic materials (concrete). Limit analysis: lower/upper bound theorems.

****757 / Advanced Statistical and Data Driven Methods in Hydrology / P. Coulibaly (cross-listed as Earth Sciences *757)***

The objective of this course is to provide a survey of advanced statistical and data-driven methods in hydrology and water resources engineering, and to apply selected methods to hydrologic modeling and water resources problems solving.

***758 / Introduction to Mechanics of Elastic/Inelastic Solid / S. Pietruszczak**

Foundations of the theory of elasticity: general formulation of quasi-static problems in elasticity; discussion of elementary two-dimensional problems in rectangular and polar coordinates; introduction to energy principles. Basic concepts of plasticity: specification of yield/failure criteria for ductile/brittle materials; elastic-perfectly plastic formulations, isotropic strain-hardening concepts.

761 / Civil Engineering Seminars / Staff

This is a seminar series presented by graduate students and guest speakers invited by the department. All full time students arerequired to take this course in both fall and winter terms. Course grades are either 'pass' or 'fail'. In order to pass the course thestudent must attend a minimum of 70% of the seminars. Full time Master's students are required to present one seminar in the secondyear of their program, while the full time Ph.D. students must present two seminars during the period between the second year and thesubmission of Ph.D. thesis. The seminar topic will be in the area related to student's current research.

770 / Advanced Groundwater Flow and Contaminant Transport / S. Dickson (cross-listed as Geography *750)

This course will cover the theory, equations, fundamental principles, and processes of the flow of fluids and transport of contaminants in soils and groundwater at an advanced level.

***774 / Environmental Hydraulics / I.K. Tsanis**

Similarity and dimensional analysis; turbulent diffusion and dispersion; turbulent jets and plumes; turbulent buoyant surface jets; hydro-dynamic elements of mixing processes; outfall and diffuser hydraulics; discharge of wastewater into marine environment; and design of an outfall system in the Great Lakes.

***775 / Computational Hydraulics / I.K. Tsanis**

Review of methods and strategies used in computational hydraulics for the solution of algebraic, ordinary, and partial differential equations; flow in closed conduits (pipe networks); non-steady flow (water hammer); flood propagation in open channel; backwater curve analysis; groundwater flow (seepage under a dam); advective diffusion and dispersion.

***779 / Aquatic Chemistry / S. Dickson**

This course will cover chemical equilibrium, reaction thermodynamics, activity, acid-base chemistry, coordination chemistry, redox reactions, precipitation and dissolution and contaminant detection and quantification. It is recommended that students have a background in year 1 undergraduate chemistry.

***798 / Uncertainty Analysis in Water Resources Engineering/ Y. Guo**

This course introduces a variety of methods that can be used for environmental and water resources decision-making under various kinds of uncertainties. Following a brief review of probability and statistics, the focus of the course is on selected uncertainty analysis methods that can be used to assess the statistical properties of system outputs as a function of its stochastic inputs and parameters. Example water resources engineering problems are used in introducing the various methods.

***799 / Stormwater Management Modeling and Analyses/ Y. Guo**

The course introduces various structural and non-structural stormwater management measures. The design and performance of some of the structural stormwater management measures are examined in detail. Modeling and analyses conducted for the planning, design and operation of stormwater management systems are the focus of this course.

Appropriate courses offered by other departments are also acceptable on the approval of the Chair.

Research in Civil Engineering

Current research activities in the Department of Civil Engineering can be described in terms of discipline areas grouped as follows: Computational Mechanics, Environmental and Water Resources Engineering, Structural and Earthquake Engineering.

The Department of Civil Engineering provides opportunities for research in a broad range of fundamental and applied research topics. Research in Civil Engineering includes: decision support systems for design of sustainable communities, municipal solid waste management planning (B.W. Baetz); durability/service life modeling of engineering materials, modeling heat and mass transfer in porous media, concrete technology, stone masonry, energy efficiency of buildings (S.E. Chidiac); water resources engineering, statistical hydrology, environmental data analysis (P. Coulibaly); contaminant hydrogeology (S. Dickson); masonry structures, seismic design, performance under blast loads, performance-based design, composite structures (W. El-Dakhakhni);geomechanics, geotechnical engineering and finite element applications (P. Guo); uncertainty analysis in environmental hydrology and water resources engineering, watershed planning and stormwater management (Y. Guo); water/wastewater treatment processes, ion-exchange membrane systems, and microbial fuel cells (Y. Kim); dynamics, earthquake engineering (D. Konstantinidis); Great Lakes research, public policy implications for engineering infrastructure (G. Krantzberg); constitutive modeling of engineering materials, finite element applications (S. Pietruszczak); concrete materials, concrete structures design, concrete infrastructure durability, FRP reinforced concrete design and retrofit, design and strengthening of structures against blast loads (A. GhaniRazaqpur); sensing, automation, and information technology for construction, infrastructure management, transportation (S. Razavi); steel structures, composite material structures, finite element applications (K.S. Sivakumaran); geomechanics, finite element algorithms and applications, highway materials (D.F. Stolle); structural dynamics, passive structural control systems, base isolation, structural health monitoring, retrofit/rehabilitation (M. Tait); hydraulics, hydrodynamics of water bodies, air-water interaction, diffusion and dispersion of pollutants, environmental information systems (I.K. Tsanis); seismic bridge engineering, earthquake engineering, system identification (J.C. Wilson).

Facilities for Research

McMaster University Centre for Effective Design of Structures

The McMaster University Centre for Effective Design of Structures links research and education to produce engineers who understand durability of materials, possess advanced analytical skills, can identify client-specific needs, and satisfy sustainability concerns including reduced maintenance and extended service life of structures. The construction process, building envelope design and building services are integrated parts of design.

Matching funding from the consulting engineering and construction industries (materials, design and contracting), the Province of Ontario and McMaster University provided 9.9 million dollars to finance changes which differentiates McMaster from other universities and provides research and education suited to the changing needs of the 21st Century. The establishment of the Centre has also led to the creation of three endowed chairs and two additional faculty positions. Funding has been used to enhance support levels and increase the number of positions for graduate students, post-doctoral fellows and research engineers, and summer research assistants as well as direct support of research.In addition to traditional areas of research in concrete, steel and analytical methods, the Centre has established the following four areas of research focus: Masonry, Remediation of Structures, Earthquake Engineering, and Enhanced Use of New and Under-Utilized Materials.

Structures and Earthquake Engineering Laboratory

Experimental research is conducted in the Applied Dynamics Laboratory, which is designed with a cellular box foundation strong floor measuring 25 m by 40 m. The special design features make the Applied Dynamics Laboratory a particularly suitable facility for large scale structural experimental research. Clear head room of over 12 m beneath a 10 tonne overhead crane permits full scale testing as well as scaled models of structures or structural components. The Laboratory has a large strong wall, which is used to provide reaction and support for load application equipment. The strong wall is capable of providing reaction for 100 tonnes at a height of 6 m.

The main hydraulic system is an MTS 90 GPM hydraulic power unit to operate a range of servo-controlled hydraulic actuators. This test equipment permits pseudo-dynamic testing through the use of a multi-actuator test system (2 to 4 actuators simultaneously) with capacities ranging from 450 kN to 1,400 kN and an advanced data acquisition system. This multi-actuator system permits the testing of a whole class of structural applications, which cannot be tested on a shake table.

The main hydraulic system is also used to power horizontal and vertical shake tables for seismic engineering studies. In addition to a selection of hydraulic jacks, computer controlled data acquisition equipment, MTS controller units (MTS 406 and MTS 407), load cells and displacement transducers, 3 fixed in-plane test machines with capacities between 5,000 kN and 550 kN are available.

An Air-bag testing system and a full-scale rain penetration testing apparatus are also available for out-of-plane testing of walls and rain penetration evaluation of building envelope components.

Recently Acquired Equipment

Recent major research equipment acquired includes a Structural Control Test Apparatus that can be configured to operate as a biaxial shake table or a three-degree-of-freedom suspended platform and has a high displacement capacity of ±1,500 mm. In addition, a self-reacting test frame designed to test multi-storey large-scale buildings under simulated earthquake loading, is currently operational. Finally, an Extreme Dynamic Load Simulator that will enhance the seismic, blast, and impact test capabilities is expected to be operational in 2012.

Through McMaster's collaboration with and generous support provided by the Canadian masonry industry, a Variable Scale Block Machine (VSBM) was acquired in 2008. The VSBM has been used to produce model-scale concrete-blocks which are utilized both at McMaster and by numerous researcher institutions throughout Canada.

Material Testing Facilities and Equipment

An important aspect of design is the consideration of the material properties of concrete, including workability, durability, and mechanical properties. The material's laboratory at the ADL has loading devices for determining mechanical properties of materials, and equipment for determining the workability and durability of cementious products such as concrete and masonry. The workability equipment consists of BTRHEOMrheometer, which can be used to measure the plastic viscosity and yield strength of fresh concrete; and slump rate machine, which also allows one to determine the rheological properties of fresh concrete by using a modified, more sophisticated slump test. The durability field/laboratory testing equipment consists of: torrent permeability tester to measure permeability coefficients of concrete; electronic moisture balance to accurately measure moisture uptake; rapid freeze-thaw cabinet to subject concrete specimens to harsh environmental conditions; and ultrasonic instrument TICO, which is a non-destructive testing method that allows measurement of elastic and strength properties of hardened concrete.

Geotechnical and Materials Engineering

The geotechnical and construction materials laboratories are equipped with conventional triaxial, direct shear, consolidation (odometer) testing equipment. An MTS loading system is available for the cyclic or dynamic testing of soils and pavement construction materials. A state -of-the-art hollow cylinder apparatus can be used for advanced testing to investigate the fundamental behaviour of soils. The impact of freeze-thaw on soil behaviour can also be explored in the Geotechnical Laboratory. Moreover, various components and instrumentations for small-scale model tests are available so that various model tests can be carried out to investigate complicated soil-structure interaction problems. Computing facilities are available for finite element computations. In addition, field studies on construction projects have been a regular part of the research program.

The Construction Materials Laboratory is equipped for the characterization of a range of materials such as aggregates, asphalt cements, Portland cements and slags. In particular, the laboratory can perform resilient modulus testing for pavement aggregates and asphalt concrete, which makes the lab unique in Ontario. A concrete mixer with 0.12 m^3 capacity, aggregate, shakers, and sample splitters are also parts of the concrete technology laboratory.

Environmental and Water Resources

A 20 m^2 graduate research lab is available with state-of-the-art equipment. The laboratory includes common areas available to all users (e.g., balances, sample preparation, fume hoods, and analytical equipment), as well as individual work spaces that can be assigned to graduate students for longer-term experiments.

An array of analytical equipment exists in the laboratory, including:

- two high performance liquid chromatographs (HPLC) equipped with an autosampler and full range of detectors (i.e., conductivity, ultra violet/visible, refractive index, fluorescence, and photodiode array detectors) and a computer for control and data acquisition purposes;
- a gas chromatograph (GC) equipped with an autosampler capable of handling solid-phase microextraction (SPME), an electron capture detector (ECD) and a flame ionization detector (FID) and a computer for control and data acquisition purposes;
- a spectrophotometer that can be employed in either a discrete sample or flow-through mode equipped with a computer for data acquisition;
- a fluorometer that can be employed in either a discrete sample or flow-through mode equipped with a computer for data acquisition;
- a PCR machine;
- a DGGE system;
- a gel documentation system;
- a mass spectrometer equipped with a computer for data acquisition purposes;
- a laser diffraction particle size analyzer

The lab is also well-equipped in terms of general instrumentation which serves as the basis for all research activities conducted in the lab. This instrumentation includes a water purification system, an autoclave, sample storage units, an ultrasonic cleaner, a laminar flow cabinet with flow control, an ultracentrifuge, balances, liquid and gas delivery systems, and a shaker table.

Supplementary laboratory equipment includes four fermenters equipped with computer control, water baths, digital cameras, various pH, dissolved oxygen and conductivity meters, sieve shaker and a set of sieves,data loggers, tipping bucket rain gauges, and pressure transducers. Field equipment includes water level tapes, pressure transducer/data loggers, high precision GPS, network of time domain reflectometry (TDR) systems for continuous soil moisture monitoring at three research sites, five weather stations, and 15 automated tipping bucket rain gauges, providing continuous record of meteorological data needed for hydrological model development and testing, flow meters and automatic samplers, fluid permeability test kit, and a research vehicle for fieldwork.

In addition to this in-house laboratory facility, extensive experimental facilities and support are available through Environment Canada's National Water Research Institute.

CLASSICS

The Department of Classics offers programs leading to the M.A. and Ph.D. in Classics.

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Faculty / Fall 2012

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Evan W. Haley, A.B. (Dartmouth), M.A., Ph.D. (Columbia) / Joint appointment in History / Graduate Advisor

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PROFESSORS EMERITI
Katherine M.D. Dunbabin, M.A., D.Phil. (Oxford)
Howard Jones, B.A. (London), M.A., Ph.D. (Indiana)
Peter Kingston, B.A., Ph.D. (London)
William J. Slater, M.A., Ph.D. (St. Andrews)

Candidates for the M.A. and Ph.D. degrees in programs offered by the Department of Classics must comply with the general regulations of the School of Graduate Studies and the specific regulations listed below.

M.A. Degree in Classics

Admission

Applicants for the M.A. Program in Classics may be admitted as Regular Students if they are graduates with at least B+ standing of any Honours program taken at McMaster or other university, which includes:

1. At least 12 units of Greek and at least 12 units of Latin with an average of at least B in each language.

2. At least 30 additional units of Classical Civilization, Greek, Latin, Ancient History, or other courses approved by the Department of Classics, at least 12 of these units to be in upper-level courses.

   Graduates without sufficient specialization may be admitted with the requirement that they complete extra prerequisite courses with a grade of at least B+.

   Candidates will not be allowed to take a graduate course in a language or area in which the Department feels they do not have sufficient background. For graduate courses in Latin or Greek, the minimum requirement is 24 units of the language.

   In exceptional cases, students who have less than two years of undergraduate coursework in the ancient languages may be accepted into the program, providing they are well qualified and have an undergraduate record of superior academic achievement; they will, however, have to do extra language courses beyond the required minimum while in the M.A. program.

Program Requirements

The general requirements for the M.A. degree appear earlier in the Calendar. With the approval of the Department of Classics, candidates may take the degree either with or without thesis. A grade of at least
B- is required in all courses.

Requirements for the M.A. degree with thesis are:

1. Eight half courses (one-term courses) offered by the Department, of which no more than two may be at the undergraduate level, and of which at least four must be graduate or undergraduate Latin or Greek. Six courses are completed in the first year of study and two additional language courses are taken in year two. A grade of at least B- is required in all courses.

   Students who are admitted without the minimum entrance requirements in the ancient languages must take nine half courses to make up the deficiencies in their language preparation.

2. A comprehension test in French or German or Italian; exemption from this test may be granted to candidates who have completed an equivalent test at this or other universities.

3. A satisfactory thesis of approximately 80 pages on an approved topic.

4. An oral examination to defend the thesis.

Requirements for the M.A. degree without thesis are:

1. Six half courses offered by the Department, of which no more than two may be at the undergraduate level, and of which at least two must be graduate or undergraduate Latin or Greek.

   Students who are admitted without the minimum entrance requirements in the ancient languages must take seven half courses to make up the deficiencies in their languagepreparation.

2. A project consisting of a major research paper to be written during the summer, under the supervision of a faculty member;

3. A comprehension test in French or German or Italian; exemption from this test may be granted to candidates who have completed an equivalent test at this or other universities.

Ph.D. Degree in Classics

<u>Admission</u>

Applicants for the Ph.D. Program in Classics may be admitted if they are graduates with either a grade of at least A- in at least two half courses or distinction in an approved thesis of an M.A. Program in Classics or Classical Studies (with sufficient Greek and Latin), taken at this University or of equivalent programs taken at other universities.

Graduates of other programs may be admitted in exceptional cases. Applicants without sufficient preparation may be admitted with the requirement that they complete extra prerequisite courses.

<u>Program Requirements</u>

The general requirements for the Ph.D. degree appear earlier in the Calendar. A grade of at least B- is required in all courses and in Special Areas examinations.

Requirements for the Ph.D. degree are:

1. Four appropriate graduate half courses. These are the minimum requirements; candidates may be requested by their supervisor to take additional courses;

2. One comprehensive examination in each of Greek and Latin translation;

3. A language examination to demonstrate reading knowledge of two of the following languages: German, French, Italian; exemption from these tests may be granted to candidates who have completed equivalent tests at this or other universities;

4. Two comprehensive examinations, covering special areas of Greek and Latin literature or Ancient History or Classical Art and Archaeology; these are to be assigned by the supervisory committee in preparation for the thesis;

5. A thesis proposal approved by the Department with an oral defense;

6. Any other requirement established by the Department on admission;

7. A satisfactory thesis on an approved topic;

8. An oral examination to defend the thesis.

Courses

A limited number of the following courses will be offered in any year. All courses are half courses and are marked with an asterisk (*). Candidates should inform themselves of the availability of courses in advance.

LITERATURE

***721 /** Greek Epic Poetry
***722 /** Greek Tragedy
***723 /** Greek Comedy
***724 /** Hellenistic Poetry
***728 /** Greek Historical Writers
***732 /** Reading in a Selected Greek Author
***733 /** Greek Lyric Poetry
***747 /** Topics in Classical Literature
***751 /** Roman Satire
***752 /** Roman Comedy
***754 /** Vergil
***755 /** Horace
***756 /** Cicero
***757 /** Roman Historical Writers
***760 /** Catullus
***761 /** Roman Elegy
***763 /** Reading in a Selected Latin Author

ART AND ARCHAEOLOGY

***725 /** Topics in the Art and Archaeology of Antiquity
***726 /** Topics in the Iconography of Greek and Roman Art
***735 /** Topics in Greek Art and Archaeology
***736 /** Topography of Athens
***737 /** Topics in Hellenistic Art and Archaeology
***738 /** Greek Colonization
***767 /** Roman Campania
***770 /** Topics in Roman Art and Archaeology
***771 /** Augustus and Rome
***772 /** Greek and Roman Mosaics
***774 /** Greek and Roman Domestic Architecture
***780 /** Independent Study in Classical Archaeology

ANCIENT HISTORY

***714 /** Origins of the Polis
***715 /** Speech, Performance, and Power in the Athenian Democracy
****734 /*** *Latin Epigraphy (cross-listed as History *734)*
****739 /*** *Topics in Late Roman Republican and Early Imperial History (cross-listed as History *739)*
***741 /** Greek Inscriptions as a Reflection of Social Life
***742 /** Tacitus and Tiberius
***743 /** Roman Slavery
***744 /** Death and Commemoration in the Roman World
****759 /*** *Ancient Historiography (cross-listed as History *735)*
***764 /** Topics in Greek History
***766 /** Studies in the Social and Cultural Life of Antiquity

Additional courses in classical studies may be available in the Departments of History, Philosophy, and Religious Studies. These may be taken for credit with the approval of the Department of Classics and the instructor.

COGNITIVE SCIENCE OF LANGUAGE

Based in the Department of Linguistics and Languages, the graduate program (M.Sc.; Ph.D.) in the Cognitive Science of Language is interdisciplinary and includes faculty from Humanities, Science, and Health Sciences. The program has a strong research orientation and has expertise in the areas of Linguistics, Cognitive Science, Sociolinguistics, Neurolinguistics, Forensic Linguistics, Applied Linguistics, Computational Linguistics, and Psycholinguistics. The breadth of faculty research areas provides a rich environment for graduate training. The graduate program introduces students to the issues in those fields that form the nexus of cognitive science, linguistics, and languages and trains them in the research methods employed to study them. Our graduate programs provide flexibility so that students can optimize their studies around their own areas of interest.

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Faculty / Fall 2012

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Karin Humphreys (Psychology, Neuroscience and Behaviour)
Michael Kliffer (French)

Graham Knight (Communication Studies and Multimedia)
Victor Satzewich (Sociology)
Michael Schutz (School of the Arts)
David Shore (Psychology, Neuroscience and Behaviour)
Peter Szatmari (Psychology, Neuroscience and Behaviour)
Laurel Trainor (Psychology, Neuroscience and Behaviour)

ADJUNCT MEMBER
VeenaDwivedi (Applied Linguistics, Brock University)

Fields of Study in the Graduate Program

The M.Sc./Ph.D. program in the Cognitive Science of Language comprises the following fields:

Computational Linguistics and Cognition
This field will focus on computational modeling of human linguistic competence and performance, as well as cognitive modeling of multi-modal human-computer interaction (i.e., textual, visual and auditory). It will also focus on the cognitive measurement of information visualization.

Cognitive Sociolinguistics
This field examines cognitive aspects of language varieties and use in diverse social contexts. Using methods from varied theoretical frameworks, it investigates pragmatic and sociocultural phenomena, including bilingual education/upbringing of children, second language learning, first and second language attrition, contact languages, pidgins and creoles. In addition, cognitive aspects of the use of language for persuasion advertising, propaganda and politics are also studied.

Psycholinguistics, Neurolinguistics and Clinical Linguistics
This field looks at how language is represented and processed, from both a functional and neurobiological perspective. It includes three broad areas: how language is comprehended, produced and acquired. This encompasses the study of these aspects of language in all age groups, from infants to older adults, in both first and second languages. It also looks at cases of both normal and impaired language, the latter including developmental disorders and those acquired through strokes or other brain injuries. This field includes research into language therapies.

M. Sc. Degree

Applicants will be eligible for admission if they hold a four-year Honours undergraduate degree in one of the following disciplines, and fulfill McMaster's School of Graduate Studies general requirements (http://www.mcmaster.ca/graduate): Linguistics; Psychology, Neuroscience; Speech Sciences; Health Sciences; Communication Studies; Multimedia; Computer Science; and

Engineering. Some applicants may require additional courses in core areas (e.g., linguistics or psychology) in order to be eligible for admission. Each application will be evaluated on an individual basis.

Coursework (2.5 courses plus additional requirements below)

Note: * denotes half courses; # denotes quarter course modules

Required courses: COGSCIL *750 (or equivalent course)
COGSCIL *721 and *722
One of COGSCIL *730 or *731

plus the equivalent of one additional half course (within the Department of Linguistics and Languages or in another related department).

Additional requirements (these are ***Pass/Fail*** courses):
COGSCIL #741
COGSCIL #725

plus the M.Sc. Thesis.

The M.Sc. Thesis is a work of original research (empirical or theoretical) under the supervision of a participating faculty member and evaluated by a thesis committee established by the department. The thesis must be submitted by August of the second year of the M.Sc. program.

Ph.D. Degree

The M.Sc. in the Cognitive Science of Language or an equivalent Master's degree is required for entrance into the Ph.D. program. Some applicants may require additional courses in core areas (e.g., linguistics or cognitive science) in order to be eligible for admission. Each application will be evaluated on an individual basis.

A. For students holding an M.Sc. in the Cognitive Science of Language

Note: * denotes half courses; # denotes quarter course modules

Students entering with the M.Sc. in the Cognitive Science of Language are required to complete the equivalent of two full courses. If the following courses were not included in the M.Sc. program, they must be included in the Ph.D. program of study: COGSCIL *730, *731, *750.

Additional requirements (these are ***Pass/Fail*** courses):
COGSCIL #742
COGSCIL #726

B. For students entering with a Master's degree but not anM.Sc. in the Cognitive Science of Language

Coursework (four courses total plus additional requirements below)

Required courses: COGSCIL *750 (or equivalent course)
COGSCIL *721 and *722
COGSCIL *730 and *731

plus additional courses to total four courses.

Additional requirements (these are ***Pass/Fail*** courses):
COGSCIL #726
COGSCIL #742

Ph.D. Comprehensive Examination

The Ph.D. comprehensive examination must be completed within two years of entering the Ph.D. program and is articulated in three phases:

Phase 1: The student will develop a reading list in collaboration with the supervisor and the Comprehensive Committee (appropriate for each student), by the Spring of the first year of Ph.D. study. The Reading List, established by the Comprehensive Committee, will cover at least two (2) subject areas determined by this committee.

Phase 2: In the Spring of the second year of the Ph.D. program, students will be required to take a comprehensive exam. The examination is on two distinct areas and requires the student to complete one assignment in each area, i.e., the student may write two papers (of publishable quality), take two take-home exams, prepare two original experiment reports, or some combination of these. The Comprehensive Committee will determine the appropriate format of the written exam for each student. If the student fails the exam, there will be one opportunity to re-write the exam within one month of the original.

Phase 3: Oral Exam: Within one week of having completed and passed the written exam, the student will be examined orally by the Comprehensive Committee. The Oral Exam will take the form of a discussion of the material submitted for the Written Exam. If the student fails the exam, there will be one opportunity to re-take it.

According to Departmental Policy, all Comprehensives are to be completed within the month of May.

Language Requirement

In order to ensure language diversity and breadth, the Department has a second-language requirement for the Ph.D. degree, in addition to the general Graduate School requirement of English proficiency. Candidates should have, as a minimum, intermediate knowledge of a language other than English, defined as having passed the equivalent of two (2) full year courses. Candidates admitted without this requirement will be expected to pass the equivalent of two (2) full year courses or to pass a Qualifying Exam. The Department will evaluate each student's language preparation at the Admission stage.

Courses

***6B03 / Second Language Acquisition**
This course examines theoretical perspectives and empirical evidence on second and foreign language learning.

***6CS3 / Clinical Sociolinguistics**
This course examines clinical applications—e.g., language assessment and diagnosis—of key sociolinguistic research in bilingualism, language planning, code-switching.

***6D03 / Computers and Linguistic Analysis**
This course studies the linguistic applications of computer technology in general, and language processing in particular, including parsers and machine translation.

***6EL3 / Experimental Laboratory in Cognitive Science ofLanguage**
Students will collaborate to plan, carry out, analyse and report an experiment addressing a cognitive aspect of language processing or acquisition.

***6LB3 / Advanced Phonetics and Phonology**
This course examines advanced issues in phonetics and phonology, seeking to evaluate current theory and to address data that fall beyond the explanatory capacities of those paradigms. The course is data oriented, with material taken from several languages.

***6LC3 / Advanced Morphology and Syntax**
This course examines advanced issues in morphology and syntax, seeking to evaluate current theory and to address data that fall beyond the explanatory capacities of those paradigms. The course is data oriented, with material taken from several languages.

***6ML3 / Mathematics for Linguists**
This course will introduce the advanced student to aspects of linguistics that lend themselves to mathematical analysis. The goal is to prepare the student either for further pursuit of mathematical techniques useful in linguistics or for applied work in computer modeling of language and linguistics problems.

***6M03 / Pidgins and Creoles**
A survey of the structure (grammar and vocabulary), genesis, evolution and social history of the languages that developed as a result of European expansion to Africa, the Americas, Asia and the Pacific. Emphasis will be placed on the Atlantic (Caribbean and West African) creoles.

***6P03 / Advanced Pragmatics / M. Kliffer**
This course is a continuation of LINGUIST 3P03 and will provide an opportunity for in-depth study of major areas of pragmatics.Seminar (two hours); one term
Prerequisite(s): LINGUIST 3P03 or equivalent or permission of instructor

***6R03 / Cross-Cultural Communication**
Students will explore the links between language and culture and learn skills necessary to be intermediaries between cultures. Topics include: communication between genders, the cognitive role of metaphor, language and perception, emotions across cultures, culture and advertising, body language and cultural stereotyping.

***6S03 / Interpersonal Communication**
This course offers an introduction to contemporary interpersonal communication theories and research. Topics include: small group communication, persuasive communication, argumentation strategies, conflict resolution and computer mediated, intercultural, international and political communication.

***6XX3 / Topics in Linguistic Theory**
issues in different aspects of Linguistic Theory and Advanced Philology. Consult the Department for the topic to be offered.

#712 / Reading Course (Linguistics) / Staff
Directed reading course or intensive research module on advanced level topics in Linguistics. The course may be repeated once on a different topic or module or a combination of reading course and module.

#713 / Reading Course (Cognitive Science) / Staff
Directed reading course or intensive research module on advanced level topics in Cognitive Science. The course may be repeated once on a different topic or module or a combination of reading course and module.

***721 / Fundamentals of the Cognitive Neuroscience of Language**
The course will examine a range of linguistic topics from the cognitive and cognitive neuroscience perspectives. Linguistic topics will include but not be limited to: phonetics, phonology, morphology, syntax, and semantics. The course will emphasize cognitive processing mechanisms for typical language as well as a range of developmental and acquired disorders of language processing. No single text will be used but rather selected readings that will include current research articles and book chapters.

***722 / Contemporary Issues in the Cognitive Neuroscience of Language**
The course is a continuation of COGSCIL *721 and will examine current issues and controversies in the cognitive science and cognitive neuroscience of language areas. Linguistic topics will include but not be limited to: phonetics, phonology, morphology, syntax, and semantics. The course will emphasize cognitive processing mechanisms for typical language as well as a range of developmental and acquired disorders of language processing. No single text will be used but rather selected readings that will include current research articles and book chapters.

***723 / Bilingual Language Processing / C. Anderson, E. Service**
The course studies the psycholinguistic research on the processes and mental representations involved in language processing in bilinguals. The central question is the extent to which a bilingual's two languages influence each other at the levels of phonological, lexical, syntactic and semantic processing.

***724 / Human Sentence Processing / C. Anderson**
The course studies current theories of how the human mind parses and interprets sentences in real-time, contrasting symbolic computation models with non-symbolic connectionist accounts. Readings are drawn from the primary literature investigating linguistic and psychological factors that play a role in real-time comprehension.

#725 / The Cognitive Science of Language Master's Lecture Series
The course is comprised of a series of one-hour lectures by established researchers in areas encompassed by the Cognitive Science of Language program. Talks will occur biweekly (i.e., fortnightly) and will be followed by a discussion period.

#726 / The Cognitive Science of Language Ph.D. Lecture Series
The course is comprised of a series of one-hour lectures by established researchers in areas encompassed by the Cognitive Science of Language program. Doctoral students will be expected to make at least one presentation in the series. Talks will occur biweekly and will be followed by a discussion period.

***727 / Visual Language Processing / V. Kuperman**
This course will provide a critical overview of current theories and models of visual recognition of words and continuous texts, as well asintroduce students to the experimental technique of eye-tracking. The extensive discussion of visual, cognitive and linguistic processesimplicated in reading will be complemented by the hands-on experience of planning and conducting eye-tracking experiments andanalyzing eye-movement data.

***730 / Language Analysis Methods: Phonology and Morphology**
This course is a foundational course whose aims is to ensure that students are familiar with current approaches and issues in the areas of phonology and morphology. Students will work through complex cross-linguistic data from a variety of approaches in order to evaluate the effectiveness of particular theoretical models in handling phonological, morphological and

morphophonological phenomena. Particular attention will be paid to phonological phenomena that are sensitive to morphological (morpheme) structure.

***731 / Language Analysis Methods: Syntax and Semantics**

This course is a fundamental course whose aim is to ensure that students are familiar with current approaches and issues in the areas of syntax and semantics. Students will work through complex cross-linguistic data from a variety of approaches in order to evaluate the effectiveness of particular theoretical models in handling syntactic phenomena and in how meaning is derived at the word, sentence or discourse level.

***732 / Contemporary Issues in Semantics and Pragmatics**

The course elaborates on the foundations of formal semantics and pragmatics introduced in COGSCIL *731. It introduces intentional semantics and investigates the relation between formal semantics and formal pragmatics.

***733 / Intonational Phonology / T-J Yoon**

Intonational phonology is the study of the suprasegmental features of an utterance (e.g., F0, duration, and amplitude) that contribute to its meaning. This course aims to ensure students are familiar with current approaches and issues in the areas of intonational phonology. Topics will include, among others, the analysis, representation and processing of intonational structure within the autosegmental/metrical model of intonational phonology.

***734 / Contemporary Issues in Syntax**

The course extends the basics of syntactic theory introduced in LING 3I03 and COGSCIL *731. The course uses detailed investigation of topics in syntactic theory to familiarize students with tools and methods used in current syntactic frameworks, such as Minimalist Program.

***735 / Contemporary Issues in Linguistic Theory / I. Kucerova, A. Moro**

The course offers a detailed investigation of current topics in linguistic theory. The class will concentrate on current research issues related to Spell-out interfaces (syntax-semantics, syntax-morphology, phonology-morphology, syntax-phonology). Students will critically evaluate current open research question related to inter-modular interactions. Offered topics will include Analogy in the grammar (phonology, morphology, syntax), Markedness in the grammar (morphology, syntax, semantics), and Information structure (syntax, semantics, phonology).

***736 / Cognitive Aspects of Thought Manipulation / M. Stroinska**

The course offers an in-depth review of linguistic and psychological mechanisms of argumentation and persuasion and thought manipulation used in politics, science and advertising. A historical and sociological perspective helps to appreciate the role of context, in a very broad sense, in the formation and maintenance of beliefs.

***737 / The Evolution of Language and Cognition / J. Colarusso**
This course will examine the theories of the phylogenetic origin of language and its accompanying cognition, covering the recent works of Bickerton, Jackendoff, Pinker, Hauser, Chomsky, Fitch, Lieberman and Colarusso.

#741 / Research Proposal Development (Master's Thesis)
The course functions as a tutorial/mentor experience with the student developing a research protocol in consultation with the relevant supervisor.

#742 / Research Proposal Development (Ph.D. Thesis)
The course functions as a tutorial/mentor experience with the student developing a detailed protocol, in consultation with his/her supervisor, in preparation for the doctoral thesis.

***749 / Laboratory Methods of Visual Language Research**
The course offers an in-depth hands-on overview of experimental methods used in visual language research, including eye-tracking and chronometric experimentation. Students will be trained on all aspects of planning and conducting a psycholinguistic experiment, from formulating a hypothesis to experiment design and implementation to data collection and analysis. Students will be trained in using the advanced eye-tracking technology.

***750 / Research Design and Methods**
The course will cover general quantitative and qualitative methods in language research, providing skills for independent planning of research projects. Specific topics will vary from one year to another, targeting, for instance, methods of psycholinguistic, neurolinguistic, sociolinguistic and applied linguistic research as well as corpus-based analysis, computational linguistics and phonetics.

Additional courses that can be used to fulfill the M.Sc. and/or Ph.D. program requirements:

Psychology, Neuroscience and Behaviour:
***710 /** Statistics and Research Design
***726 /** Behavioural Neuroscience
***729 /** Physiological Psychology
***730 /** Quantitative Methods
****734 /** Neural Network Models for Cognition and Perception (cross-listed as Computational Science & Engineering *734)*
***#711 /** Advanced Statistics and Computational Methods I(Same as Computational Science and Engineering #711)*
#712 / Advanced Statistics and Computational Methods II
#713 / Special Topics in Psychology, Neuroscience and Behaviour I
#714 / Special Topics in Psychology, Neuroscience and Behaviour II
#715 / Special Topics in Psychology, Neuroscience and Behaviour III
#716 / Special Topics in Psychology, Neuroscience and Behaviour IV

COMMUNICATIONS MANAGEMENT

The Master of Communications Management (MCM) degree program is offered in partnership by the Department of Communication Studies and Multimedia, the DeGroote School of Business and the S.I. Newhouse School of Public Communications, Syracuse University. McMaster University provides complete facilities to students seeking the degree.

Enquiries: 905 525-9140 Ext. 23603
Email: mcm@mcmaster.ca
Fax: 905-570-1167
Website: mcm.mcmaster.ca

Faculty / Fall 2012

McMaster University

PROFESSOR
Milena Head, B.Math. (Waterloo), M.B.A., Ph.D. (McMaster) / DeGroote School of Business

ASSOCIATE PROFESSORS
Nick Bontis, B.A., Ph.D. (Western) / DeGroote School of Business
Alexandre Sévigny, B.A. (York), M.A., Ph.D. (Toronto) / Program Director / Communication Studies and Multimedia

ASSISTANT PROFESSORS
Terence (Terry) Flynn, APR, FCPRS, B.A. (Carleton), M.S., Ph.D. (Syracuse) / Communication Studies and Multimedia
Laurence Mussio, B.A. (Western), M.A. (McMaster), Ph.D. (York) / Communication Studies and Multimedia
Philip Savage, B.A. (Carleton), M.A. (Simon Fraser), Ph.D. York / Communication Studies and Multimedia
Peter Vilks, B.Sc.E.E. (SUNY-Buffalo), MBA (McMaster) / DeGroote School of Business

CANADIAN PROFESSIONAL FACULTY
Ira Basen, B.A. (Carleton), M.A. (Wisconsin-Madison) / Canadian Broadcasting Corporation
Dan Henry, B.Comm., LL.B. (Toronto) / Canadian Broadcasting Corporation (Ret.)
Andrew Laing, B.A. (Queen’s), M.B.A. (Royal Roads), Ph.D. (York) / Cormex Research
David Scholz, B.A., M.A. (Manitoba) / Leger Marketing
Alfred Seaman, B.B.A. (UNB), C.A. (CMANB), Ph.D. (Queen’s) / Humber College of Applied Arts and Technology

Syracuse University

PROFESSORS

Patricia H. Longstaff, B.A., M.A. (Iowa), M.P.A. (Harvard), J.D. (Iowa) / S.I. Newhouse School of Public Communications
Maria P. Russell, B.A. (College of Saint Rose), M.A. (Syracuse) / S.I. Newhouse School of Public Communications

AMERICAN PROFESSIONAL FACULTY

Neil Katz, B.A., M.A. (St. Louis), Ph.D. (Maryland)
F. William Smullen III, B.A. (Maine), M.A. (Syracuse)
Michael Meath, B.S. (SUNY-Buffalo), M.S. (Syracuse)

Program

This is Canada's first Master of Communications Management degree program, combining the best of advanced public relations management and business administration courses, designed specifically for the busy, working public relations professional. The program is designed to enable experienced mid-career, public relations executives and professionals to acquire critical management and advanced public relations abilities.

Recognizing the specialized needs, interest areas and professional time limitations of today's public relations practitioners, this program combines an intense and challenging educational experience with flexibility and an opportunity for students to set their own pace for acquiring this valuable degree.

This program is designed so that students may complete their master's degree in two years. To do so, students attend three on-site residencies per year (mid-October, mid-February, and mid-June) and register for six credits (two courses) each term. During the week-long residencies, faculty members present an overview of their entire course and guidelines for specialized study. Upon return to their own community, students complete readings and assignments at their own pace, meeting pre-determined deadlines with ongoing access to professors via a dedicated web-based student portal.

Admission Requirements

A maximum of 25 students will be admitted each year to this program. The admission decisions will be based on the following considerations:

- An Honours Bachelor's degree or equivalent professional degree from an accredited university with at least a B+ average and three years of full time professional experience in public relations or a related field, excluding time spent in internships.

- Three letters of recommendation, including one from the current employer. (If the applicant is an independent consultant or counselor, this letter can be from a current client or business partner).

- A personal essay (typed; maximum 500 words) explaining interest and suitability for the program as well as potential for completing the program.

- A portfolio of samples of best work, particularly those which illustrate strategic management ability (e.g. public relations plans; marketing plans; crisis plans).

- A personal interview with the Academic Director or Admissions Committee, either in person or via teleconference. The purpose of this interview is to ensure that the applicant is fully aware of all aspects of the program and the commitment needed for successful completion.
- Prospective applicants who do not meet the normal admission requirements should consult the Program Director to discuss how their work experience might be assessed to make up for insufficient standing in their undergraduate degree. Please refer to Section 2.1.3 of the Graduate Calendar on this matter.

Program Requirements

In order to graduate a student is required to complete 36 credits covering these four elements:

Public Relations Core (4 required courses; 12 credits)

Organizational Public Relations
Public Relations Research
Communications Law and Ethics for Public Relations
Strategic Public Relations Management

Management Core (4 required courses; 12 credits)

Financial Reporting and Management Accounting
Financial Management
Marketing Management
Strategic Management

Electives (two courses; 6 credits, or three courses; 9 credits)
(During the second term, students will vote for a total of three electives, which will be offered in the third term subject to the availability of instructors; taught by faculty from either Syracuse or McMaster faculty).

Branding for Public Relations Professionals
Communications Frontiers
Communication Theory

Communication and Conflict Resolution Skills
Negotiation: Theory and Practice
Conflict Resolution in Groups: Facilitation and Conflict Management
Interpersonal Conflict Resolutions Skills
Mediation: Theory and Practice
New Technologies in Communications

Cumulative Experience(6-credit thesis or 3-unit Professional Capstone Project)
Students in this program can choose either a thesis-based option or a professional capstone project option. Students choosing to complete a thesis will only require two electives while students choosing to complete a professional capstone project will require three electives to complete their degree.

Courses

Public Relations Core

***711 / Organizational Public Relations**
The course focuses on how excellent public relations are carried out in organizations. Management theories applied to public relations, public relations roles and models, strategic management processes, theories of organizational effectiveness, and such organizational characteristics as participation and authority, culture, diversity, globalization, and change. The framework of excellence permits an examination of the history, research, social effects, and ethics of public relations.

***712 / Public Relations Research**
Nature, formation, and communications of attitudes and public opinion in public relations settings.Application of methods for measuring attitudes, opinions, and public relations performances.Sampling, interviewing and data analysis techniques.

***713 / Communications Law and Ethics for Public Relations**
A basic understanding of communications law as it relates to public relations. Students will gain knowledge in major areas of communications law; application of specific areas of communications law to public relations practice; management of legal risks faced in public relations; the role of public relations in a client’s litigation strategy; and dealing with lawyers.

***714 / Strategic Public Relations Management**
Relates management function of policy formation to the communication process of disseminating ideas and information to the organization’s public.Applies management science techniques to communication planning and information dissemination.

Management Core

***721 / Strategic Management**

An integrative course that pulls together, through the concepts of "strategy", fundamentals learned in previous management courses. Business "fundamentals" are used to study full organizational issues. A basic premise is that functional area decisions cannot and should not be made in isolation. Such decisions need to be consistent in ways that provide an organization with a sustainable competitive advantage in the marketplace and enable the most effective and efficient achievement of the firm's short and long term goals. Case studies are used to assist students to learn how to analyze the competitive structure of industries, how to assess and choose the "best" strategies for organizations, and how to ensure that the various functional area decisions follow from and help facilitate, rather than obstruct, the realization of chosen strategies.

***722 / Financial Reporting and Management Accounting**

Accounting information is fundamental to business decisions. Managers are familiar with accounting systems and their potential for providing them with critical data and information about their organizations. Given this perspective, this course provides sufficient understanding of the accounting process and how to recognize the potential of accounting information to become a more effective manager. What accountants do and why they do it, not how they do it, is the focus.

***723 / Financial Management**

An introduction for the non-finance manager to the issues faced by the finance managers of large businesses. No prior knowledge of business finance is expected from the students. However, understanding of the basic accounting principles (balance sheet and income statements) is a prerequisite. The course begins by examining a corporation's responsibility to its various stakeholders – stockholders, employees, customers, and society. This leads to a well-defined objective of financial management. Various decisions and responsibilities of the financial manager consistent with the objective above are studied. These may be divided into two components: capital acquisition and its deployment. Key aspects of the financial environment and some methods of determining the financial health of a corporation are also studied.

***724 / Marketing Management**

The fundamentals of marketing and the management decision-making skills related to the design of marketing strategy. By the end of the course, students can: (1) understand the role that marketing plays in an organization; (2) analyze how the environment affects marketing strategy; (3) analyze how consumers make a purchase decision; and (4) design a marketing strategy for a product or service.

Electives

***730 / Leadership, Persuasion and the Successful Executive**
Leadership, Persuasion and the Successful Executive offers an intensive examination of the leadership-communication connection. In other words, how do successful executives engage employees, teams and organizations to effect change and influence behavior in an often-contested and challenging environment through effective communications? This course focuses on how executives successfully exert their leadership in the broader external environment.

***731 / Reputation and Brand Management for Public RelationsProfessionals**
The word "brand" is everywhere. Each year 3,000 new brands enter a marketplace already cluttered with sagging older brands and filled with fickle consumers. Strong brands make companies profitable, yet remaining a top brand is tough. It's not just about selling a product but about creating a lifestyle or personality that truly engages people's emotions. In so doing, products and services become brands that forge strong connections and relationships with customers. Effective brand building involves the communications efforts of the entire organization. With this in mind, this course focuses on branding principles culled from a variety of new theories on the subject and case studies and interactive exercises to point out successful communications techniques in brand building.

***732 / Communications Frontiers**
Preparation for developing business, regulatory, and technical trends that will be part of the students' careers as communications managers. These trends include globalization and industry consolidation. Specific trends in broadcasting, print, satellite, cable, and the internet are examined. The class looks for evidence of some of these trends as they are experienced in public relations through an original research project.

***733 / Communication Theory**
An introduction to the process of interpersonal, group, and mass communication. Perception, attitude, opinion, and other principles of psychology, social psychology, and other social sciences related to the communication process are explored.

***734 / Communication and Conflict Resolution Skills**
Successful public relations managers need highly refined communication and conflict resolution skills in today's stressful and competitive business environment. This elective course helps students learn about practice, and further develop some key fundamental behaviours designed to establish powerful rapport with business personnel and clients, and to manage conflict creatively and constructively when it occurs. Core skills include reflective listening, matching and pacing, managing agreement (assertion), problem solving, and negotiation. Approaches to learning include theory presentation, skill demonstration, skill practice, and critique.

***735 / Negotiation: Theory and Practice**

Introduction to negotiation theory and the skills associated with successful practice. Explore tensions between distributive and integrative negotiation principles of interest-based negotiation. Importance of preparation, sources of power, role of culture, and ways to overcome dirty tricks and other barriers to successful negotiation. Interactive learning approach, using lecture, discussion, exercises, and simulations to build personal capacities for successful negotiating. Exercises include two-person to more complex multi-party negotiations, in both domestic and international cases.

***736 / Conflict Resolution in Groups: Facilitation and Conflict Management**

This workshop focuses on the role and competencies of the facilitator in effectively managing group process, group dynamics, and differences among group members. Among the subjects explored are contracting around role and outcomes, design of agenda and process, states of group development, observing and giving feedback about group dynamics, and managing conflict. Format provides opportunities for intensive practice, coaching by instructors and reflective work in a Personal Learning Plan.

***737 / Interpersonal Conflict Resolutions Skills**

Enhanced communication rapport building skills to interact more effectively and solve problems creatively. A foundational course that emphasizes reflective listening, problem solving, assertion and managing conflicts among needs and values. Includes theory, demonstrations, skill practice, and critique.Designed to have immediate and wide applicability in interpersonal and group settings.

***738 / Mediation: Theory and Practice**

Mediation theory and skills to facilitate the resolution of disputes and differences.Techniques of third-party intervention with individuals and groups. Learning approach includes lectures, simulations, demonstrations, and practice mediations in a variety of areas, including community, workplace, family and commercial settings. Participants receive the 25-hour skills training required of them as mediators.

***739 / New Technologies in Communications**

New communications technologies are emerging on the Web like blogs (web blogs) and podcasts. This course will deal with uses of these technologies, issues around social presence, privacy, and openness in communication. Students will learn to use these technologies and will run projects applying them to communication problems.

***740 / Professional Project**

The Professional Project course is seen as an independent research project that results in a communication product or program (“deliverable”). The Professional Project embodies original and/or secondary research and solves a specific problem or challenge for an organization or industry or the greater public relations/communications management profession.

741 / Crisis Communications

Crises are a fact of organizational life. From the small, not-for-profit organization to the global, multi-national corporation, crises can suddenly disrupt an organization's ability to efficiently and effectively achieve its mission. Organizational crises rapidly consume unbudgeted financial and human resources and diminish an organization's reputation and goodwill. The economic, social, and political fallout from organizational crises have been significant and warrant a renewed focus on research and scholarship.

COMMUNICATION AND NEW MEDIA

The Department of Communication Studies and Multimedia offers a program leading to an M.A. degree in Communication and New Media.

Enquiries: 905 525-9140 Ext. 27575
Fax: 905 570-1167
E-mail: gradcnm@mcmaster.ca
Website: http://csmm.mcmaster.ca/grad/contacts.html

In addition to the faculty listed below, students in the M.A. program may select a supervisor from outside the department where appropriate.

Faculty / Fall 2012

PROFESSOR
Robert S. Hamilton, M.F.A. (SAIC), M.F.A. (Jan van Eyck Acadamie)

ASSOCIATE PROFESSORS
Christina Baade, B. Mus. (Northwestern), M. Mus., Ph.D. (Wisconsin-Madison)
Andrew Mactavish, B.A. (Mount Saint Vincent), M.A. (Dalhousie),Ph.D. (Alberta)
Liss Platt, B.F.A. (Connecticut), M.F.A. (California-San Diego)
AlexandreSévigny, B.A. (York), M.A., Ph.D. (Toronto)

ASSISTANT PROFESSORS
Sara Bannerman, B. Mus. (Queen's), M.A., Ph.D. (Carleton)
Terence Flynn, B.A. (Carleton), M.S., Ph.D. (Syracuse)
FaizaHirji, B.A. (Simon Fraser), M.A., Ph.D. (Carleton)
Laurence B. Mussio, B.A. (Western), M.A. (McMaster), Ph.D. (York)
David Ogborn, B.Sc. and B.A. combined (Mary), B.A. (Manitoba),B. Mus., Mus. Doc. (Toronto)
Christine Quail, B.A., M.A. (Pennsylvania), Ph.D. (Oregon)
Philip Savage, B.A. (Carleton), M.A. (Simon Fraser), Ph.D. (York)
David Harris Smith, M.F.A. (York), Ph.D. (York)

PROFESSOR EMERITUS
Graham Knight, B.A. (Kent), M.A., Ph.D. (Carleton)

M. A Degree

Admission to the program will be on a full-time basis only, starting in September of the academic year.

Admission to the M.A. degree program will normally require an Honours Bachelor's degree (four-year degree) in a Communication Studies and/or Multimedia program, or its equivalent with a minimum grade point average of B+ (equivalent to a McMaster 8.5 GPA out of 12) in the last 10 one-term courses relevant to studies in communication and digital media.

Students holding Honours Bachelor's degrees (four-year degrees) from other disciplines in the humanities, the fine arts and the social sciences may also be considered, if they can demonstrate sufficient training in Communication Studies and Multimedia to undertake studies at the graduate level.

Degree Requirements

The M.A. in Communication and New Media will typically be completed within twelve months. Students will complete six 3-unit courses and year-long pro seminar, in addition to a major research project (either a 40-page research paper/project or a digital media project supported by a shorter paper).

Course Requirements

Course requirements consist of required core courses in methodologies relevant to communication studies and new media (CSMM *700, CSMM *712 and CSMM *799; see Course List) and four elective courses from the Course List. Students must achieve a grade of at least a B- in all courses they take for credit in order to qualify for the degree.

Major Research Project

In addition to the course requirements, students will complete a major research project under the supervision of a core faculty member. The major research project will be evaluated on a Pass/Fail basis by the project supervisor and second reader.

There are two options for the major research project:

1. A paper (approximately 40 pages) based on original research.

   The paper will provide an opportunity to apply methodological skills acquired in the research methods courses (CSMM *700 and CSMM *712) to theoretical and substantive issues taken up in other courses.

2. A digital media project (e.g., a work of art, performance, or installation; methodological tool; a software application; an educational application,or a digital game) together with a shorter paper (approximately 15-20 pages) explaining the conception and development of the project.

The digital media project may reflect expertise and knowledge acquired during course work.

Program Timetable

Students will normally take three courses in Term I and three courses in Term II, in addition to the pro seminar, which runs through terms I and II. Preparation for the major research project will normally begin in Term II. Between May and July, students are expected to meet regularly with their faculty supervisor and make steady progress on their research and writing. A first complete draft of the project is due to the supervisor no later than 1 July, a final draft is due to the second reader by 1 August, and the approved version of the project must be submitted to the department no later than 31 August.

Courses

Required Courses

All students are required to take CSMM *700, CSMM *712, and CSMM 799. CSMM *700 and CSMM *712 are half-year courses, both of which are offered in Term I. CSMM 799 is a full-year course.

***700 / Communication Research Methods**
This course provides an overview of research methodology relevant to the study of human communication. Topics include formulation of a research problem and research questions, appropriate methods of data gathering (questionnaires, focus groups, interviewing, enthnography, digitalized document collection), and data analysis (quantitative and qualitative approaches).

***712 / New Media Methods**
This course provides a broad overview of the methods and processes of making new media works in a collaborative studio setting. Students will develop or expand competency in a medium of their choice, realizing a project through the following research-creation stages: conceptualization, planning, analysis of source materials, composition, revision, enhancement, presentation/exhibition, and documentation archiving.

799 / Pro-Seminar
This graduate pro-seminar provides a broad examination of theories and practices in the areas of Communication Studies and New Media. There will be no assignments but attendance is mandatory and a Pass/Fail grade will be assigned based on attendance.

Elective Courses

All students are required to take four elective courses from the list below. Offerings will vary from year to year depending on student and faculty interest. All courses listed below run for one term.

***701 / Media, Gender and Performance**
This course examines how gendered identities are performed and/or constructed in complex social, historical, and cultural processes and conditions. Particular attention is paid to the impact of the media and mediation upon gender performance. Topics may include fashion, popular music, and queer genders.

***702 / Media and Social Issues**
An analysis of relationships between mass media and modern society. Topics may include ideology and agenda-setting in the news, representations of social problems (e.g., homelessness, violence), moral panics, media scandals, media and violence, media and racism, media and religion, media and social activism, etc.

***703 / New Media Studio Topics**
This studio course pairs emerging and established production modalities with media culture criticism. Students will engage in project-based learning outcomes and develop analytic frameworks to guide and evaluate their production activities.

***704 / Media, Discourse and Reality**
This course will investigate different forms of communication using the methods of discourse analysis. Cognitive and social theories ofdiscourse will be examined from the perspectives of social theory, the philosophy of mind and hermeneutics. Questions ofperspectivalism, reality, truth, rhetoric, power and persuasion will be explored. As well, the epistemological and ontologicalunderpinnings of research design will be discussed, with specific application in a major case study assignment.

***705 / Digital Media and Cultural Exchange**
This course investigates the social and cultural impacts of participation in the production and exchange of culture supported by digitalcommunication technologies. It will consider a broad range of digital media within the context of participatory and regulatory practices. Topics may include: user-generated content, fan culture, theories of interactivity, open access, digital rights management, digital copyright, and conflicts over thelegitimacy of participation in cultural exchange.

***706 / Technologies of Communication**
This course will examine technological dimensions of communication practices from various perspectives (e.g., actor-network theory, media ecology, science studies, material cultural studies, and policy formation). Topics may include: the debate over technological determinism;

feminist critiques of technology; bio-technology as a communicative medium; technology and democracy; and media technologies in historical and cross-cultural perspective.

***707 / Theoretical Issues in Media, Culture and Communication**
This course examines selected theories and theoretical issues in communication (e.g., the history of communication as object and field of study, critical approaches to the study of communication, and socio-cultural approaches to the study of communication). The main focus will be to advance understanding of theoretical and normative frameworks of media and communication. Specific topics may vary from year to year.

***708 / Selected Topics in Communication and New Media**
This course consists of an examination of different aspects of communication and new media as determined by the course instructor.

***709 / Independent Study**
Students will undertake an in-depth examination of a particular topic of their choice under the supervision of a faculty member. This course may be taken no more than once. Departmental permission required.

***710 / International Communication**
This graduate course in international communication and diaspora is intended to provide greater understanding oftransnational/international communication concepts and debates, such as globalization, imperialism, dependency and modernizationtheory, diaspora, hybridity, and cosmopolitanism. Each concept will be examined and debated in some depth, in the context ofcontemporary examples.

***711 / Sound as Art and Research**
This course explores sound both practically and theoretically, with an emphasis on creative work in various forms of audio production.Studio, field recording and interactive techniques are comprehensively introduced, refined and then examined from the point of view ofdiverse methodologies, including phenomenology, spectromorphology, psychoacoustics and action research.

****731 / Crisis Management and Communication (cross-listed as Business *P731)***
This course provides students with conceptual tools to successfully manage complex organizational crisis scenarios. Topics include managing issues and media, dealing with special interest groups, addressing social media risks and facilitating legislative and regulatory communications. Class time will be comprised primarily of lectures, discussions, case studies, guest speakers and in-class simulations. Evaluation components include class participation, written case analysis, publishing of a reflective crisis blog and final exam.

COMPUTATIONAL SCIENCE AND ENGINEERING

The School of Computational Science and Engineering (hereafter the School) is an equal partnership between the Faculties of Science and Engineering, with outreach to the School of Business and the Faculty of Health Sciences. The School of Computational Science and Engineering will produce highly qualified graduates who can develop and apply computational methodology to all areas of engineering and science. Graduates of the School will be employed by engineering design, information technology, financial, biotechnical industries, government and academic institutions. Educational programs will be at the Master's (M. Eng. and M.Sc. with coursework and project, as well as M.A.Sc. and M.Sc. with thesis), and Ph.D. level. These will be of an interdisciplinary nature including core courses at the Master's level and module-based topic courses at all levels.

Enquiries: 905 525-9140, Ext 26635
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Website: http://computational.mcmaster.ca/

Faculty / Fall 2012

DISTINGUISHED UNIVERSITY PROFESSOR
Simon S. Hakin, B.Sc., Ph.D., D.Sc. (Birmingham), F.I.E.E.E., F.R.S.C. / Electrical and Computer Engineering

PROFESSORS
Alex B. Bain, B.Sc. (Toronto), M.Sc. (British Columbia), Ph.D. (Cambridge) / Chemistry
Suzanna Becker, B.A., M.Sc. (Queen's), Ph.D. (Toronto) / Psychology, Neuroscience &Behaviour
Patrick J. Bennett, B.Sc. (Tufts), Ph.D. (California, Berkeley) / Psychology, Neuroscience & Behaviour / Canada Research Chair in Vision Science
Ben Bolker, B.S. (Yale), Ph.D. (Cambridge) / Mathematics and Statistics
David W. Capson, B.Sc. Eng. (New Brunswick), M. Eng., Ph.D. (McMaster), P. Eng. / Electrical & Computer Engineering
Samir E. Chidiac, B.Eng., M.Eng., Ph.D. (McMaster), P.Eng. / Civil Engineering
Walter Craig, Ph.D. (Courant, N.Y.U.) / Mathematics & Statistics / Senior Canada Research Chair in Mathematical Analysis and its Application
Hugh Couchman, B.A., M.A., Ph.D. (Cambridge) / Physics & Astronomy / Scientific Director SHARCNET
Timothy Davidson, B.Eng. (Western Australia), D.Phil. (Oxford), P.Eng/ Electrical & Computer Engineering / Canada ResearchChair in Communication Systems
Antoine Deza, M.Eng. (Ecole Nationale des Pontset Chaussées, Paris), Ph.D. (Tokyo Institute of Technology), P.Eng / Computing & Software / Canada Research Chair
David Earn, B.Sc., M.Sc. (Toronto), Ph.D. (Cambridge) /Mathematics & Statistics
Franya Franek, M.Sc., RNDr (Charles, Prague), Ph.D. (Toronto) / Computing & Software

G. Brian Golding, B.Sc. (Dalhousie), Ph.D. (Alberta) / Biology / Canada Research Chair in Bioinformatics
Paul Higgs, B.A., Ph.D. (Cambridge) / Physics & Astronomy / Canada Research Chair in Biophysics
Thomas R. Hurd, B.Sc. (Queen's). D.Phil. (Oxford) / Mathematics &Statistics
Pavlos S. Kanaroglou,B.Sc. (Athens), M.A., M.Sc., Ph.D.(McMaster) / School ofGeography and Earth Sciences / CanadaResearch Chair in Spatial Analysis
Nicholas Kevlahan, B.Sc. (British Columbia), Ph.D. (Cambridge) / Mathematics & Statistics
Thia Kirubarajan, B.A., M.A. (Cambridge, UK) M.S., Ph.D.(Connecticut, USA) / Electrical & Computer Engineering / CanadaResearch Chair in Information Fusion
Marilyn F. Lightstone, B.A.Sc. (Queen's), M.A.Sc., Ph.D. (Waterloo), P.Eng. / Mechanical Engineering
John C. Luxat, B.Sc. (Eng.) (Cape Town), M.Sc. (Cape Town), Ph.D.(Windsor), P. Eng. / Engineering Physics / NSERC/UNENEIndustrial Research Chair in Nuclear Safety Analysis
Vladimir Mahalec, Dipl. Ing. (Zagreb), Ph.D. (Houston), P. Eng./ Chemical Engineering
Kathryn M. Murphy, Ph.D. (McMaster) / Psychology, Neuroscience & Behaviour
Natalia Nikolova, Dipl. Eng. (TU - Varna, Bulgaria), Ph.D. (University of Electro Communications, Tokyo), P.Eng. / Electrical & ComputerEngineering / Canada Research Chair in High-frequency Electromagnetics
Dmitry Pelinovsky, M.S. (Nizhny Novogorod State, Russia), Ph.D. (Monash University, Australia) / Mathematics & Statistics
Sanzheng Qiao, B.S., M.S. (Shanghai Teacher's College) M.S.,Ph.D. (Cornell) / Computing & Software
Allison B. Sekuler, B.A. (Pomona College), Ph.D.(Psychology, UC Berkley) / Psychology, Neuroscience & Behaviour / Canada Research Chair in Cognitive Neuroscience
An-Chang Shi, B.Sc. (Fudan), M.Sc., Ph.D. (Illinois) / Physics andAstronomy
Eric Sorensen, B.Sc., M.Sc., (Arhus), Ph.D. (California, Santa Cruz)/ Physics and Astronomy
George Steiner, M. Sc. (Budapest), Ph.D. (Waterloo) / DeGroote School of Business
Dieter F.E. Stolle, B.Eng., M.Eng., Ph.D. (McMaster), P. Eng., / Civil Engineering
Chris Swartz, B.Sc. (Eng) (Cape Town Ph.D). Wisconsin MAIChE /Chemical Engineering
Ioannis K. Tsanis, Dipl. Eng. (Thessaloniki), M.A.Sc., Ph.D. (Toronto),P. Eng. / Civil Engineering
Xialon Wu, B.Sc. (Wuhan University, China) Ph.D. (University ofCalgary, Canada) / Electrical & Computer Engineering
Boris Zhorov., M.S c., Ph.D., D.Sc. (St. Petersburg, Russia) /Biochemistry & Biomedical Sciences

ASSOCIATE PROFESSORS

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Mohamed Bakr, B.Sc., P.Eng. M.Sc. (Cairo University, Egypt), Ph.D.(McMaster) / Electrical & Computer Engineering
Ian Bruce, B. Eng., M. Eng., Ph.D. (McMaster), P. Eng. / Electrical and Computer Engineering
Jonathan Dushoff, B.A. (Pennsylvania), Ph.D. (Princeton) / Biology

Randall S. Dumont, B.Sc. (University of Western Ontario), Ph.D. (University of Toronto) / Chemistry
Troy Farncombe, B.Sc. (Calgary), M.Sc., Ph.D. (British Columbia) / Radiology
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Aleksandar Jeremic, Dipl.Ing. (Belgrade), M.S., Ph.D. (Illinois at Chicago) / Electrical & Computer Engineering
George Karakostas, Dipl. Eng. (Patras), M.S.A., Ph.D. (Princeton) / Computing & Software
Ned Nedialkov, B.Sc. (Sophia University, Bulgaria), M.Sc., Ph.D. (Toronto) / Computing & Software
Michael Noseworthy, B.Sc., M.Sc., Ph.D. (Guelph), P.Eng / Electrical and Computer Engineering
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Shahram Shirani, B.S. (Isfahan), M.Sc. (Amirkabir), Ph.D. (BritishColumbia, P.Eng / Electrical and Computer Engineering
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Allan Spence, B.Math. M.A.Sc. (Waterloo), Ph.D. (British Columbia),P.Eng/ Mechanical Engineering
Jonathan Stone B.Sc., M.Sc., Ph.D. / Biology / SHARCNET Chair/ Origins Institute Director
Stephen Tullis, B.Sc., M.Sc., (Queen's), Ph.D. (Cambridge), P.Eng. / Mechanical Engineering
James Wadsley, B.Sc. (Monash), Ph.D. (Toronto) / Physics andAstronomy / SHARCNET Research Chair

ASSISTANT PROFESSOR

Kai Huang, B.Sc. (Huazhong University of Science & Technology), M.Sc. (Tsinghua), Ph.D. (Georgia Institute of Technology) / DeGroote School of Business, Operations Management

ADJUNCT MEMBERS

Jan Modersitzki, Dipl. Math., Dr. rer.Nat. (Hamburg), Habil. (Luebeck)
Douglas Moseley, B. Math (Waterloo), M.Sc., Ph.D. (Western)
Michael Sharpe, B.Sc., Ph.D. (Western)
Tamás Terlaky, Ph.D. (Loránd Eötvös, Budapest)

PROFESSOR EMERITUS

J.W. Bandler, B.Sc.(Eng.), Ph.D., D.Sc.(Eng.) (London), D.I.C.(Imperial College), F.I.E.E.E., F.I.E.E., F.E.I.C., F.R.S.C., C.Eng., P.Eng. / Electrical & Computer Engineering

Master's Degrees

The Master's programs emphasize industry relevant academic research and development. The degree (M.Sc.) may be earned either with a thesis option, a course-and-project option, or a coursework-only option. A strong bachelor's degree with an average of at least B+ (equivalent to a McMaster GPA of 8.5) in physical sciences, mathematics or engineering that included a substantial computational component is generally required to enter the Master's programs with thesis option. For the Master's programs with the course-and-project or coursework-only option an average of at least a B is required.

Master's Degrees with Thesis

A candidate for a Master's degree with thesis is required to successfully complete a minimum of four half courses and successfully defend a thesis. Two of the four half courses have to be chosen from the three core courses offered by the School. The remaining two half courses are normally chosen from the list of the courses approved by the School. One of the courses may be at the 600-level where appropriate. Additional courses beyond the minimum four may be required by the Director, in consultation with the supervisor. The thesis topic is to be chosen in consultation with the supervisor. The School arranges a series of seminars; candidates are required to attend and participate, and may be required to present their research results as part of this series. Normally, the thesis-based program is completed within 20 months of full time study. It is expected that many students will choose this route towards a Ph.D. degree.

Master's Degrees with Project

A candidate for a Master's degree with project is required to successfully complete a minimum of six half courses plus a research project. The project is to be decided jointly by the candidate and the supervisor, and approved by the Director. Of the six half courses, three must be chosen from the core courses, whereas the remaining three course may be chosen from those listed by the School, in consultation with the project supervisor. Up to two of the half courses may be at the 600-level. The School arranges a series of seminars; candidates are required to attend and participate, and may be required to present their research results as part of this series. Normally, this option will require 16 months residence. This option is not a preferred qualification for entrance to a Ph.D. program.

Master's Degrees by Coursework

A candidate for a Master's degree by coursework is required to successfully complete a minimum of eight half courses. Of these, four must be the core courses, whereas the remaining courses may be chosen from any of those listed by the School, in consultation with the Director. Up to two of the half courses may be at the 600-level. The School arranges a series of seminars; candidates are required to attend and participate. Normally, this option will require 12-16 months residency. This option is not a preferred qualification for entrance to a Ph.D. program.

Ph.D. Degree

The general regulations for the Degree Doctor of Philosophy appear earlier in the Calendar. Students with a Master's degree equivalent to the Master's degree with thesis option at the School of Computational Science and Engineering are required to take two 700 level half courses. Students who previously earned a Master's degree at a relevant program are required to take a total of four courses, of which at least three must be at the 700 level. Students entering into the Ph.D. program directly from a bachelor's degree, or transferring into the Ph.D. program without completing the Master's degree are required to take a total of six courses, of which at least four must be at the 700 level. During their course of study, doctoral candidates will have to pass a Comprehensive Examination of the School of Computational Science and Engineering. The purpose of this examination is to ensure that the candidate possesses sufficient knowledge and maturity in computational science. The Comprehensive Examination will be in two parts.

Part I will be an oral examination which is designed to test the student's breadth of knowledge, her/his understanding of computational sciences and computational engineering, and to test the student's ability in critical thinking, and her/his ability to synthesize and integrate ideas from within and peripheral to the candidate's research area.

The examination committee will meet to determine the topic related to, but peripheral to the candidate's intended research topic. The choice of topic may be made in consultation with the Director.

Once the candidate receives the topic, he/she will have four weeks to review the state of art on the specified areas, write a maximum 20 page report surveying these areas and identify between 1 and 3 interesting open problems without the aid of any other individual. An official letter is sent to the candidate outlining the proposal topic, examination procedures and guidelines. The oral examination will take place two weeks after submission of the report. The examination will include an oral presentation, not more than 20 minutes in length. This is followed by a question period from the examination committee. The total examination will normally be 2 hours in length, but no more than 3 hours. At the end of Part I an interim form should be returned to the School. This form can be obtained from the Administrator.

Part II will take the form of a written research proposal and an oral examination designed to examine the student's understanding of, and approach to, her/his proposed dissertation research topic. Formulation of the dissertation topic shall be done in consultation with the Supervisor. Both parts of the examination may be repeated once.

The examination committee consists of the student's supervisory committee plus one additional member whose area is relevant to the examination topic. Suggestions for the additional member will be provided by the supervisory committee and approved by the Director. During its initial meeting the examination committee will also determine its Chair.

After completion of both part of the exam, the Comprehensive Examination Results form is to be completed by the Chair and submitted together with the student's report to the Director for approval in accordance with regulations of the School of Graduate Studies. This form can be found at http://graduate.mcmaster.ca/current-students/forms/department-forms. The completed form and report are then submitted to the Administrator who will forward both to Graduate Studies and update the candidate's departmental file.

Courses

Courses marked with an asterisk (*) are half courses. Courses marked with a pound (#) sign are quarter courses (modules).

***600 / Mathematical Foundations for Computing**
An introduction to the mathematical tools of scientific computing. This course is required for students whose mathematical background is not adequate to proceed with the core courses. Topics will include: Algebra: bases, vector spaces, sets of linear equations, matrices, linear transformations; Calculus: limits, derivatives, integration, vector calculus; Differential equations: separable equations, integrating factors, first order linear equations; Series: Taylor series, Fourier series and transforms, Laplace transforms; Probability and Statistics: discrete random variables, continuous random variables, and probability density functions.

<u>Core Courses</u>:

***700 / Foundations of Scientific Computing / N. Nedialkov**
An introduction to scientific computing, modeling, and numerical methods covering such topics as Taylor series and truncation errors, numerical differentiation and integration, constrained optimization, and solving sets of: linear equations; linear algebraic equations; ordinary differential equations; and partial differential equations.

***701 / Foundations of Modern Scientific Programming / Staff**
An introduction to modern scientific programming providing a background to such topics as binary systems, Unix and Windows based operating systems, parallel and distributed computing, and popular programming languages.

****702 / Advanced Computational Methods and Models/ N. Nedialkov(cross-listed as Computing and Software *755)***
Advanced topics in scientific computing, including iterative sparse methods and direct sparse methods for linear systems, QR-type algorithms for computing Eigen values, perturbation analysis, methods for large-scale ODE systems, choice of preconditioners, Newton-Krylov methods for solving nonlinear systems, introduction to multigrid methods, automatic differentiation, and sensitivity analysis.

Parallel Programming Modules

#704 / Parallel Programming / Staff
General ideas and principle of parallel programming.Investigates fundamental concepts of data vs. work division, domain decomposition, scaling, efficiency, communication to computation cost ratios. Introduction to parallel programming techniques including, shared memory and distributed systems (message passing). First approaches to parallelizing a new or existing application will be discussed.

#706 / Shared Memory Approaches to Parallel Applications / Staff
Shared memory is an approach to parallel programming that relies on expensive hardware to make program data available to all processors. This makes parallel programming easier and has lead to OpenMP as a standard compiler extension to enable semi-automated parallelism. The module will examine OpenMP in depth and also the lower level threads approach on which it is based. Examples applications in C and Fortran will be parallelized using OpenMP.

#713 / The Message Passing Interface for Parallel Applications / Staff
Message passing is required to share program data between processors on distributed memory parallel computing platforms. The Message Passing Interface is the standard behind MPI message passing libraries available on parallel computing platforms. The rationale and overall structure of MPI will be discussed, including implementation, bottlenecks, variations between platforms and common mistakes. Example applications in C and FORTRAN will be parallelized with MPI.

#727 / Parallel and High Performance Computing Systems / Staff
Hardware: cache, memory subsystems, network architectures and design, latency vs. bandwidth. Classifications: SISD, SIMD, MIMD. History: Moore's Law, Top 500, Vector, RISC, Beowulf clusters. Parallel languages (HPC, UPC, Titanium, OpenMP, CHARM++) and messaging libraries (PVM, MPI, MPI2, vendor lib's). Design of software frameworks for parallel computing; evolution of programming strategies in relation to hardware; grid computing. Elements of parallel software development.

Computational Techniques Modules

#703 / Computational Linear Algebra / Staff
In addition to solution techniques for large linear systems, this module will also review the computational techniques of eigenvalue and singular value problems, various decompositions (LU, Cholesky), and linear least squares problems. Sparse matrix techniques and various parallelization strategies will be considered.

#707 / Visualization and 3D Rendering / Staff
This course will provide an introduction to the use of graphics to visualize research data (grids, meshes, particles) in two and three dimensions. It will cover algorithms (surface drawing, transparency), real time visualization, post processing (including large data sets) and generating

animations and movies. It will introduce OpenGL as a low-level mechanism to access hardware graphic acceleration as well as other popular toolkits such as vtk and provide experience with visualization tools built on these foundations.

#708 / Symbolic Computing and Automatic Differentiation / Staff
This module presents an overview of techniques for symbolic computation applied to solving linear equations, analytic and automatic differentiation and integration of functions, and analytic solution of differential equations. Hybrid, symbolic-numeric methods will be considered as well.

#709 / Optimization of Numerically Intensive Codes / Staff
This module will teach participants how to optimize numerically intensive code. Optimizing codes require knowledge of how modern compilers operate, how CPUs and memory subsystems work. This module will demonstrate how to write a code that allows the compiler to make best use of specific architectures and how to make use of vendor-optimized code libraries for linear algebra, transforms and other common operations. The module will also examine using profilers and debuggers for optimization of serial and parallel applications.

#712 / Introduction to Particle Methods / Staff
The uses of particles for numerical simulations of physical systems. Particles can correspond to real objects (molecules, stars) or represent parcels of fluid or material. When solving Hamiltonian systems, particles can be considered to be a Monte Carlo type realization of characteristics making up the phase space. Numerical methods for these systems will be examined, including smoothed particles, symplectic time integrators, discreteness effects and parallelization strategies. Applications include hydrodynamics, gravitational and molecular dynamics, and protein folding and computational materials.

#717 / Foundations of Computational Finite Element Methods/ Staff
This module provides an introduction to the general theory of the finite element method; formulation of finite elements; construction and optimization of meshes for finite elements and the treatment of boundaries. Issues for programming finite element codes including parallelization are in the focus as well.

#739 / Introduction to Iterative Methods in ComputationalScience / Staff
This module reviews the theoretical foundations and various implementation issues concerning the use of iterative methods. The focus will be on solution techniques for sparse linear systems, such as arising in numerical solution of PDEs, systems of nonlinear equations and numerical solution of integral equations.

<u>Computational Physical Sciences Courses and Modules</u>

***6E04 /** *Computational Modeling of Microstructure Formation (cross-listed as Materials Science and Engineering *6E04)*
***6G03 /** *Computational Physics (cross-listed as Physics & Astronomy *6G03)*

***6PB3 /** *Computational Models for Electronic Structure and Chemical Bonding (cross-listed as Chemistry *6PB3)*
***6Q03 /** *Numerical Methods for Differential Equations (cross-listed as Mathematics *6Q03)*
#718 / Combustion Theory and Modeling / S. Tullis
#719 / Numerical Solution of Scalar Transport / M. Lightstone
#721 / *Compressible Computational Fluid Dynamics (cross-listed as Physics & Astronomy #719) / J. Wadsley*
***724 /** *Solid and Surface Modeling Techniques (cross-listed as Mechanical Engineering *724)*
***749 /** *Mathematical and Computational Fluid Dynamics (cross-listed as Mathematics *749)*
***752 /** *Optimization of Chemical Processes (cross-listed as Chemical Engineering *752)*
***753 /** *Modern Antennas in Wireless Telecommunications (cross-listed as Electrical and Computer Engineering *753)*
***756 /** *Computational Fluid Dynamics (cross-listed as Mechanical Engineering *756)*
#770 / *Molecular Electronic Structure Theory (cross-listed as Chemistry #770)*
#773 / *Numerical Methods and Computational Chemistry (cross-listed as Chemistry #703)*
***783 /** *Finite Element Method (cross-listed as Civil Engineering *703)*

Computational Optimization Design and Control Courses and Modules

***6B03 /** *Calculus on Manifolds / M. Min-Oo(cross-listed as Mathematics *6B03)*
***6TI3 /** *Fundamentals of Image Processing / J. Modersitzki(cross-listed as Computing and Software *6TI3)*
***710 /** *Engineering Optimization (cross-listed as Electrical and Computer Engineering *710)*
#722 / Algorithms for Constrained Optimization / T. Terlaky
#723 / Algorithms for Unconstrained Optimization / T. Terlaky
#725 / Surrogate Modeling and Space Mapping / J. Bandler
#726 / Sensitivities, Tolerances and Yield-Driven Design / J. Bandler
#728 / Numerical Time Domain Electromagnetic Technique / M. Bakr
#729 / Finite Element Techniques for Electromagnetics / M. Bakr
***731 /** *Linear Systems (cross-listed as Electrical and Computer Engineering *707)*
#732 / A Basic Introduction to Data Mining / J. Peng
#733 / Advanced Topics in Knowledge Discovery / J. Peng
#736 / Computational Geometry in the Plane / A. Deza
#737 / Computational Geometry in Dimension 3 and Higher / A. Deza
***740 /** *Numerical Methods for Ordinary Differential Equations and Differential-Algebraic Equations / N. Nedialkov (cross-listed as Computing and Software *740)*
***741 /** *Development of Scientific Computing Software / S. Smith(cross-listed as Computing and Software *741)*
***742 /** *Special Topics in Communication Systems and Networks(cross-listed as ECE *738)*
***744 /** *Algorithms for Combinatorial Optimization*
***750 /** *Model-Based Image Reconstruction / C. Anand(cross-listed as Computing and Software *750)*

****751 /*** *Advanced Mechanical Engineering Control Systems / G. Bone (cross-listed as Mechanical Engineering *751)*
****768 /*** *Special Topics in Signal Processing (cross-listed as Electrical and Computer Engineering *768)*
****775 /*** *Cognitive Dynamics Systems / S. Haykin (cross-listed as Electrical and Computer Engineering *775)*
****776 /*** *Optimization I (cross-listed as Business *Q773)*
****782 /*** *Data Structures and Algorithms (cross-listed as Computing and Software *702)*
****791 /*** *Algorithms for Parameter and State Estimation / T. Kirubarajan (cross-listed as Electrical and Computer Engineering *771)*

Computational Biosciences

****6Y03 /*** *Genomes and Evolution / P. Higgs (cross-listed as Biochemistry *6Y03)*
#711 / *Advanced Statistics and Computational Methods I (cross-listed as Psychology #711)*
****720 /*** *Bioinformatics (cross-listed as Biology *720)*
****734 /*** *Neural Network Models of Cognition and Perception (cross-listed as Psychology *734)*
****738 /*** *Computational Biochemistry / B. Zhorov (cross-listed as Biochemistry *730)*
****757 /*** *Special Topics in Biophysics / P. Higgs (cross-listed as Physics and Astronomy *756)*
****796 /*** *Models of the Neuron (cross-listed as Biomedical Engineering *796) Electrical and Computer Engineering *796)*

Other Courses

***799 /** Special Topics in Computational Engineering and Science

Facilities and Research

The members of the School have active research programs in a variety of aspects and applications of computational engineering and science. The list of available research topics includes industrially strategic areas such as process control, algorithm design, financial mathematics, materials properties and manufacturing, simulation of polymer processing, casting, semiconductor design, photonics, structural analysis and nanotechnology, bioinformatics and brain modeling and neurosciences. McMaster University also offers a unique environment in Canada, boasting some of the world's leading computational resources, and an organizational culture that facilitates multidisciplinary endeavours. The departments of Computing and Software, and Material Science and Engineering, are affiliated with both the Faculties of Engineering and Science. Also, active cooperation channels exist via the Brockhouse Institute for Materials Research and the McMaster Nuclear Reactor with high quality researchers involved from both faculties. McMaster University is also a major partner in the recently formed Shared Hierarchical Academic Research Computing Network (SHARCnet), currently among the leading high-performance computing centers in the world. A significant fraction of funding for this research at McMaster University comes from industrial support. To the potential graduates, research in any of the Computational and Engineering Science research fields will provide not only in-depth training in topics that require advanced computational skills but will also expose students to cutting edge, industrially relevant multidisciplinary training. This combination will provide access to the industrial job market of the future.

COMPUTING AND SOFTWARE

The Department of Computing and Software offers programs leading to Master's and Ph.D. degrees in both Computer Science and Software Engineering; and Master's degrees in Mechatronics, and Software Engineering and Virtual Systems Design.

Enquiries: 905 525-9140 Ext. 27863
E-mail: gradcas@mcmaster.ca
Website: http://www.cas.mcmaster.ca/cas/graduate/admissions.html

Faculty / Fall 2012

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Norman P. Archer (Commerce), B.Sc. (Alberta), M.S. (New York),Ph.D. (McMaster)
SaeedHabibi (Mechanical Engineering), B.Sc. (Dundee), Ph.D.(Cambridge), P.Eng.
Graham Jones (Medicine), B.Sc. (Guelph), M.Sc., Ph.D. (McMaster),M.D. (Toronto)
MarkadKamath (Medicine), M.S., Ph.D. (Indian Institute ofTechnology), Ph.D. (McMaster)
Vladimir Mahalec (Chemical Engineering), Dipl. Ing. (U of Zagreb,Croatia), Ph.D. (Houston)

PROFESSORS EMERITI
Patrick J. Ryan, B.Sc. (Toronto), Ph.D. (Brown)
William F. Smyth, B.A. (Toronto), M.Sc. (Ottawa), Ph.D. (Curtin), C.Eng., F.B.C.S., F.I.C.A.

Admission requirements are given under the General Regulations of the Graduate School at the beginning of the Calendar.

Master's Degree in Computer Science

M. Eng. Degree

The program consists of a minimum of three consecutive terms in which the candidate is required to successfully complete six graduate half courses (or equivalent), including at least two of COM SFWR *701, *702, *703, *705, *706, *707, *708, and at least two other 700-level courses, as well as a project. The project should either be a software development project, or a project demonstrating analytical or interpretive skills. The outcome should be documented in a project report.

Students in the B.A.Sc. Computer Science program at McMaster University may apply for an Advanced Credit Option after their third year of study. The Advanced Credit Option is open to graduates who have maintained a minimum average of B in each year of the B.A.Sc. program in Computer Science at McMaster University and have taken two 600-level courses during their fourth undergraduate year for advanced graduate credit.

M.Sc. Degree

Applicants who have an honours degree in another discipline with the required average and whose undergraduate program has included a substantial Computer Science content will be required to take one or more courses simultaneously with their graduate courses to make up any deficiencies.

A M.Sc. degree can be obtained by successful completion of the following requirements:

(a) A minimum of four one-term courses (half courses) with at least a B- standing, chosen in consultation with the candidate's thesis supervisor and the Computer Science Graduate Student Advisor.

(b) A thesis which demonstrates the ability to do original research.
(c) An oral examination to defend the thesis.

It is expected that these requirements will normally be met within 20 months of full-time study. All programs of study are subject to the approval of the Department Chair.

Master's Degrees in Software Engineering

A candidate for a Master's Degree in Software Engineering may proceed by one of two routes: thesis-oriented (M.A.Sc.) or course-oriented (M.Eng.).

M.A.Sc. Degree

Students must successfully complete four graduate courses and successfully defend a thesis. Students may be required to take more courses as judged by the graduate committee. All programs of study are subject to the approval of the Department Chair.

M. Eng. Degree

Each student's background will be assessed and his/her program of study designed to ensure appropriate depth and breadth in Software Engineering.

Students must successfully complete the equivalent of six graduate courses. These include three core courses in Software Engineering, with the remaining courses to be chosen from annual lists published by the department. Students must also produce a major study report containing independent work that demonstrates knowledge of how to do Software Engineering at an advanced level.

M. Eng. Degree in Mechatronics Engineering

The program consists of a minimum of three consecutive terms in which the candidate is required to successfully complete six graduate half courses (or equivalent), which consist of COM SFWR *704, SFRW ENG *6GA3, MECH ENG *6K03 and at least three other 700-level courses from a list approved by the department, as well as a project. The project consists of designing a real Mechatronics System including software, hardware components, specification, documentation and testing reports. The outcome should be documented in a project report.

Students in the Mechatronics Engineering program at McMaster University may apply for an Advanced Credit Option after their third year of study. The Advanced Credit Option is open to graduates who have maintained a minimum average of B in each year of the B. Eng. program in Mechatronics Engineering at McMaster University and were allowed to take two 600-level courses, SFWR ENG *6GA3 and MECH ENG *6K03 during their fourth undergraduate year for advanced graduate credit.

M. Eng. Degree in Software Engineering and Virtual Systems Design

Each student's background will be assessed and his/her program of study designed to ensure appropriate depth and breadth in Software Engineering and Virtual Systems Design.

Students must successfully complete the equivalent of six half graduate courses. These include at least three core courses in Software Engineering with the remaining courses to be chosen from annual lists published by the department, of which at most two are 600-level courses approved by the department. Students must also submit and defend a report on an approved project, which must demonstrate ability to carry out independent study and reach a satisfactory conclusion in an area of Software Engineering and Virtual Systems Design.

Students in the Software Engineering (Game Design) program at McMaster University may apply for an Advanced Credit Option after their third year of undergraduate study. The Advanced Credit Option is open to graduates who have maintained a minimum average of B in each year of the B. Eng. program in Software Engineering (Game Design) at McMaster University and allows them to take two specified 600-level courses during their fourth undergraduate year.

Ph.D. Degree in Computer Science

Outstanding students with a Master's degree in a field other than Computer Science will be counselled about the breadth and depth of the comprehensive examination before proceeding with the application. Each student's background will be assessed and his/her program of study designed to ensure appropriate depth and breadth in Computer Science.

Students holding a Bachelor's degree should enrol at the Master's level. Excellent students may be transferred to the Ph.D. program prior to completing their Master's thesis.

Ph.D. Degree in Software Engineering

Outstanding students with a Master's degree in a field other than Software Engineering will be counselled about the breadth and depth of the comprehensive examination before proceeding with the application. Each student's background will be assessed and his/her program of study designed to ensure appropriate depth and breadth in Software Engineering.

Students holding a Bachelor's degree should enrol at the Master's level. Excellent students may be transferred to the Ph.D. program prior to completing their Master's thesis.

Requirements for the Ph.D. Degrees in Computer Science and Software Engineering

Students must successfully complete the following requirements:

(a) Equivalent of 4 one-term (half course) graduate courses in Computer Science, Software Engineering, or relevant areas of Engineering or Mathematics. At most two courses can be from outside the department, all must be at the 700-level. More than two courses outside the department requires approval of the department. Students may be required to take more courses as judged by the supervisory committee.
(b) Pass a two-part Comprehensive Examination. Part I tests breadth of knowledge and Part II is a defense of a thesis proposal.
(c) Prepare and successfully defend a thesis.

Courses

All graduate courses offered by the Department are one-term courses (half courses) and are marked with an asterisk (*). Not all courses are given each year. The 600-level courses are offered in conjunction with senior undergraduate students, but are also available for graduate credit; graduate students will be required to do additional work as detailed in the course outline which may take the form of a seminar, written report on further studies of the topic, a more extensive project, extra assignments or term projects. Students should contact the Department or the course instructor concerning the appropriateness of their background for any course in which they are interested.

<u>**Computing and Software Courses**</u>

6DB3 / Databases / Staff (cross-listed as eHealth *6M03)
Physical organization of data, file structures, need for database management systems, entity-relationship design, the relational data model, concurrent access, mechanisms for data recovery. Assorted applications. Antirequisite: SFWRENG 4M03, COMP SCI 3DB3, SFWRENG 4DB3

***6E03 / Performance Analysis of Computer Systems / Staff**
Use of queuing models and simulation to predict computer system performance and find bottlenecks in a system.Types of models, distributions.Markov models.Modelling storage and network behaviour, lock, critical sections, concurrency.Introduction to analytical system reliability.Antirequisites: COMP SCI 4E03, SFWRENG 4E03

6F03 / Distributed Computer Systems / Staff (cross-listed as eHealth *6CD3)
Distributed systems; real-time, agent-oriented, heterogeneous, multi-computer, multi-processor, coupling schemes: loose, tight; networking, ATM, frame relay, clustering, software protocols; communication strategies, client/server approaches.
Antirequisite: COMP SCI 4CD3, COMP SCI 4F03, SFWRENG 4F03

***6GA3 / Real-Time Systems and Computer Game Applications / Staff**
Hard and soft real-time systems.Safety classification.Fail-safe design, hazard analysis. Discrete event systems. Modes. Requirements and design specifications. Tasks and scheduling. Clock synchronization. Date acquisition. Applications in real-time networking, quality of service and multimedia. Antirequisite: SFWRENG 4GA3

***6GC3 / Sensory Perception, Cognition and Human/Computer Interfaces for Game Design / Staff**
Human sensory perception, learning and cognition.Game aesthetics.Precise control and feedback mechanisms.Use of music and sounds.Critical analysis of existing interfaces. Alternate input devices. Antirequisite: SFWRENG 4GC3

****6HC3 / The Human Computer Interface / Staff (cross-listed as eHealth *6D03)***
A study of the principles of good interface design. Information overload problems and accommodating user mental models. Human input and technology insertion methods.Information and data visualization techniques.Modes and the mode awareness problem. Human factors and health issues, ergonomics. Interface design tools and Performance Support Systems. Antirequisite: SFWRENG 4D03, COMP SCI 4HC3, SFWRENG 4HC3

***6O03 / Operations Research / Staff**
Linear programming, integer programming, decision trees, network flow problems, graph algorithms, route planning, applications to engineering problems.
Antirequisite: COMP SCI 4O03, SFWR ENG 4O03

***6TB3 / Syntax-Based Tools and Compilers / Staff**
Lexical analysis, syntax analysis, type checking; syntax-directed translation, attribute grammars; compiler structure; implications of computer architecture; mapping of programming language concepts; code generation and optimization. Antirequisite: COMP SCI 4TB3

***6TC3 / Recursive Function Theory and Computability / Staff**
Recursive and primitive recursive functions, decidability and undecidability with applications to formal language theory, logic and algebra.Antirequisite: COMP SCI 4TC3

***6TE3 / Continuous Optimization Algorithms / Staff**
Fundamental algorithms and general duality concepts of continuous optimization. Special attention will be paid to the applicability of the algorithms, their information requirements and computational costs. Practical engineering problems will illustrate the power of continuous optimization techniques. Antirequisites: COMP SCI 4TE3, SFWR 4TE3

****6TI3 / Fundamentals of Image Processing / Staff (cross-listed as Computational Science and Engineering *6TI3)***
Discrete-time signals and systems, digital filter design, photons to pixels, linear filtering, edge detection non-linear filtering, multi-scale transforms, motion estimation.
Antirequisite: COMP SCI 4TI3

***6WW3 / Web Systems and Web Computing / Staff (cross-listed as eHealth *6WW3)**
World wide web as networks: protocols, clients/servers and social issues; programming systems: mark ups, scripts, style; platform technologies; WWW services: standard systems, browser-based, security issues, examples. Antirequisite: COMP SCI 4WW3

The following 700-level courses are offered for graduate credit.

***701 / Logic and Discrete Mathematics / Staff**
The course will cover some of the material encountered at the undergraduate courses on logic and discrete mathematics as well as advanced material on topics such as proof systems, sets, relations, and functions, recursion, type theory, and first and higher order logic systems. There will be emphasis on topics related to computer science and software engineering.

***702 / Data Structures and Algorithms / Staff (cross-listed as Computational Science and Engineering *782)**
The course will cover some basic material encountered at the relevant undergraduate courses on data structures and algorithms plus more advanced material on topics such as network flows, linear programming, computational geometry and NP-completeness. There will be emphasis on techniques such as greedy and dynamic programming.

***703 / Software Design / Staff**
Formal specification methods.Requirements specifications.Fail-safe systems.Verification of safety critical applications.Systematic testing.Specification and design of concurrent, multi-process and distributed systems.

***704 / Embedded, Real-Time Software Systems / Staff**
Continuous and discrete event dynamical systems.Stability, controllability and observability.State space control.Scheduling for soft and hard real-time software systems. Design of software real time control systems and codesign issues.

***705 / Computability and Complexity / Staff**
Computability: Finite automata, Turing machines, and recursive functions. The Halting problem and the Church-Turing thesis. Complexity: Classes defined in terms of time, space, and circuits. The reachability method.The P vs. NP problem, Cook's theorem, and NP-completeness.The Time and Space Hierarchy theorems.Randomized and parallel computations.

***706 / Programming Languages / Staff**
Design, definition and implementation of programming languages.Programming language paradigms; syntax, attribute grammars, typing; axiomatic, operational and denotational semantics; correctness proofs; implementation techniques, virtual machines; design and implementation of Domain-Specific Languages.

***707 / Formal Specification Techniques / Staff**
Pre/Postconditions, refinement, state-based approaches, event based approaches, algebraic specifications, Petri nets, temporal logic, properties of programs, and specification, verification, and validation.

***708 / Scientific Computation / Staff**
Floating-point arithmetic, solutions of systems of linear equations by direct and iterative methods, sparse matrix algorithms, solving systems of nonlinear equations, integration, differentiation, eigenvalue problems, methods for initial value problems in ordinary differential equations, and automatic differentiation.

***721 / Combinatorics and Computing / F. Franek**
Topics in applied combinatorics and graph theory of importance to both theoretical computer science and practical computing including combinatorial computing. Main topics: graph theory and algorithms, combinatorial optimization and algorithms, design theory and coding theory. Solving problems in finite combinatorics using computers.

***722 / Computing Patterns in Strings / W.F. Smyth**
This course deals with algorithms for finding "patterns" in strings, patterns of three main kinds: specific, generic, and intrinsic. The importance of approximate patterns and algorithms which identify them is made clear. Applications to DNA sequence analysis and other scientific areas are emphasized.

***723 / Distributed Real-Time Systems / W.F.S. Poehlman**
A study of hard and soft systems: specifications, event processing, data concurrency, distribution completeness, corrections, integrity fallback, fault tolerance and applications; timing analysis: synchronization, deadlock, modeling.

***724 / Concurrency Theory / R. Janicki**
Models based on interleaving and partial order paradigms including the Calculus of Communicating Systems (CCS), Communicating Sequential Processes (CSP), Actors, Petri Nets, Pomsets and COSY. Basic properties of concurrent systems such as deadlock, liveness, safety, fairness, etc.Temporal Logic techniques. The growing role of concurrent systems in many diverse scientific and engineering activities will also be discussed.

***725 / Formal Methods of Real-Time Systems / M. Lawford**
Introduction to formal methods including equivalence verification, model-checking and theorem proving. Emphasis on verification of safety-critical real-time control systems using automated theorem provers and simple programming techniques.

***727 / Design of Numerical Software / S. Qiao**
Principles of finite precision computation, subtleties of floating point arithmetic, design of stable and accurate numerical algorithms, techniques of testing numerical software, portability and performance.

***728 / Computability on Abstract Data Types / J. Zucker**
A study of the extension and generalizations of classical computability theory (or recursion theory) to abstract data types.

***729 / Problem Solving with Knowledge-Based Systems / W.F.S. Poehlman**
A practical study of knowledge-based technology as applied to appropriate problems including knowledge engineering; structure of expert, neural and fuzzy systems; application areas include simulation, fault analysis, rapid prototyping, adaptive scheduling, control and strategic planning.

****730 / Machine Learning and Data Mining / I. Bruha (cross-listed as eHealth *730)***
A broad study of major approaches and methodologies related to machine learning from the viewpoint of artificial intelligence. Symbolic algorithms of learning.Statistical algorithms of learning.Well-known existing learning systems. Data mining and knowledge discovery.

***731 / Symbolic and Logic Programming / I. Bruha**
Methodology of advanced symbolic programming: data structures and non-standard control techniques. Methodology of logic programming: Prolog programming for AI, strategies of the resolution principle, reverse resolution, elements of theory revision.

***732 / Logical Foundations of Computer Science / J. Zucker**
A solid logical and mathematical foundation for reasoning about software and software descriptions is provided. Topics include: introductory concepts in set theory (sets, relations, functions, etc.); various logics (first order, higher order, equational, conditional equational); many-sorted algebras; initial algebra semantics for equational and conditional equational theories.

***733 / Mobile User Interface Design / C. Anand**
An advanced look at User Interface issues associated with mobile devices, e.g. smart phones. This course is for graduate students whohave already taken a course in human-computer interaction and already know how to program non-trivial applications on at least onemobile device. Through literature review, and experimentation, students will learn how the advent of mobile devices is changing ourapproach to human-computer interactions, and will practice a quantitative approach to evaluating the effectiveness of user interfaceconcepts.

***734 / Formalized Mathematics / W.M. Farmer**
Computer-supported, formalized mathematical reasoning for practical applications. Specification and verification in higher-order logic. Interactive theorem proving systems.Techniques for developing axiomatic theories.

***736 / Analysis of Stochastic Networks / D. Down**
Techniques for the analysis of large networks that can be modeled in a statistical manner. Single queues, product form networks and mean value analysis. Fluid and diffusion approximations.Simulation techniques, including variance reduction.Hybrid simulation. Current research directions in Stochastic networks.

***738 / Algebraic Methods in Software Engineering and Computer Science / R. Khedri**

The course covers a variety of software development issues, and illustrates the versatility of algebraic methods when used as conceptual tools in the software development process. The topics include algebraic approaches to software requirements, design, program verification, testing, and security. Several algebraic structures, such as relation algebra, Kleene algebra, and product family algebra, are introduced and discussed within software related issues.

****740 / Numerical Methods for Ordinary Differential Equationsand Differential-Algebraic Equations / N. Nedialkov (cross-listed as Computational Science and Engineering *740)***

Numerical methods for ODEs and DAEs; Runge-Kutta, multistep methods; convergence, accuracy, consistency; error estimation and propagation, stepsize and order control; stability, non-stiff and stiff methods; software for ODEs and DAEs.

****741 / Development of Scientific Computing Software / S. Smith (cross-listed as Computational Science and Engineering *741)***

This course presents the basic principles of software development for reliable scientific and engineering software. Using example applications, a systematic process is given for the development and documentation of requirements, high-level design, module design, implementation, testing and inspection.

***742 / Methods of Symbolic Computation / M.V. Mohrenschildt**

This course gives an introduction to symbolic computation methods and their application to (electrical, computer and mechanical) engineering problems. Topics include: linear and nonlinear equations and their solutions; algebraic equations; term-rewriting and their application to formal software specifications; Groebner-basis and their application to geometric problems; differential equations; visualization of dynamic processes.

***743 / Functional Programming / W. Kahl**

The powerful abstraction capabilities and clean semantics of functional programming languages improve programmer efficiency and facilitate correct program derivation and transformation. This course will present practical aspects of software development in modern functional programming languages and theoretical foundations, like term rewriting systems, lambda-calculi, and type systems.

***744 / Advanced Topics in Design of Algorithms / G. Karakostas**

Advanced design techniques for algorithms, including (but not limited to): approximation algorithms, randomized algorithms, on-line computation and competitive analysis, quantum computing. Each term the course will concentrate mainly on one of these topics for a deeper understanding of the particularities and the defining problems/issues of the field as well as its applications to other fields and to practice. Presentation of up to date results and tackling of open research problems will be the main requirement for the students taking this course.

***745 / Supervisory Control of Discrete-Event Systems / R. Leduc**
This course is an introduction to the control of discrete-event systems (DES), asynchronous systems discrete in space and time (e.g. manufacturing systems, communication systems, etc.). The course will provide a solid foundation for research in this area, focusing on architectural issues such as modular, decentralized, and hierarchical control. The course will also discuss timed DES, as well as current topics of interest.

***746 / Advanced Topics in Combinatorial Optimization/ A. Deza**
This course provides an introduction to useful frameworks for discrete optimization problems. We introduce the basic concepts of polyhedra, lattices and integer cones and illustrate these notions by some examples coming from combinatorial optimization. An algorithm for finding the Hermite normal form of a lattice and the main methods for facet or vertex enumeration are presented.

***748 / Analysis and Synthesis of Sound / M. V. Mohrenschildt**
Sound as signals (Fourier Analysis, basic harmony theory), Sound analysis (filters, FFT), Synthesis (band limited signals), over-sampling, real-time signal processing, user interfaces (real time interaction with algorithms), vocoders, physical modelling (fast DSP algorithms to solve PDE's).

***749 / Advanced Topics in Computational Geometry / A. Deza**
This course provides an introduction to useful frameworks for computational geometry problems in dimension 2, 3 and higher. We introduce the basic concepts of triangulations, Voronoi diagrams, polyhedra, lattices and integer cones, arrangement of hyperplanes and linear programming and illustrate these notions by some examples coming from combinatorial optimization.

****750 / Model-Based Image Reconstruction / C. Anand***
(cross-listed as Computational Science and Engineering *750, eHealth *750)
An overview of three themes in advanced image processing: functional analysis (e.g., Fourier, Wavelet and SVD methods), PDEs (e.g., anisotropic diffusion), optimization of statistical models (e.g. Total Variation regularization). And, a detailed look at specific methods and techniques for applying these methods in new areas: medical imaging, visual process control. Including all phases of application development from mathematical modelling, through complexity analysis.

***752 / Symbolic Analysis / J. Carette**
This course explores the topic of exact, or closed-form, analysis by computer. This requires merging topics from Computer Algebra, classical analysis and constructive mathematics. Topics covered will involve computations of limits, series, integrals of functions, as well as closed-form solution of algebraic and differential equations. Very close attention will be paid to underlying semantics issues.

***753 / Specifying, Implementing and Verifying Timing Behaviours for Hard Real-Time Systems / A. Wassyng**

Hard-real-time systems are those in which timing requirements are just as important as any other requirement. The course will present a number of timing specification models and methods, such as timed automata, as well as new methods that cope with tolerances on the time durations. Techniques for implementing timing behaviours and verification of those behaviours, both mathematical and testing-based, will be included.

***754 / Programming Methodology /E. Sekerinski**

Verification and Refinement Methods for Sequential and Concurrent Programs, Specification Techniques, Reliability, Object-Orientation (Modeling, Design, Patterns, Concurrency), Program Design and Program Documentation, Tools and Compilers.

****755 / Advanced Computational Methods and Models / Staff (cross-listed as Computational Science and Engineering *702)***

Advanced topics in scientific computing, including iterative sparse methods and direct sparse methods for linear systems, QR-type algorithms for computing Eigen Values, perturbation analysis, methods for large-scale ODE systems, choice of preconditioners, Newton-krylov methods for solving nonlinear systems, introduction to multigrid methods, automatic differentiation, and sensitivity analysis.

***756 / Advanced Topics in Formal Methods and SoftwareArchitecture / T. Maibaum**

The course presents advanced techniques for formal specification of requirements, designs and implementations of software based systems, focusing on software architecture as the organising principle for software development. Course content will include some topics amongst: comparative properties of formalisms for specification; meta-properties of specification formalisms, including interpolation properties, modularity and their relationships; component based approaches and the role of category theory in component composition; formalisation of encapsulation, cohesion and coupling; externalisation of interaction definition; formal toolkit for software architecture.

****757 / Modern Software Technology for eHealth / Staff (cross-listed as eHealth *757)***

This course exposes the graduate students in software engineering, computer science, or related programs to the challenges in the field of electronic health (eHealth). The course introduces a collection of modern architectures and technologies that are recommended by standardization organizations to build the infrastructure that meets the emerging demands in the growing network of health care systems. The topics include: standard health care and data and service representations; clinical terminology systems; web services and service oriented architecture; decision support systems; data mining techniques on clinical data; data and knowledge interoperability; security and privacy techniques, and health care application development environments.

***758 / Advanced Compiler Design and Optimization / F. Franek**
Advanced compiler design methodologies with emphasis on control and data flow analyses, code optimization and related issues.

***760 / Logic for Practical Use / W. M. Farmer**
Attributes of a practical logic.Techniques for improving the practicality of traditional logics.Design, implementation, and use of practice-oriented logics.

***761 / Generative Programming / J. Carette**
This course will explore the rationale for, and the various aspects of generative programming. Special attention will be paid to Domain Specific Languages, and typed Meta programming. The relation with product families and model-driven software engineering will be emphasized. Key techniques in generative programming will be studied.

***762 / Cryptography / M. Soltys**
An introduction to cryptography: the course will cover public key cryptography based on the discrete logarithm problem, factoring, ellipitic curves and lattices. Thus, it will examine the Diffie-Hellman and ElGamalpkc, RSA as well as lattice-based cryptographic schemes. Other topics will be key-exchange and authentication, identification, schemes, commitment schemes, electronic elections and digital cash, as well as provably secure encryption.

***780 / Independent Study in Computing and Software**
Normally a self-study course. Prerequisite: Permission of the Chair of the Department.

***781 / Advanced Topics in Computing and Software / Staff**
Topics of interest to Computer Science and/or Software Engineering. See annual departmental listings for current year topic. A student may receive credit for this course more than once if the specific topic differs.

CULTURAL STUDIES AND CRITICAL THEORY

The Department of English and Cultural Studies offers a program in Cultural Studies and Critical Theory leading to an M.A. degree. Completed applications should reach the Department by January 15. Programs begin annually in September.

Enquiries: 905 525-9140 Ext. 24732
Fax: 905 777-8316
E-mail: englgrsc@mcmaster.ca, obriensu@mcmaster.ca
Website: http://www.humanities.mcmaster.ca/~cstudies/MA_CSCT

Faculty / Fall 2012

PROFESSORS
David Clark, B.A., M.A., Ph.D. (Western)
Daniel Coleman, B.Ed., M.A. (Regina), Ph.D. (Alberta)
Susan Fast, B.M. (Western Washington), M.A., Ph.D. (Iowa)
Henry Giroux, B.S. (Maine), M.A. (Appalachian State), Ph.D.(Carnegie-Mellon) / Global Television Network Chair inCommunications
Donald Goellnicht, B.A. (Queen’s), M.A., Ph.D. (McMaster)
Mary O’Connor, B.A. (McGill), M.A., Ph.D. (Toronto)
Peter Walmsley, B.A., M.A. (Toronto), Ph.D. (Cambridge) / Chair of English and Cultural Studies
Lorraine York, B.A., M.A., Ph.D. (McMaster) / Senator WilliamMcMaster Chair in Canadian Literature and Culture

ASSOCIATE PROFESSORS
Sarah Brophy, B.A. (Wilfrid Laurier), M.A., Ph.D. (McMaster)
ChandrimaChakraborty, B.A. (Calcutta), M.A., M. Phil. (Jawaharlal Neru), Ph.D. (York)
Catherine Graham, B.A., M.A., Ph.D. (McGill)
Janice Hladki, B.A. (York), M.A., Ph.D. (Toronto)
Dana Hollander, B.A. (Oberlin College), M.A., Ph.D. (Johns Hopkins)
Grace Kehler, B.A. (Regina), M.A., Ph.D. (Western)
Andrew Mactavish, B.A. (Mount St. Vincent), M.A. (Dalhousie),Ph.D. (Alberta)
Gabriel Moyal, B.A. (McGill), M.A., Ph.D. (Toronto)
Peter Nyers, B.A., M.A. (Victoria), Ph.D. (York)
Susie O’Brien, B.A. (Queen’s), M.A. (Queensland), Ph.D. (Queen’s)
Liss Platt, B.F.A. (Connecticut), M.F.A. (California)
Petra Rethmann, B.A. (Vienna), M.A. (Munich), Ph.D. (McGill)
Susan Searls Giroux, B.A., M.A.T. (Miami), Ph.D. (PennsylvaniaState)

ASSISTANT PROFESSORS
Nadine Attewell, B.A. (Toronto), M.A., Ph.D. (Cornell)
Amber Dean, B.A. (Alberta), M.A. (Simon Fraser), Ph.D. (Alberta)
Rick Monture, B.A., M.A., Ph.D. (McMaster)
Eugenia A. ZuroskiJenkins, B.A. (Columbia), M.A., Ph.D. (Brown)

M.A. Degree

Candidates for the M.A. in Cultural Studies and Critical Theory will complete 2 compulsory core half courses (CSCT *700 and *701) and 4 elective half courses (or their equivalent) over the fall and winter terms, with grades of at least B- in each, write a satisfactory major research project of 10,000 to 12,500 words (40 to 50 pages) over the course of the summer, and successfully present the project at a symposium.

The M.A. degree normally requires one full year to complete. The minimum admission requirement is a four-year undergraduate degree in a relevant discipline (or disciplines), and with an average of B+ in at least six full or twelve half courses beyond the introductory level. In recent years, successful candidates typically have had averages of at least 80% in their upper-level courses in their area(s) of specialization.

Courses

Required Courses for All Graduate Students

All graduate students, including part-time students, must complete the following courses within the first twelve months after their admission to graduate studies at McMaster: SGS #101-Academic Research Integrity and Ethics and the SGS #201-Accessibility for Ontarians with Disabilities Act (AODA). The purpose of SGS #101 is to ensure that the standards and expectations of academic integrity and research ethics are communicated early and are understood by incoming students. The purpose of SGS #201 is to ensure that students gain an understanding of, and learn how to identify and reduce attitudinal, structural, informational, technological, and systemic barriers to persons with disabilities. A graduate student may not obtain a graduate degree at McMaster without having passed these courses. In the eventthat a student fails either course, he/she must retake it at the earliest opportunity. The course descriptions for SGS #101 and SGS #201 may be found in Section 11.

<u>Note</u>: Ten full-year graduate courses or their equivalent are usually taught in a given year. Courses marked with an asterisk (*) are half courses. The course load may include up to two half courses taken outside of the Department, in each case to be approved by the Department. A more detailed description of those courses offered in the upcoming year can be obtained after April on the Department website.

Core Courses

***700 / Issues in Cultural Studies and Critical Theory I: Power/Knowledge/Critique**

This course focuses on the historical provenances, conceptual genealogies, and cultural locations of critique as a critical practice through a careful engagement with a selection of relevant contemporary texts in cultural studies and critical theory, and some of their historical pretexts. The specific content of the class will vary from year to year depending on the instructor involved.

***701 / Issues in Cultural Studies and Critical Theory II: Sitesand Spaces of Critique**

This course invites students to examine critically specific institutional and historical sites in which the practice of critique has been developed and continues to be carried out today. Particular attention may be paid to an interrogation of the university, but other cultural sites and conceptual spaces may also be considered.

Elective Courses

***702 / Film Theorizes Social and Cultural Differences/ J. Hladki**

This course examines how gender, race, sexuality, and disability are theorized through film and other audio-visual technologies. How do films mobilize “difference”; and how, as socially constructed subjects, do we encounter/mediate/negotiate the production of cultural identities in film and other modes of production?

***703 / Cultural Production and Cultural Studies / J. Hladki**

This course will examine the ongoing significance of perspectives in feminist, queer, disability, and critical race studies for practices of cultural production. Forms of cultural production covered will include popular film, artists’ filmmaking, video art, and performance art.

****705 / Music, Gender and Sexuality / S. Fast(cross-listed as Gender Studies and Feminist Research *705)***

This course considers how gender and sexuality are constituted through music. A range of scholarly work that has laid the theoretical groundwork for the fields of feminist music studies, queer studies in music, and music and masculinities will be examined; case studies from across the spectrum of pop, jazz, “world” and classical music will also be taken up, both through readings and through recorded and live performances.

***706 / Fictionality, Historiography, and the Afterlife of theEvent / P. Rethmann**

In this course we will examine the afterlives of vital cultural and political moments and events in 20th century political culture. With a few exceptions, we will focus on the period of the mid-1950s to the mid-1990s in an attempt to access the fictional and historical afterlife of the important moments and events, including social and political utopianism, internationalism, “third-worldism,” Vietnam, and 1968 afterlives (Germany, Italy, France, United States).

707 / Acts of Global Citizenship / P. Nyers(cross-listed as Globalization *703)

This course examines recent debates about a fundamental concept in globalization studies: global citizenship.

709 / Contemporary Women's Collaborative Writing / L. York (cross-listed as English *704)

This course examines collaborative writing by women, particularly the overt co-authorship or co-signature of women's texts. A substantial part of the course will be devoted to theoretical discussions of authorship and collaborative writing, since one of the main aims of the course will be to assess the implications of this mode of writing for existing theories of authorship. Other relevant questions will include: Are women's collaborative texts necessarily subversive, or do they harbour various ideological potentials and power relations? How can difference operate in a textual venture that has traditionally been described in terms of cooperation and mutuality?

711 / Celebrity/Culture / L. York (cross-listed as English *711)

This course engages the pervasive phenomenon of celebrity and poses questions about its operations in the field of culture. It will focus on influential theories of stardom and ideology, power, and cultural value that see celebrity operating variously within culture, and audiences, in turn, acting and signifying upon celebrity. Students will be encouraged to develop a framework for using a specific study of a celebrity or celebrity phenomenon to assess theoretical texts. This course will consider the workings of celebrity in academia.

712 / Childhood in Cultural Theory and Popular Culture / S. Brophy (cross-listed as English *712)

Childhood is a contested site of symbolic, moral, and material investment in contemporary culture. Focusing on three topics—gender and sexuality, delinquency, and consumption—and with reference to a variety of media, we will consider how cultural theory questions the governing myths of childhood and attempts to theorize children as cultural agents.

713 / Cosmopolitanism and Nationalism in the Eighteenth Century / E. Zuroski Jenkins (cross-listed as English *713)

This course considers the role of cosmopolitanism in eighteenth-century British culture, particularly its relationship to the emergent discourses of modern nationalism and imperialism. How do authors of fiction and poetry use cosmopolitan figures to think about travel and exploration, diaspora and colonization, foreignness and exoticism, commerce, the global, the self, and the human?

715 / Modern and Postmodern Slavery / S. Searls Giroux (cross-listed as English *715)

Although most people consider slavery to be a historical aberration confined to the distant past, the practice of enslaving people by violence and by holding them against their will continues to the present. This course offers a critical and historical investigation of the economic and political conditions of slavery, as well as the broader socio-cultural contexts that enable and legitimate its ongoing existence.

716 / Bob Dylan and American Culture: Memory, Consciousness and Meaning / R. Monture(cross-listed as English *716)

Through a critical examination of selected songs, essays, and auto/biography, this course will assess the significance of Bob Dylan's work within popular music and culture.

717 / Global Sex / S. SearlsGiroux (cross-listed as English *717 and Globalization *717)

This course explores the culture of neoliberalism in terms of its specifically gendered dynamics. It will engage three related moments that map the transformation of human relations, moving out from the most intimate of human bonds to the broadly political: (1) the shifting nature of human connectedness—of intimacy, family, community, national unity; (2) the commodification of sexual relations recast as sexual revolution for some, sexual slavery for others; and (3) the emergence of rigidly fundamentalist and patriarchal discourses globally.

719 / Public Intellectuals and Their Work: Intellectual Practices in Culture Studies and Politics / H. Giroux (cross-listed as English *719)

This course will examine the role of a select group of academics who have become known in the dominant media in the United States as engaged public intellectuals. It will focus on the political rationale for their work, the institutional conditions that make such work possible, and how the work functions as a particular form of intellectual practice and mode of cultural politics. The work of a number of public intellectuals will be examined, including that of Cornel West, Arundhati Roy, Pierre Bourdieu, Edward Said, and Michael Dyson.

720 / Looking Within: Films about Filmmaking / J. King (cross-listed as English *720)

This course concentrates on the presentation of actors, the ensemble, writers, producers, the studio system and audience in cinema. Issues such as reflexivity and meta-cinema would be treated, but the focus is on films that deal specifically with the making of and showing of films.

***722 / Activist Bodies in the Public Sphere / C. Graham**

This course will explore theoretical approaches to understanding activist uses of the body to influence public opinion, with a concentration on notions of the public sphere, social body and performance as political action.

***723 / Surveillance and Digital Society / L. Platt**

This course explores the issue of surveillance through both theoretical writings and media art practices.

724 / Reproduction, Citizenship, and the Nation/State / N. Attewell (cross-listed as English *724)

Through readings of anglophone cultural and theoretical texts from a variety of contexts, this course offers a critical study of reproduction and its place in discourses of citizenship and national identity.

725 / Romanticism, War, and Peace / D. Clark (cross-listed as English *725)
This course explores the symptomatic presences of war and the auguries of a just peace in Romantic literature and culture.

727 / The New Constellation of Race: Sovereignty, Citizenship, Social Death / S. Searls Giroux (cross-listed as English *727 and Globalization *727)
This course seeks to map the new trajectories of race theory in a post-civil rights, post-apartheid, post 9/11 world.

729 / Cultural Studies and the Politics of Cultural Pedagogy / H. Giroux (cross-listed as English *729)
This course will examine the intersection of cultural studies and critical education in both the early and later work of a prominent number of cultural studies theorists and educational theorists. The course will examine the primacy of pedagogy in the early work of prominent cultural studies theorists such as Raymond Williams, Stuart Hall, and Paul Willis and how such work not only provided a way to make the political more pedagogical but also gestured towards connecting work in higher education with a broader set of social issues and public commitments.

730 / Indigenous Literature of North America / R. Monture(cross-listed as English *730)
An examination of indigenous literature in North America over the past two centuries, with particular emphasis on cultural traditions, literary representation, and writing as resistance.

731 / Anxiety Disorders: The Cultural Politics of Risk / S. O'Brien (cross-listed as English *731 and Globalization *731)
Through a variety of critical and imaginative works, this course will consider some political, cultural, affective, and environmental dimensions of contemporary "risk" society.

739 / The Archive and Everyday Life / M. O'Connor (cross-listed as English *739)
An exploration of the intersecting fields of archive theory and everyday life theory and an examination of the practice of archival work in selected artists, writers and scholars.

742 / Mapping South Asian Masculinities / C. Chakraborty (cross-listed as English *742)
This course focuses on masculinities in moments of conflict and crisis in South Asia to explore how masculinities are embedded in and enable the operation of large scale political-historical projects/processes such as colonial rule, nation-formation, construction of civil society and religious fundamentalism. Reading South Asian literary and cinematic texts, it will examine masculinities in articulated relation to other social categories: among them, caste, class, religion, ethnicity and sexuality.

744 / Gender, Violence and Visual Culture / A. Dean (cross-listed as English *744)
This course involves the critical analysis of representations of gendered violence drawn from visual culture, including documentary film, photography, visual and performance art, advertising, television, Hollywood cinema, and public monument. We will explore how feminist

scholars, activists and cultural producers might intervene in visual cultures of gendered violence to analyze, contextualize, and produce examples of such culture that draw attention to the dangers of making gendered identities that conflate "female" with "victim" and "male" with "violence" pre-exist an act of violence itself.

745 / Theorizing Care: Dependency, Representation, Ethics / A. DeFalco (cross-listed as English *745)

This course considers depictions of caregiving in contemporary film and literature in tandem with various works of ethical philosophy. The course brings a variety of disciplines into dialogue, including ethics of care philosophy, theories of witnessing and obligation, animal studies, literary studies and cinema studies in its focus on the theorization and representation of care in contemporary Western culture at the turn of the century.

747 / Discourses of Empire 1700-1820 / P. Walmsley (cross-listed as English *747 and Globalization *747)

This course will consider how British and Colonial literatures articulated the process of forging a world empire. Our central project will be to map the shifting identities of self and other, and metropolis and colony, throughout the eighteenth century. We will read a wide range of texts—not only novels and poems representing imperial encounters, but also travel books and early slave narratives—and the course will provide ample opportunity for reference to McMaster's rich collection of books and periodicals from this period.

749 / Getting and Spending: The Birth of Consumer Culture/ P. Walmsley (cross-listed as English *749)

This course will consider how eighteenth-century British and Colonial literatures articulate the opportunities and the dangers of an emergent consumer culture, focusing on ideas of money, luxury, shopping and labour.

750 / Gothic, Sensation and Victorian Discourses of the Body/ G. Kehler (cross-listed as English *750)

This three-unit course will explore the diversity in sensational and gothic treatments of bodies, bodies both literal and metaphoric, individual and collective, normative and "diseased." In particular, Gothic and Sensation writing compulsively explores (figures of) physicality as a means to interrogate the legitimate or desired composition of family and nation.

***754 / The Cultures of Modernism / N. Attewell**

A critical examination of early twentieth-century Anglo-American literature, criticism, and ethnography. Explores the formal, generic, and thematic contours of modernist thinking about culture.

755 / Neoliberalism and the Limits of the Social / H. Giroux (cross-listed as English *755)

This course will analyze the history, ideology, and cultural politics of neoliberalism and its impact on democracy and the demise of the social state. It will also critically engage the work of *some of its major theorists and what the relevance of this work might be for constructing a new understanding of a publicly engaged notion of theory and social change.*

756 / The Secret Life of Things in the Eighteenth Century / E. Zuroski Jenkins (cross-listed as English *756)

Considers emergent literary discourses about inanimate objects and non-human animals and their role in social life in eighteenth-century Great Britain, attending to the way writers identify and animate "things" in relation to persons and subjects, and vice versa. It will also introduce students to methodologies in the study of material culture in the context of literary and cultural studies.

757 / Gender, Civility, and Courtliness in Early Modern Europe / M. Gough (cross-listed as English *757)

This seminar studies early modern discourses of gender and proto-Orientalism in connection with emerging notions of civility at European courts, particularly those of England and France. How did class intersect with gendered, religious, and ethnic difference in the formation and contestation of early modern civility? In what ways was European civility inflected by emerging contacts with the Islamic world? What role did elite women's cultural production play in practices of civility, defined as prowess in "arms" but also excellence in "letters," including music, dance, poetry, plays, and masques?

758 / Literature as Witness / G. Kehler (cross-listed as English *758)

This course explores a selection of the theories of witnessing and trauma alongside of the witness literature of a diasporic, persecuted minority, the so-called Russian Mennonites, many of whom live on the Canadian prairies and who have become leading voices in Canadian and international literature.

759 / Victorian Natures / G. Kehler (cross-listed as English *759)

This course relies equally on Victorian texts and current criticism to investigate British successes and failures in coming to terms with "nature," both theirs and others'.

761 / Framing CanLit / D. Coleman (cross-listed as English *761)

This seminar focuses on the interpretive frameworks we bring to our interpretations of Canadian texts by asking students to select specific critical or theoretical perspectives and explain why they are crucial or important for reading texts that have become canonical to "CanLit."

762 / Queer Historicisms and British Cultural Memory / S. Brophy (cross-listed as English *762)

A critical examination of British queer film and fiction since the 1980s. Diverse approaches to representing the historical will be explored in light of queer theory and diaspora/postcolonial theory.

765 / Biopolitics: An Introduction / H. Giroux (cross-listed as English *765 and Globalization *765)

This course will analyze how the concept of biopolitics is developed in the work of some of its major theorists and what the relevance of this work might be for constructing a new understanding of a publicly engaged notion of theory and social change.

766 / Feminist, Queer, and Trans Theory / M. Gough (cross-listed as English *766)

This seminar sets out to imagine effective ways for feminist, queer, and trans theories to meet, ally, and perhaps intermingle. We will examine areas of distinction and contention between these three discursive sites; discuss key topics, such as normativity and identity, about which all three fields have had important things to say; and ask how feminist, queer, and trans theorists separately and together might make effective intellectual and political interventions across the fields of critical race studies, postcolonial studies, gender studies, and sexuality studies.

767 / Regarding Animals: Theories of Non-Human Life / D. Clark (cross-listed as English *767)

This course explores the question of the otherness of non-human animals through a reading of twentieth- and twenty-first-century theory and philosophy.

769 / Science Fiction: Mindworlds and the Boundaries of the Human / A. Savage (cross-listed as English *769)

Speculative fiction explores the multiple ways in which boundaries are breached by imagination and science. This course examines dissolving or movable boundaries in a variety of fictions, sites, or technologies, including neuroscience, philosophy, virtual worlds, cybernetics, and intra-species relations.

771 / Canadian Literary Celebrity / L. York (cross-listed as English *771)

This seminar investigates the workings of celebrity in the contemporary Canadian literary arena, focusing on the relationship between the marketplace and literary value.

774 / Derrida's Wake: On The Futures of Deconstruction/ D. Clark (cross-listed as English *774)

How does one say adieu to Jacques Derrida? Exploring the legacies of Derrida's life and work, this course is organized around five over-lapping questions: mourning, responsibility, democracy, justice and animality. We will read materials from thinkers with whom his writings are in a critical dialogue, including Marx, Levinas, Kant, and Benjamin.

776 / Racial Formation: Selected U.S. Projects / D. Goellnicht (cross-listed as English *776)

Drawing on recent theories of racial formation, this course examines a number of significant moments in American racial history with the aim of understanding some of the complex ways in which "race" has operated, and continues to operate, as a discursive system that has profound material effects on the lives of Americans.

777 / Topics in Philosophy and Jewish Thought / D. Hollander (cross-listed as Religious Studies *777)

778 / Topics in Modern Jewish Thought / D. Hollander (cross-listed as Religious Studies *778)

779 / The Times We Live In / S. O'Brien (cross-listed as English *779 and Globalization *779)

This course looks at changing conceptions of time in the late 20th/early 21st century in the context of globalization. We will survey a range of literary texts, films and social movements (e.g. Slow Food) that explore ideas about temporality, with a focus on the ways in which culture resists and/or supports such trends as acceleration, synchronization and the erosion of boundaries between private and public time.

784 / Decolonizing Bodies / C. Chakraborty(Same as English *784 and Globalization *784)

An examination of the representations of the body in postcolonial literary and visual texts from Africa and South Asia.

787 / Post-colonial Ecologies / S. O'Brien(cross-listed as English *786 and Globalization *787)

This course will consider issues central to ecocritical and post-colonial theories, with a specific focus on topics of language, political sovereignty and the relationship between "self" and "other" in contemporary post-colonial English literature.

788 / Writing Diaspora: Literature, Community, and Displacement / D. Coleman (cross-listed as English *788 and Globalization *788)

This course examines critical debates in contemporary cultural studies over the best way(s) to conceptualize the experiences of people who have left their places of birth or places of cultural origin in an era of "globalization." It examines the representation of these experiences in literary works (memoirs, short stories, poems, and novels) by M.G. Vassanji and Dionne Brand about people who move between cultural locations on the assumption that literary works condense and intensify the questions and problems that characterize such cross-cultural movements.

789 / Studies in Asian North American Literature, Culture andIdentity / D. Goellnicht (cross-listed as English *789)

This course examines selected topics (e.g. national versus transnational/diasporic subjectivities, gender formation) in Asian American and/or Asian Canadian literature and culture, with a focus on issues of identity. The specific topics will vary from year to year.

791 / Rethinking Politics: Thinking Past War, Democracy, and Terror / H. Giroux (cross-listed as English *791)

This seminar addresses how the notion of politics is being redefined within a changing global public sphere. How politics is addressed is central to matters of agency, social justice, as well as *notions of individual and collective struggle. The course attempts to understand how politics is being addressed as a site of struggle through various deployments around race, globalization, education, and resistance.*

793 / Oh Behave! Post-war Sexualities / S. Brophy(cross-listed as English *793)

A critical study of sexualities in British film, fiction, and culture of the 1950s and 60s. We will consider how key figures such as the teenager, the working woman, the single mother, the migrant, the homosexual, the servant, the playboy, and the secret agent mediated a rapidly transforming post-war social landscape.

***797 / Politics for Our Times / P. Rethmann**

The goal of this graduate seminar is to tackle the question of "the political," especially the ways in which it is used, conceptualized, and understood in the present. Drawing on critical theory and thought, the course aims to interrogate the historical epistemological conditions from which politics emerge. In marking these conditions, it also aims to map alternative orientations for the crafting of (our) futures.

ECONOMICS / ECONOMIC POLICY

The Department of Economics offers programs leading to the degrees M.A. and Ph.D. in Economics and M.A. in Economic Policy.

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Faculty / Fall 2012

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William M. Scarth, B.A. (Queen's), M.A. (Essex), Ph.D. (Toronto)/ Chair
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Arthur Sweetman, B.Eng. (McGill), M.A., Ph.D. (McMaster)
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James R. Williams, M.A., Ph.D. (Minnesota)

Candidates for the M.A. and Ph.D. degrees in Economics and the M.A. in Economic Policy will normally satisfy the general regulations of the School of Graduate Studies with respect to admission and residence. Candidates with Honours, Master's or Ph.D. degrees in Business or in mathematically oriented disciplines will be given special consideration and may be admitted as students in the graduate program.

M.A. Degree

Candidates proceeding to the degree M.A. in Economics will follow a program comprising:

a) **REQUIRED COURSES**

***721** / Microeconomic Theory I
***723** / Macroeconomic Theory I
***761** / Econometrics I
***762** / Econometrics II
***765 /** Mathematical Methods (non-credit)

One (but not more than one) of these required courses may be waived if equivalent work has already been completed by the student in undergraduate course work. A student's claim to have completed equivalent work will be tested by examination at the beginning of the academic year.

b) Subject to the approval of the Department, an elective program comprisinga sufficient number of courses, from those listed below, to bring the student's total load to 8 half course equivalents. The course load may include up to two half courses taken outside of the Department, in each case to be approved by the Department.

Candidates must obtain a grade of at least B- in all courses taken for credit in order to receive the degree.

Ph.D. Degree

The minimum standard for admission to the Ph.D. program is a Master's degree from a recognized university, with a B+ average. Admission is competitive: not all applicants who meet the minimum standard will be offered admission.

There are three phases of doctoral studies. The first is passing the comprehensive exams in microeconomic and macroeconomic theory. Students must complete the theory sequence (*721,*722, *723 and *724), the econometrics sequence (*761 and *762) and the mathematics review course (*765) before attempting these exams. A candidate who has taken courses equivalent to *721, *723 and/or *761 at another university can petition the Chair of the Graduate Studies Committee to have these course requirements reduced. Both of the theory exams must be completed within eighteen months of entering the doctoral program.

The second phase is passing the comprehensive exams in two areas of specialization. Certain courses, selected at the discretion of the field examination committee, must be completed before attempting these exams. The areas of specialization, and typical course requirement for each of them, are:

Health Economics: *788, two of *791, *793 or *795.
International Economics: *751 and *752.
Labour Economics: *785, *781 and *782.
Growth and Monetary Economics: *741 and *742.
Population Economics: *785, *710 and *711.
Public Economics: *735, *733 and *731.
Econometrics: *761, *762 and *768.

These comprehensive exams must be completed within twenty-four months of entering the doctoral program.

The third phase is the thesis. A student may choose to take additional courses at this stage if the courses are germane to the student's proposed research. Up to four half courses may be taken outside of the department with the approval of the Graduate Chair. A student at this stage is required to complete the seminar courses *798 and *799. Doctoral students typically take a total of 12-14 graduate courses at this university.

M.A. Degree in Economic Policy

Candidates for the M.A. in Economic Policy must complete eight half-courses. The following five half-courses are required for all candidates:

***727 /** Microeconomic Theory for Public Policy
***728 /** Macroeconomic Theory for Public Policy
***761 /** Econometrics I
***773 /** Economic Policy Analysis I
***774 /** Economic Policy Analysis II

Economics *761 may be waived if equivalent work has already been completed by the student in undergraduate course work. A student's claim to have completed equivalent work will be tested by examination at the beginning of the academic year.

Candidates for the M.A. in Economic Policy will designate a field of specialization in Health Economics, Human Resource Economics or Public Economics.

Co-op Option in M.A. and Ph.D. Degrees

M.A. students who have successfully completed Economics *761 and Ph.D. students who have successfully completed the comprehensive examinations, may apply for the co-op option associated with these degree programs. Students will not be considered for acceptance into this option in advance of completion of these requirements. The number of students who will be accepted will be small and will depend on available placements.

To complete either the M.A. or Ph.D. co-op option successfully, the student must work a total of eight months in either one or two placements. Each placement must be approved in advance by the supervisor and the Department. A placement must include a significant research opportunity and be consistent with progress to a degree. At the completion of each placement, the student must write a report describing the research outcome and append a letter of evaluation by the employer. This report must be judged satisfactory by the supervisory committee. In the event the report is judged unsatisfactory, the student will return to his/her original program (either the M.A. or Ph.D.) and will not be eligible for the co-op designation on her/his transcript. The remaining requirements for the M.A. or the Ph.D. program must be completed. During the period of co-op placement, a student will be considered as a full-time student but will pay reduced fees.

Courses

Courses marked with an asterisk (*) are half courses. Courses marked with a plus sign (+) are open only to Ph.D. students except by special permission of the Department.

The following 700-level courses are offered for graduate credit. A list of course offerings for the forthcoming academic year will be posted on the grad website:
http://www.mcmaster.ca/economics/grad

***700 / Topics in Economics / Staff**

***703 / Experimental Economics / S. Mestelman, A. Muller**
An introduction to the design of laboratory environments in economics, to the conduct of laboratory sessions, and to the analysis of laboratory generated data. Applications to public economics, industrial organization, and the evaluation of economic theory are studied.

***710 / Population Economics I / B. Spencer, M. Grignon**
A survey of topics in population economics, including the economic consequences of population aging, the economic theory of fertility, and the interrelations between economic and demographic phenomena generally.

+*711 / Population Economics II / F. Denton, B. Spencer
An advanced course in population economics, open only to Ph.D. students choosing population economics as a field.Prerequisite: *710

***716 / History of Economic Thought / R. Dimand**
The development of economic analysis from its beginning through mercantilism through the classical school of political economy, Marx, marginalism, institutional economics, and Keynes to modern macroeconomics and microeconomics.

***721 / Microeconomic Theory I / J. Leach, S. Han**
This course covers basic graduate-level microeconomic theory, including constrained optimization, theory of the household and the firm, decision-making under uncertainty, and general equilibrium analysis.

***722 / Microeconomic Theory II / S. Han, M. Ivanov, P. McCabe**
Topics include the theory of public goods and externalities, non-cooperative game theory and the economics of information such as adverse selection, moral hazard, and mechanism design. Applications can include bargaining, monopoly and oligopoly pricing, insurance and employment contracts, and auctions.

***723 / Macroeconomic Theory I / A. Johri, M. Letendre**
This course is an introduction to advanced macroeconomic theory which is based on dynamic optimization and general equilibrium. Applications will vary from year to year and may include economic fluctuations, economic growth, asset pricing, and fiscal policy.

***724 / Macroeconomic Theory II / A. Johri, M. Letendre**
The course focuses on theories that help explain business cycle fluctuations and economic growth. Some additional topics will also be covered that change from year to year.

***727 / Microeconomic Theory for Public Policy / M. Veall**
This course covers graduate-level microeconomic theory, but with an emphasis on how the tools of microeconomics can be used to inform public policy. Topics include theory of the household and the firm, decisions under uncertainty and over time, and basic welfare economics.

***728 / Macroeconomic Theory for Public Policy / W. Scarth**
This course introduces students to the research methods of modern macroeconomics, with an emphasis on developing an understanding of the major controversies in the field, and on how these tools can be used to address central policy issues (such as recessions, exchange-rate stability and debt reduction). The three modules focus on short-run stabilization problems, structural unemployment and long-run growth in living standards. Analysis based on the theory of the second best is stressed in an attempt to identify policy options that can simultaneously improve both economic efficiency and equity.

***731 / Public Finance / K. Cuff**
Topics may include positive and normative theories of taxation, the provision of public goods, collective decision-making, the theory of local public goods, and issues in fiscal federalism including tax and expenditure competition and inter-governmental transfers.
Prerequisite: *733

***733 / Topics in Public Economics / K. Cuff, A. Payne**
Topics may include: capital taxation; economic theory of redistribution; empirical assessment of the effects of taxation and government expenditure; and the measurement of welfare, poverty and inequality.

***735 / Economics of Public Sector Policies / A. Payne**
This course will study a current topic or theme in Public Economics. State of the art research will be surveyed with an emphasis on the policy relevance of research. Possible themes include: politicians v. bureaucrats in the provision of public goods, the effects of government policy on the provision of education, the alleviation of racial segregation through government policy, the relationship between federal and local governments.

***736 / Environmental and Resource Economics / S. Mestelman, A. Muller**
The course covers selected issues in the management of natural resources and the environment. Possible topics include the theory of externalities and policy instruments for remedying the associated market failure, management of renewable and non-renewable common property resources, contingent valuation, ecological indicators and the measurement of natural resource and environmental variables in the national accounts.

***741 / Monetary Economics / A. Johri**
This course is devoted to the discussion of some key issues in monetary theory and policy. It does not assume prior knowledge of dynamic optimization techniques. Topics that use modern macroeconomic methods will be discussed at the end of the semester.

***742 / Topics in Money and Macroeconomics / A. Johri, M. Letendre**
The course covers stochastic dynamic general equilibrium models in different fields of macroeconomics. Topics may include business cycle theory, numerical methods, open-economy models (real and monetary), heterogenous-agent models, asset pricing and growth theory. Prerequisite: *724

***751 / International Trade, Development and Investment / S. Demidova**
The neoclassical or real theory of international trade is presented in a general equilibrium format using geometrical and mathematical methods. A central application of these methods is to the trade problems of developing countries. Topics therefore may include North-South trade, export-led growth, commercial policy, elective protection, foreign investment, integration, savings, financial development and income distribution.

***752 / International Finance / M. Letendre**

The course covers empirical evidence and theories of the current account, real exchange rate, nominal exchange rate, international business cycles, and sovereign debt.

***761 / Econometrics I / L. Magee, M. Veall**

Topics include linear regression and generalized least squares.

***762 / Econometrics II / L. Magee, M. Veall**

Topics include time series and simultaneous equations.

***765 / Mathematical Methods / S, Han, J. Leach, M. Letendre**

This course provides a systematic review of mathematical and statistical methods commonly used in economic modelling.

***766 / Quantitative Methods and Systems in Economic Analysis/ F. Denton**

Topics include methods of seasonal adjustment, alternative forecasting techniques, price indexes, demographic modeling and projection, interpreting econometric models, and input-output analysis.

***768 / Advanced Econometrics / J. Racine**

This course builds on the material in *761 and *762. Topics may include: nonparametric estimation, robust estimation, asymptotictheory, econometric programming.

***769 / Applied Microeconometrics / P. Contoyannis**

The main topic of the course is the application of econometric techniques to the study of household behaviour. Topics may include expenditure systems, the relationship of consumption patterns, labour supply, and savings behaviour, aggregation, price indices and household production. There are extensive illustrations employing household microdata.

****770 / Advanced Analysis of Survey Data / M. Boyle, K. Georgiades***
(cross-listed as Geog *770, Psychology *770, Sociology *770, HRM *790)

The course is divided into two parts. The objective of Part I is to have students identify a suitable data set (research study) and develop a proposal describing their secondary analysis project. Students will be helped to develop their 1-2 page proposals which will include: the research question, a brief outline of its relevance and importance; identification of the appropriate data set(s); a brief statement about analytical approach to be used; and the identification of 3-4 key references. The instructors have access to several data sets that can be used for this course. This part will occur between October and December. There will be two class sessions—one in October and the other in November and the opportunity for two individual sessions. The objective of Part 2 is to complete the research paper (review of the literature, analysis of data, write-up and revision of the report) with the purpose of submitting the paper for review to a peer-reviewed journal. This part will occur between January-May and include 10 class sessions.

***773 / Economic Policy Analysis I / P. DeCicca, J. Hurley,A. Payne, W. Scarth**
This course is the first semester of the two-semester sequence that will provide a grounding in policy processes, policy issues, and important institutional structures, in relevant policy sectors in Canada, and provide an introduction to the basic research designs appropriate for establishing causal relationships through program/policy evaluation.

***774 / Economic Policy Analysis II / P. DeCicca, J. Hurley, A. Payne, W. Scarth**
This course is the second semester in the two-semester sequence in Economic Policy Analysis. It will survey more advanced issues in policy evaluation and culminate in a major policy project the student will complete in conjunction with an outside agency.

***781 / Labour Economics I / S. Jones, S. Yamaguchi**
A survey of basic labour economics. Topics include labour demand, labour supply, and the determination of equilibrium wages in competitive markets. Sources of wage differentials in competitive markets, such as human capital investment and compensating differentials, are examined, as are the effects on labour markets of government policies such as minimum wages, immigration restrictions, occupational health and safety regulations, and subsidies to education.

***782 / Labour Economics II / S. Jones, S. Yamaguchi**
This course surveys state-of-the-art research in labour economics. Recently covered topics include asymmetric information models of strikes; estimation of duration models; recent trends in wage structure, firm size, unionization, and self employment; the impact of international competition and technological change on labour markets; and modeling dynamic family labour supply decisions.
Prerequisite: *781

***784 / Industrial Organization / Staff**

***785 / Economics of Human Resource Policies / Staff**
This course will study a current topic or theme in Human Resource Economics. State-of-the-art research will be surveyed, with an emphasis on the policy relevance of research. Possible themes include: the design of social insurance systems for unemployment, disability, or retirement; policies to foster human capital formation; methods for evaluating labour market interventions; the human resource policy implications of globalization, technological change, or aging populations.

****788 / Health Economics / J. Hurley, P. Contoyannis***
(cross-listed as Health Research Methodology *788)
This is a basic graduate survey course on the economics of health and health care. Topics include the organization, financing and utilization of health care services. Both theory and evidence relating to patterns of consumer and provider behaviour are examined, as are the functioning and regulation of "markets" for health services. Major public policy issues in the

provision of health care in Canada are identified and the economic aspects of such issues are considered in detail.

****791 / Topics in Advanced Health Economics / P. Contoyannis, J. Hurley, A. Sweetman, J. Tarride, E. Tompa(cross-listed as Health Research Methodology *791)***

*This course focuses on contemporary issues relating to the economics of health and health care. It is intended to provide a more detailed examination of selected issues from Economics/HRM *788 as well as expose students to more advanced topics and aspects of recent research in health economics. Topics may include economic evaluation, the economics of occupational health and safety, evaluation of health-care related interventions, advances in the empirical analysis of income and health inequalities, and the evolution of health from childhood to adulthood. Prerequisite: ECON *788*

***793 / Health Economic Policy / P. DeCicca, P. Grootendorst**

This course will study specific topics or theme areas of health economics. State-of-the-art research will be surveyed, with an emphasis on the policy relevance of research. Possible topics include the economics of health, health care financing, health care funding, the economics of the pharmaceutical sector, health and aging, and labour market experiences and health.

***795 / Analysis of Health Data / P. Contoyannis**

This course is designed to introduce students to methods for the analysis of health data, with a particular focus on the use of survey datasets used in health-related micro-econometric research. Investigating features of health data requires the recognition of and methodology to cope with several characteristics not regularly (and rarely simultaneously) encountered in other areas. During the course, we will focus on the use of cross-sectional and longitudinal observational data to estimate causal parameters of interest and test hypotheses relevant to the econometric analysis of health data. At the end of the course, students should be able to perform their own econometric analyses of health data, and interpret and evaluate related studies.

+*798 / Workshop in Economics I / Staff

+*799 / Workshop in Economics II / Staff

eHealth

eHealth (also known as Health Informatics) is defined as "The knowledge, skills and tools which enable information to be collected, managed, used and shared to support the delivery of healthcare and to promote health" (taken from the UK National Health Service). The objective of the program is to produce Masters level graduates with high quality training in the broad interdisciplinary area that spans eHealth, emphasizing industry-relevant academic research and development.

The program is based on a collaborative partnership among the Faculties of Health Sciences, Engineering and the DeGroote School of Business. It is administered by the DeGroote School of Business. Three Academic Units are major collaborators in the program: the Department of Clinical Epidemiology and Biostatistics (Faculty of Health Sciences), the Department of Computing and Software (Faculty of Engineering), and the Information Systems Area in the DeGroote School of Business. Additional faculty members with eHealth interests from other departments also participate in the program.

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Faculty / Fall 2011

PROFESSORS

Donna Ciliska, B.Sc.N.,M.Sc.N (Western), Ph.D. (Toronto) / Nursing
Franya Franek, M.Sc., RNDr. (Charles, Prague), Ph.D. (Toronto) / Computational Engineering and Science
Khaled S. Hassanein, B.Sc. (Kuwait), M.A. Sc. (Toronto), M.B.A. (Wilfred Laurier), Ph.D. (Waterloo), P.Eng. / Chair Information Systems / Director, McMaster eBusiness Research Centre
R. Brian Haynes, B.Sc., M.D. (Alberta), M.Sc., Ph.D. (McMaster), F.R.C.P.(C), Clinical Epidemiology and Biostatistics / Medicine
Milena Head, B.Math (Waterloo), M.B.A., Ph.D. (McMaster) / Information Systems
Anne Holbrook, B.Sc. Pharm. (Toronto), Pharm. D. (Philadelphia), M.D., M.Sc. (McMaster), F.R.C.P.(C) / Medical Sciences / Physiology / Pharmacology
Robert Issenman, M.D. / Pediatrics
RyszardJanicki, M.Sc. (Warsaw), Ph.D., D.Hab. (Polish Academy of Sciences) / Computing and Software
Thomas Maibaum, B.Sc. (Toronto), Ph.D. (London) / Canada Research Chair, P. Eng. / Computing and Software
Ali Montazemi, H.N.D. (Teeside Polytechnic, U.K.), M.Sc. (Southampton), PhD. (Waterloo) / Information Systems

ParminderRaina, B.Sc. (Saskatchewan), Ph.D. (Guelph) / Clinical Epidemiology and Biostatistics
Joseph Tan, B.A. (Wartberg), M.S. (Iowa), Ph.D. (British Columbia) / Information Systems / Wayne C. Fox Chair in Business Innovation
Yufei Yuan, B.S. (Fudan), Ph.D. (Michigan) / Information Systems

ASSOCIATE PROFESSORS

Christopher Anand, B. Math (Waterloo), M.Sc., Ph.D. (McGill)/ Computing and Software
Pamela Baxter, B.A. (Wilfred Laurier), B.Sc.N., M.Sc., Ph.D. (McMaster) / Nursing
Nick Bontis, B.A., Ph.D. (Western) / Strategic Market Leadership & Health Services Management / Director, Undergraduate Programs
Kenneth R. Deal, B.S., M.B.A., Ph.D. (SUNY at Buffalo) / Strategic Market Leadership & Health Services Management
Maureen Dobbins, B.Sc.N. (McMaster), Ph.D. (Toronto) / Nursing
Lisa Dolovich, B.Sc. Pharm (Toronto), M.Sc. (McMaster), Pharm. D. (Toronto) / Physiology / Pharmacology / Clinical Epidemiology and Biostatistics
Douglas G. Down, B.A.Sc., M.A.Sc. (Toronto), Ph.D. (Illinois, Urbana-Champaign), P. Eng. / Computing and Software
ElkafiHassini, B.Sc., (Bilkent), M.A.Sc., Ph.D. (Waterloo) / OperationsManagement
David Koff, M.D. (Rene-Descartes) ,/ Chair, Department of Radiology
Anthony Levinson, M.D., M.A. (Sussex), M.Sc. (McMaster), F.R.C.P.(C) / John R. Evans Chair Health Sciences / EducationalResearch and Instructional Development
Christopher Longo, B.A. (York), M. Sc. (Western), Ph.D. (Toronto) / Strategic Market Leadership and Health Services Management
Ann McKibbon, B.Sc. (Guelph), M.L.S. (Western), Ph.D. (Pittsburg) / Clinical Epidemiology and Biostatistics
W.F. Skipper Poehlman, B.S. (Niagara), B.Sc. (Brock), M.Sc., Ph.D. (McMaster), P.Eng. / Computing and Software
Rolf J. Sebaldt, B.Sc., M.D., C.M. (McGill), F.R.C.P.(C), F.A.C.P. / Clinical Epidemiology and Biostatistics / Medicine
Emil Sekerinski, Dipl.Inf.,Dr.rer.nat. (Karlsruhe) / Computing and Software
LehanaThabane, B.Sc. (Lesotho), M.Sc. (Sheffield), Ph.D. (Western) / Clinical Epidemiology and Biostatistics
RutaValaitis, B.A., B.Sc.N. (Windsor), M.H.Sc. (McMaster), Ph.D. (Toronto) / Nursing
Alan Wassyng, B.Sc. (Hons), M.Sc., Ph.D. (Witwatersrand) / Computing and Software

ASSISTANT PROFESSORS

Ilana Bayer, Ph.D. (Toronto) / Pathology and Molecular Medicine
David Musson, M.D. (Western), Ph.D. (Texas at Austin) / Anesthesia

ASSOCIATE MEMBERS

David H. Chan, B.Sc.E.Eng. (Louisiana) M.D. (Toronto), C.C.F.P., M.Sc. (McMaster) F.C.F.P., Associate Professor / Family Medicine
Alex Drossos, B.E.Sc., B.Sc., M.B.A (McMaster), M.Ed (Toronto, in progress), M.D. (St. George's, in progress), Adjunct Professor (McMaster) / Health Services Management

KarimKeshavjee, B.Sc. (McGill), M.Sc. (Toronto), M.D. (Toronto), M.B.A. (Toronto), C.C.F.P. / InfoClin
Marion Lyver, B.Sc. (Hons.), M.D. (Memorial), F.R.C.P.(C), F.C.F.P.C., Dip. ABEM, CPHIMS / Family Medicine
Rocco Piro, B.Sc. (McMaster), / Director, IT, Faculty of Health Sciences
Nancy Wilczynski, B.A., M.Sc., Ph.D. (McMaster) / Clinical Epidemiology and Biostatistics
Donald Willison, B.Sc. (Toronto), M.Sc. (McMaster), Sc.D. (Harvard)/ Senior Scientist, Surveillance and Epidemiology Division, Ontario Agency for Health Protection and Promotion

PROFESSORS EMERITI
Norman P. Archer, B.Sc. (Alberta), Ph.D. (McMaster), M.S. (New York) / Information Systems
William F. Smyth, B.A. (Toronto), M.Sc. (Ottawa), Ph.D. (Curtin), C.Eng., F.B.C.S., F.I.C.A. / Computing and Software

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Areas of Specialization

Students may specialize in one of three fields in the program: Health Sciences, Computer Science, or Business. All students are required to complete the three core courses, and a variety of elective courses in each field are available to cater to individual interests. Student specialization interest must be declared when applying for admission. Each student is assigned a supervisor from the student's field of interest upon registration, and a second member of the supervisory committee from one of the other two fields is appointed to ensure that the student maintains a broadly focused view of the eHealth field. All students must participate in and contribute to a seminar series designed to acquaint students with recent advances in the eHealth field, build skills sets, and supplement course content.

Admission

Students entering the eHealth program may be admitted from a variety of suitable undergraduate degrees. They will belong to a community with a variety of backgrounds in related fields, with common interests in information technology to support health services delivery and research. The main requirements are a good background in computing and a strong interest in the use of computing support in health care applications. Students will not be admitted to the program unless they can present evidence that they have taken a minimum of two computer science-related courses at the undergraduate level. One of these courses must be in any programming language, and the second course must be in either data base design or data structures and algorithms. A background in Health Sciences, Life Sciences, Business, or Computer Science is an asset, but not a requirement. The Admissions Committee will in each case judge the candidate's suitability for the program. A minimum B+ average in the final year of a four-year undergraduate degree program is required for admission. Applicants for the full-time options must also pass a face-to-face interview that evaluates their suitability for an eight-month internship, a required component of the program.

Degree Options and Internship

A candidate for the M.Sc. eHealth degree may choose to take the program either full-time or part-time. The full-time program has two options: thesis or course-project. In the thesis option, students must complete the three required courses plus one elective course from the field of specialization (a total of four courses). In addition, students must complete and defend a Master's thesis successfully. The thesis option is not open to part-time students. Completion of the M.Sc. thesis option is the preferred route to a Ph.D. program in a similar field (e.g., Health Research Methodology, Computer Science, or Business). In the course-project option (which may be taken full or part-time), students take the three required courses, two electives from the field of specialization, and two other electives selected from one or both of the other two fields (for a total of seven courses). All courses must be completed with at least a B– standing.

Students taking the thesis option are expected to complete their programs and submit their research theses within 24 months of registration. Full-time students taking the course-project option are expected to complete their programs within 20 months, including a project which will result in a scholarly paper arising from a relevant study in eHealth. Full time students are limited to a maximum of three years from initial registration. Part-time students are expected to complete their programs within four years of registration, but are limited to a maximum of five years. They are also required to complete a project that is a scholarly paper relevant to eHealth, often for their current employer if the employer is in a health care industry.

In addition to coursework, all full-time students must complete an eight-month internship with a company, healthcare institution, or government agency. In most, but not all cases, the internship will be a paid position.

Courses

<u>Required Courses</u>

All required and elective courses are half courses. Required courses must be taken in the first and second semester of study by full-time students, and early in the program for part-time students.

724 / Fundamentals of eHealth and the Canadian Health Care System / A. McKibbon (cross-listed as HRM *724)

This tutorial-based course will cover a broad range of eHealth topics from the perspective of health care delivery. Topics include a definition of eHealth; health care data; hospital and primary care information systems (i.e., electronic health records [EHR] systems), specialty components of an EHR system; how health professionals use data; human/cognitive factors in development and implementation of eHealth applications, safety, standards, vocabulary and nomenclatures and how used; aggregation of health information, especially for research purposes; patient information systems and consumer eHealth; research and evaluation of *eHealth applications and research using eHealth applications; implementation issues and privacy, security, and confidentiality; and the future of eHealth. Prerequisite: One-day orientation to the Canadian health care system for students (non-health background) completed before the course starts.*

736 / Management Issues in eHealth / J. Tan, N. Archer(cross-listed as Business K736)

This course covers a number of topics relevant to the management of electronic health systems. These topics will be presented in an integrated manner that will promote an understanding of health system governance, accountability, risk analysis, management, legal and regulatory standards, and policies. It will demonstrate real issues by focusing on a team-based case study through much of the course that covers the life cycle process of managing a project to implement an eHealth system, beginning with needs analysis and ending with implementation and maintenance. Prerequisite: K603 Information Systems Management (see MBA calendar) or equivalent.

757 / Modern Software Technology for eHealth / Staff (cross-listed as Computing & Software *757)

This course exposes graduate students to technical challenges in the field of electronic health (eHealth). The course introduces a collection of modern architectures and technologies that are recommended by standardization organizations to build the infrastructure that meets the emerging demands in the growing network of health care systems. The topics include: standard health care and data and service representations; clinical terminology systems; web services and service oriented architecture; decision support systems; data mining techniques on clinical data; data and knowledge interoperability; security and privacy techniques, and health care application development environments.

Elective Courses

For course details, see MBA Calendar (School of Business courses); and the School of Graduate Studies Calendar: Computing and Software, Health Research Methodology, and Nursing. Other graduate level courses not listed below may be approved through special permission, if the student can justify why an elective is important to his/her understanding of eHealth.

***6DB3 /** *Databases / F. Franek (cross-listed as Computing and Software *6DB3)*

***6F03 /** *Distributed Computer Systems/ Staff (cross-listed as Computing and Software *6F03)*

***6HC3 /** *The Human Computer Interface / Staff (cross-listed as Computing and Software Engineering *6HC3)*

***6WW3 /** Web Systems and Web Computing / Staff *(cross-listed as Computing and Software *6WW3)*

***701 /** Research and Evaluation Methods in eHealth / A. McKibbon
This course will provide background and basic principles of research and evaluation methods for eHealth students. The course will study research/evaluation methods of such eHealth applications as electronic medical records systems or handheld devices to provide decision support as well as research/evaluation using eHealth applications. Examples of these latter applications are data mining of electronic health records information to determine prognostic data on individuals or construction of and data analyses using data from large prospective population databases. The course is given in seminar (small group) format. Evaluation is based on participation, two written assignments, a final paper in the form of a research proposal or contract proposal to address a Request for Proposal from industry. Students will also review a project proposal done by another student.

***711 /** Health Economics and Evaluation / C. Longo *(cross-listed as Business *C711)*

***721 /** Health Policy Analysis / G. Randall*(cross-listed as Business* C721)*

***722 /** Management of Population Health / C. Longo*(cross-listed as Business *C722)*

***723 /** Data Mining and Business Intelligence / Y. Yuan *(cross-listed as Business *K723)*

***725 /** Business process Reengineering / A. Montazemi*(cross-listed as Business *K725)*

***726 /** eBusiness Strategies / K. Hassanein*(cross-listed as Business *K724)*

***727 /** Strategic Knowledge Management / N. Bontis*(cross-listed as Business *P727)*

***730 /** Machine Learning and Data Mining / I. Bruha*(cross-listed as Computing and Software *730)*

***731 /** Project Management / J. Tan *(cross-listed as Business *K731)*

***734 /** Supply Chain Management / E. Hassini*(cross-listed as Business *O734)*

***737 /** Cases in eBusiness, Innovation, and Entrepreneurship/ K. Hassanein *(cross-listed as Business *K737)*

***747 /** Software Architecture Modeling and Reverse Engineering *(cross-listed as Computing and Software *747)*

***750 /** Model-Based Image Reconstruction / C. Anand*(cross-listed as Computing and Software *750)*

***792 /** Security, Privacy, and Trust in eBusiness / Y. Yuan*(cross-listed as Business *K792)*

ELECTRICAL AND COMPUTER ENGINEERING

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Faculty / Fall 2012

DISTINGUISHED UNIVERSITY PROFESSOR
S.S. Haykin, B.Sc., Ph.D., D.Sc. (Birmingham), F.I.E.E.E., F.R.S.C.

PROFESSORS
T. Davidson, B. Eng. (Hons.) (Western Australia), D.Phil. (Oxford),P. Eng. / Canada Research Chair (Tier II) in CommunicationSystems
J. Deen, B.Sc. (Guyana), M.S., Ph.D., (Case Western Reserve),F.I.E.E.E., F.I.N.A.E., F.E.I.C., F.C.A.E., F.E.C.S., F.A.A.A.S.,F.R.S.C., F.A.P.S. / Canada Research Chair in Information Technology
A. Emadi, B.S., M.S. (Sharif University of Technology), Ph.D. (Texas A&M University), Canada Excellence Research Chair in Hybrid Power Train
W.P. Huang, B.S. (Shandong), M.S. (University of Science andTechnology of China), Ph.D. (M.I.T.)
T. Kirubarajan, B.A., M.A. (Cambridge), M.S., Ph.D., (Connecticut)/ Canada Research Chair (TierII) in Information Fusion / Associate Chair (Graduate Program)
X. Li, B.S. (Shandong), M.S. (Wuhan Research Institute of Posts &Telecommunications), Ph.D. (Northern Jiaotong), P.Eng.
N. Nicolici, Dipl. Ing. (Univ. of Timisoara), Ph.D. (Southampton, U.K.), P.Eng.
N. Nikolova, Dipl. (Tech. University of Varna), Ph.D. (University ofElectrocommunications, Tokyo), P.Eng. / Canada Research Chairin High Frequency Magnetics
J.P. Reilly, B.A.Sc. (Waterloo), M.Eng., Ph.D. (McMaster), P.Eng./ Associate Chair (Undergraduate Program)
S. Shirani, B.Sc.Eng. (Isfahan Univ. of Tech.), M.Sc. (Amirkabir Univ. of Tech.), Ph.D. (British Columbia), P.Eng.
P.M. Smith, B.Eng.Mgt.,M.Eng., Ph.D. (McMaster), P.Eng.
T.H. Szymanski, B.A.Sc., M.A.Sc., Ph.D. (Toronto), P.Eng./ L.R. Wilson/BCE Chair in Data Communications
T.D. Todd, B.A.Sc., M.A.Sc., Ph.D. (Waterloo), P.Eng.
K.M. Wong, B.Sc.(Eng.), Ph.D., D.Sc.(Eng.), D.I.C. (London), F.I.E.E.E., F.I.E.E., F.C.A.E., F.R.S.C., F.Inst.P., F.S.S., C.Eng., P.Eng. / NSERC-Mitel Chair in Digital Signal Processing
X. Wu, B.Sc. (Wuhan University, China), Ph.D. (Calgary)

ASSOCIATE PROFESSORS
M. Bakr, B.Sc., M.Sc. (Cairo), Ph.D. (McMaster), P.Eng.
I. Bruce, B.Eng., Ph.D. (Melbourne), P. Eng.
C.H. Chen, B.A.Sc. (National Central Univ., Taiwan), M.A.Sc.(Simon Fraser), Ph.D. (McMaster), P.Eng.
H. de Bruin, B. Eng, M. Eng., Ph.D. (McMaster), P.Eng.
S. Dumitrescu, B.Sc., Ph.D. (Bucharest)
T. Field, B.A., D.Phil. (Oxford, U.K.)
Y. Haddara, B.Eng., (Memorial), M.Sc., Ph.D. (Stanford), P.Eng.
S. Hranilovic, B.A.Sc. (Waterloo), M.A.Sc., Ph.D. (Toronto), P.Eng.
A. Jeremić, Dipl.Ing. (Belgrade), M.S., Ph.D. (Illinois at Chicago)
S. Kumar, B.S. (Mysore Univ., India), M.S., Ph.D. (Indian Institute ofScience), Ph.D. (Osaka, Japan), P. Eng.
M. Noseworthy, B.Sc., M.Sc., Ph.D. (Guelph)
M.R. Sirouspour, B.Sc., M.Sc. (Sharif Univ., Iran), Ph.D. (U.B.C.),P.Eng.
D. Zhao, B.S. (Northern Jiaotong, Beijing), Ph.D. (Waterloo), P.Eng.

ASSISTANT PROFESSORS
J. Chen, B. Eng., M.Sc., Ph.D. (Cornell) / Barber Gennum Chair inInformation Technology
T.E. Doyle, B.Sc., B.E.Sc., M.E.Sc., Ph.D. (Western Ontario), P. Eng.
A. Patriciu, B.Sc., M.Sc. CompSci. (Univ. Craiova, Romania), M.Sc., MechEng., Ph.D. (John Hopkins)
J.K. Zhang, B.Sc., M.S., Ph.D. (Xidian Univ., P.R. China)

ASSOCIATE MEMBERS
M. Anvari (Surgery)
S. Becker (Psychology)
W. Datars (Physics and Astronomy)
Q. Fang (Engineering Physics)
M. Kamath (Medicine)
R. Kleiman (Engineering Physics)
A. Knights (Engineering Physics)

ADJUNCT MEMBERS
E. Bosse, B.Sc.A., M.Sc. (Laval), Ph.D. (Carleton, Ottawa, Laval)
L. Carney, S.B., M.S., Ph.D. (Wisconsin)
Z. (Jack) Ding, B.Sc., M.A.Sc., Ph.D. (Northwestern PolytechnicUniversity, P.R. China)
M. Haacke, B.Sc., M.Sc., Ph.D. (Toronto)
M. Howlader, B. Eng. (Bangladesh), M.Sc., Ph.D. (Kyushu, Japan)
T. Lang, B.Eng.,M.Eng. (McMaster)
Z.Q. (Tom) Luo, B.Sc. (Peking), Ph.D. (M.I.T.), P.Eng.,F.I.E.E.E.
M. Margarit, M.Sc. (Bucharest), Ph.D. (Simon Fraser, B.C.)
M. McDonald, B.Sc., M.Sc. (Queen's), Ph.D. (Western)
B. Ong, B.Sc., Ph.D. (McGill)

M. Pelletier, Ph.D., P. Eng.
F. Perez-Pinal, B.S. (InstitutoPolitecnicoNacional), M.Sc. (Birmingham and Nottingham), Ph.D. (San Luis Potosi)
S. Samavi, B.B.S. (California State), M.S. (Memphis), Ph.D. (Mississippi)
N. Sangary, B.Sc., M.Eng., Ph.D. (McMaster)
P. Valin, B.A., B.Sc., M.Sc., Ph.D. (Harvard)

PROFESSOR EMERITUS
J.W. Bandler, B.Sc.(Eng.), Ph.D., D.Sc.(Eng.) (London), D.I.C.(Imperial College), F.I.E.E.E., F.I.E.E., F.E.I.C., F.R.S.C., F.C.A.E., C.Eng., P.Eng.

Master's Degree

A candidate for the Master's degree may proceed by one of three routes: the Research Program (M.A.Sc.), the course and project program (M. Eng.) or the M. Eng. in Electrical and Biomedical Engineering.

M.A.Sc. Degree

A candidate is required to complete successfully at least four graduate half courses (or equivalent), of which at least two must be from among the 700-level graduate courses offered by the Electrical and Computer Engineering Department, and to prepare a thesis embodying the results of the research taken on by the candidate.

M. Eng. Degree

A candidate is required to complete successfully a program of seven graduate half courses (or equivalent), of which at least five must be 700-level and up to two 600-level courses approved by the department; these courses may be taken on a part-time basis. Two of these 600-level courses can be taken in the final undergraduate year at McMaster for graduate credit.

M. Eng. Degree in Electrical and Biomedical Engineering

This program is open to graduates who have maintained a minimum average of B in each year of the B.Eng. program in Electrical and Biomedical Engineering at McMaster University. The program consists of a minimum of three consecutive terms in which the candidate is required to complete successfully six graduate half courses (or equivalent), of which at least four must be 700 level and up to two 600 level courses approved by the department, followed by an independent study term. Two of these 600 level courses, ElecEng *6BC4 and ElecEng *6BE4 can be taken in the fourth undergraduate year for graduate credit. At the conclusion of the final term, the candidate is required to submit and defend a report on an approved project which must demonstrate ability to carry out independent study and reach a satisfactory conclusion in an area of biomedical engineering.

Ph.D. Degree

The general requirements for the degree Doctor of Philosophy appear earlier in the Calendar. The minimum number of graduate courses required is four half courses (or equivalent) beyond the Master's degree, or eight half courses (or equivalent) beyond the Bachelor's degree. A candidate is also required to take the Ph.D. Comprehensive Examination, which is designed to test the general knowledge of both undergraduate and graduate levels of Electrical Engineering. The Comprehensive Examination will normally be attempted no later than 24 months after a student has completed a Master's degree.

Within approximately one year of commencement, a Ph.D. candidate must submit a report to the Supervisory Committee outlining the proposed line of research in sufficient detail so that the Committee can decide on its suitability.

General Requirements

Candidates for the degrees of M.A.Sc. and Ph.D. must present a seminar on a topic approved by the Department at least once during the course of their programs. Grading will be restricted to *Pass/Fail*. The thesis or report submitted by the candidate must be defended orally at the conclusion of the study. All M.A.Sc. and Ph.D. graduate students are required to register ECE 790- Graduate Seminars in Electrical and Computer Engineering. M. Eng. students registering for ECE *701, with the exception of those registered in the combined B. Eng./M. Eng. Biomedical Engineering program, must register for ECE 790 as well.

Courses

The following 600-level courses will be offered for graduate credit to ECE students in the M. Eng. program (to a maximum of two courses) or for extra graduate credits to ECE students in the M.A.Sc. and Ph.D. programs. However, these will not be available for graduate credit within the minimum course requirements of ECE students in the M.A.Sc. or Ph.D. programs. Ph.D. candidates in the department may not count courses *702-*709, inclusive, towards minimum course requirements. Courses marked with an asterisk (*) are half courses. All course prerequisites must be satisfied or students must have permission of the instructor. Credit for graduate courses from previous programs will be considered on a case by case basis by the Department's Graduate Affairs Committee on the recommendation of the student's supervisor.

6BC4 / Modeling of Biological Systems / Staff (cross-listed as Biomedical Engineering *6BC4)

Introduction to mathematical and engineering methods for describing and predicting the behaviour of biological systems; including sensory receptors, neuromuscular and biomechanical systems; statistical models of biological function; kinetic models of biological thermo-dynamics.

***6BD4 / Biomedical Instrumentation / Staff**
Generation and nature of bioelectric potentials; electrodes and other transducers; principles of instrumentation; electrical safety; neuromuscular and cardiovascular instrumentation; ultrasonics and other medical imaging.

****6BE4 / Medical Robotics / Staff (cross-listed as Biomedical Engineering *6BE4)***
Fundamentals of robotics and telerobotics; feedback from the environment using sensors and machine vision; application of robotics to medicine and surgery.

***6DK4 / Computer Communication Networks / Staff**
Introduction to switching and communication networks; packet switching; shared media access and LANs; error control; network layer operation and the Internet; ISDN: wireless networks; performance and simulation.

***6DM4 / Computer Architecture / Staff**
Overview of CISC/RISC microprocessors and their evolution; performance metrics; instruction set design; microprogramming and hardwired control; processor and memory acceleration techniques; memory hierarchies; multiprocessor structures and their performance.

***6DS4 / Embedded Systems / Staff**
Embedded processor architectures and SOC organization; EDA tools for hardware/software co-design, co-verification and testability; Interfacing; Co-processors, soft processors and ASIP design; Real-time systems; Applications.

***6EK3 / Microelectronics / Staff**
CMOS and MOSFET integrated circuit design; fabrication and layout, simulation; digital and analog circuit blocks; computer aided design and analysis; testing and verification.

***6FJ4 / Introduction to Microwave Engineering / Staff**
Transmission lines, waveguides, microwave network analysis via S-parameters, impedance matching, resonators, power dividers, directional couplers, microwave filters, microwave sources, active components and circuits.

***6PK4 / Power Electronics / Staff**
Power circuits with switches; basic rectifier circuits; commutation; choppers; inverters; harmonic suppression techniques; generation and control of rotating fields; variable speed drives; system design.

***6PL4 / Energy Systems and Management / Staff**
Elements of generation, transmission, and distribution systems; system wide-energy flow and control; modeling and simulation; economics and management; fault prediction and management.

***6TK4 / Digital Communication Systems / Staff**
A/D conversion; digital modulation; frequency hopping; code-division multiplexing; matched filters; equalization; optimal receiver design; entropy; coding; data compression; capacity of band-limited Gaussian channel.

***6TL4 / Digital Signal Processing / Staff**
Classical filter theory; DFT and FFT; FIR and IIR digital filters; effects of finite precision; implementation of DSP-based systems; adaptive filtering; signal compression.

***6TM4 / Digital Communications II / Staff**
This course continues the study of modern communication systems following ELECENG 6TK4. Topics include wireless communication systems, multiple antenna systems, channel models and error control coding.

****6TN3 / Image Processing/ Staff(cross-listed as Biomedical Engineering *6TN3)***
Digital image formation and representation; filtering, enhancement and restoration; edge detection; discrete image transforms; encoding and compression; segmentation; recognition and interpretation; 3D imagery; applications.

The following 700-level courses are available for graduate credit. However, not all courses listed will be offered each year. A list of those courses offered will be issued by the Department at the beginning of each academic year.

Required course for M. Eng. with Project

***701 / M. Eng. Project / various ECE professors**
The goal of the project will be agreed upon by the instructor and the student at the beginning of the term. At the conclusion of the course, the candidate is required to submit a report on the approved project which must demonstrate the ability to carry out independent study and reach a satisfactory conclusion. The candidate is also required to register for the seminar course ECE 790 to present their project report.

Introductory Courses

***702 / Engineering Communication and Presentation / T. Kirubarajan**
This course is on presentation and communication, both written and oral, for engineers. Students are expected to write a project proposal,conduct research/development, prepare a report and make an oral presentation. Lectures on technical writing and presentation will be conducted.

***703 / Advanced Computer Programming for Engineers / T. Kirubarajan**
This course is on the use of computer programming to solve graduate-level engineering problems using C/C++/Java and MATLAB. Advancedalgorithms, data structures, parallel computing and numerical methods will be addressed. A major project is required.

***704 / Advanced Engineering Mathematics / T. Kirubarajan**

This course is on the survey of a number of mathematical methods of importance in engineering modeling and analysis. The course coversorthogonal function expansions, Fourier series, discrete and continuous Fourier transforms, generalized functions and sampling theory, complexvariables, functions and complex integration, Laplace, Z, and Hilbert transforms. Also includes computational Fourier analysis, applications to linearsystems, waves, and signal processing and differential or partial differential equations.

***705 / Probability and Stochastic Processes / D. Zhao**

Topics in this course cover Markov chain, Poisson processes, Continuous-time Markov chain, Stationary processes, Convergence concepts; as well as a review of probability and conditional probability, random variables, and probability density function.

***706 / Digital Signal Processing / T. Davidson**

This course is a graduate-level introduction to digital signal processing covering such topics as discrete time-signals and systems, the z-Transform,sampling of continuous-time signals, and transform analysis of linear time-invariant systems.

***709 / High Performance Parallel Computing on Graphical Processing Units (GPU) / A. Patriciu**

The course is an introduction in parallel algorithm design and programming techniques for massive arrays of processing units available on modern GPU. The course will introduce the students to GPU computing architectures provided by NVIDIA and ATI. This is a hands-on course; eachstudent will complete a short project involving the design, implementation, testing, and performance evaluation of an algorithm on a GPU.

<u>**Computation**</u>

***710 / Engineering Optimization / T. Davidson, T. Kirubarajan**
(cross-listed as Computational Science and Engineering *710)

Concentrates on recognizing and solving convex optimization problems that arise in engineering. Convex sets, functions, and optimization problems. Basics of convex analysis.Least-squares, linear and quadratic programs, semi-definite programming, minimax, extremal volume, and other problems.Localization methods. Optimality conditions, duality theory, theorems of alternative, and applications. Interior-point methods. Applications to signal processing, control, circuit design, computational geometry, statistics, and mechanical engineering. The prerequisites are - a good knowledge of linear algebra and willingness to program in Matlab; exposure to numerical computing, optimization, and application fields helpful but not required; the engineering applications will be kept basic and simple.

***712 / Matrix Computations in Signal Processing / J.P. Reilly**

Matrix decompositions:eigen-decomposition, QR decomposition, singular value decomposition; solution to systems of equations: Gaussian elimination, Toeplitz systems; least square methods: ordinary, generalized and total least squares, principal component analysis.

Communication Systems and Networks

707 / Linear Systems / T. Kirubarajan *(cross-listed as Computational Science and Engineering*731)

This course is intended as a first semester graduate course on linear systems theory, design and implementation with application to signal processing, communications, estimation and control. The objective is to present a comprehensive coverage of the basic tools needed by an electrical engineering graduate student specializing in the above areas.

***708 / Digital Communications / J. K. Zhang**

The course provides an in-depth coverage of modern communication theory and technologies. The material is fundamental to the understanding, design and analysis of digital communication systems. The course is intended for students either wishing to major in digital communication, wireless communication or interested to learn the basic principles and technologies used in today's digital communication systems.

***722 / Fundamentals of Wireless Communication / J. Chen**

The past decade has seen many advances in physical-layer wireless communication theory and their implementation in wireless systems. This course takes a unified view of the fundamentals of wireless communication and explains the web of concepts underpinning these advances at a level accessible to an audience with a basic background in probability and digital communication. Topics covered include MIMO (multiple input multiple output) communication, space-time coding, opportunistic communication, OFDM and CDMA. The concepts are illustrated using many examples from wireless systems such as GSM, IS-95 (CDMA), IS-856 (1xEV-DO), Flash OFDM and ArrayCommSDMA systems. particular emphasis is placed on the interplay between concepts and their implementation in systems.

***723 / Information Theory and Coding / S. Hranilovic**

Entropy and mutual information.Discrete memoryless channels and discrete memoryless sources, capacity-cost functions and rate-distortion functions.The Gaussian channel and source.The source-channel coding theorem.Linear codes.BCH, Goppa, Reed-Solomon, and Golay codes.Convolutional codes.Variable-length source coding.

***725 / Telecommunications Networks - Modeling and Analysis/ T. Szymanski**

This course provides a fundamental and in-depth knowledge of the analysis and modeling of telecommunication networks. The course will focus on mathematical analysis of fundamental systems and concepts, such as queuing systems (M/M/1, M/D/1, M/G/), polling systems, multi access protocols (CSMA), shortest path routing, optimal routing and flow control. A good understanding of probability, digital systems and computing systems is required.

***727 / Wireless Communication Networks / T.D. Todd**

Introduction to the current state-of-the-art in wireless networking. Topics include infrastructure networking for wireless communications, smart antennas in wireless networks, wireless LANs and ATM, mobile IP, media access protocols for wireless networks and other resource allocation issues. Various networking aspects of wireless system operation such as location updating and roaming. Emphasis on system architecture, protocols and performance.

***728 / Multimedia Communications / S. Shirani**

The goal of this course is to introduce technologies involved in multimedia communications. Methods used to efficiently represent multimedia data (video, image, and audio), and deliver them over a variety of networks are discussed. State-of-the-art compression techniques will be introduced. Emphasis, however, will be given to compression standards, including H.26x, MPEG, and JPEG. The requirements and performance issues of multimedia networks (such as throughput, error resilience, delay, and jitter) and multimedia communications standards are introduced. Special factors in transmission of multimedia over ATM, wireless, and IP networks will be discussed. Moreover, authentication issues in multimedia communications (e.g. encryption, watermarking) are briefly introduced. Finally, multimedia databases, indexing and retrieval are presented. Current research areas in multimedia communications will be reviewed through students' seminars.

***729 / Resource Management and Performance Analysis in WirelessCommunication Networks / D. Zhao**

This course focuses on resource management and performance analysis in transporting multimedia traffic in wireless communication networks. Topics include traffic characteristics, connection admission control, packet scheduling, access control, and mobility and handoff management.

***731 / Networks: QOS Routing, Switching, Scheduling / T. Szymanski**

"Traffic Engineering" in telecommunication networks is rapidly evolving in response to the need to provide quality of service guarantees for data traffic in the internet. The course will focus on selected topics in the field, including the mathematical analysis of queueing systems, traffic models, large-scale switching system architectures, switch scheduling algorithms for QOS and network routing for QOS.

***732 / Non-linear Control Systems / S. Sirouspour**

Topics to be covered range from phase-plane analysis, Lyapunov and input-output stability, to feedback linearization and back stepping control.

***733 / Nonlinear Optimization for Engineers / Dr. M. Bakr**

This course addresses different concepts in nonlinear optimization with a special focus on electrical applications. Starting with classical optimization approaches and single dimensional methods, we move to cover unconstrained and constrained multidimensional optimization. Both gradient-based and value-based optimization approached are covered. The course also addresses areas of research relevant to electrical engineering. These include space mapping (SM) optimization, global optimization approaches such as particle swarm optimization (PSO), and adjoint variable methods (AVM). The examples and projects mainly focus on applications relevant to electrical engineering.

***734 / Advanced Topics in Multimedia Coding and Communications / S. Dumitrescu**
This course will familiarize the students with recent results in several modern research topics in multimedia coding and communications. Four main topics are covered: joint source-channel coding/decoding; multiple description coding; distributed source coding; network coding. Presentation will include the theoretical foundations (asymptotic rate-distortion results) as well as practical aspects (coding and decoding strategies, optimal code design), applications, and open problems.

***735 / Network Information Theory / J. Chen**
Network information theory deals with the fundamental limits on information flow in networks and optimal coding techniques and protocols that achieve these limits. It extends Shannon's point-to-point information theory to networks with multiple source and destinations. Although a complete theory is yet to be developed, several beautiful results and techniques have been developed over the past forty years with applications in wireless communication, the Internet, and other networked systems. The course aims to provide a broad coverage of key results, techniques, and open problems in network information theory.

Microelectronics

***740 / Semiconductor Device Theory and Modeling / M.J. Deen,Y. Haddara**
This course provides a fundamental in-depth knowledge of the theory of operation, modeling, parameter extraction, scaling issues, and higher order effects of active and passive semiconductor devices that are used in mainstream semiconductor technology. There will be a comprehensive review of the latest models for the devices that are valid out to very high frequencies and the use of physical device modeling/CAD tools. A review of the latest device technologies will be presented. The course will be a prerequisite to the other applied courses in microelectronics.

***741 / Analog Integrated Circuits / M.J. Deen**
This course provides a fundamental and in-depth knowledge of the analysis, modeling, and design of analog integrated circuits (ICs), mostly at radio frequencies (RF). It covers many aspects of the analysis and design of analog integrated circuits, mostly in CMOS technology. The topics include transistor models, reliability, small-signal analysis, amplifier design, biasing, noise analysis, low power design and examples of analog and RF ICs. It includes a review of the important circuit design techniques and device technologies. A good understanding of semiconductor device theory and modeling is required.

***742 / Digital Integrated Circuits / T. Szymanski**
Digital IC Design Flow, Deep Submicron Design Flow, VHDL hardware description language, synthesis of VHDL, CMOS logic, standard cell libraries, high speed clocking, verification, simulation, and testing, IC packaging, high speed I/O, ECL, LVDS, memory structures, Computer Aided Design algorithms.

***744 / System-on-a-Chip (SOC) Design and Test: Part I - Methods / N. Nicolici**

This course provides in-depth knowledge of the design methodologies that meet the challenge of the global shift from chip-based products to those which implement complete systems on a single chip. The course focuses on the novel intellectual property (IP)-centered design methodologies. The topics include embedded processor cores and memories, low power design, system verification and fault-tolerant computing. Understanding of application specific integrated circuits and hardware description languages is recommended.

***745 / System-on-a-Chip (SOC) Design and Test: Part II - Algorithms / N. Nicolici**

This course offers fundamental algorithms that are part of the computer-aided design (CAD) tools which are essential to the future of SOC design. The topics include system, algorithmic, gate and physical level design automation algorithms, as well as computer-aided verification and test. Knowledge of system-on-a-chip design methods is required.

***746 / Analysis and Design of RF ICs for Communications /C.H. Chen**

This course provides a fundamental and in-depth knowledge of the analysis and design of radio-frequency (RF) integrated circuits (IC) in CMOS technology for wireless communications. The topics include the modeling of active and passive components for AC and noise analysis, design examples of amplifiers, filters, oscillators, PLL and frequency synthesizers. Circuit performance will be evaluated by both hand calculations and computer simulations. A good understanding of circuit analysis and CAD tools (e.g. HSPICE or SpectreRF) is required.

***747 / Polymer and Organic Semi-Conductors / Y. Haddara**

The course will explore electronic properties of polymer and organic semiconducting materials. In particular, we will study material structure, charge carriers, electronic transport, the effect of doping, device behavior, and fabrication issues.

Microwaves and Photonics

***750 / Advanced Engineering Electromagnetics / W.P. Huang, X. Li, N. Nikolova**

This course provides solid understanding of electromagnetic phenomena related to microwave and millimetre-wave engineering, antenna engineering and wireless technology. It also gives comprehensive review of the last achievements in high-frequency computational electromagnetics, which form the core of contemporary electromagnetic CAA/CAD tools. Special attention is paid to analytical and numerical approaches and techniques for the analysis of electromagnetic wave propagation.

****753 / Modern Antennas in Wireless Telecommunications/ N. Nikolova***
(cross-listed as Computational Science and Engineering *753)

The course provides fundamental knowledge in the theory and practice of antennas used in modern wireless systems. It starts with an introduction into the theory of electromagnetic radiation. Fundamental antenna parameters are described in conjunction with the basic antenna measurement techniques. The course proceeds with classical antenna problems such *as infinitesimal dipoles, wire and loop antennas; antenna arrays; reflector and horn antennas. Special attention is paid to printed antennas and their applications to wireless systems.*

***754 / Modeling and Simulation of Photonic Devices andCircuits I (Passive Devices and Circuits) / W.P. Huang**

Photonic devices and circuits are key components used for lightwave generation, amplification, transmission and detection in communication systems and networks. Photonic devices and circuits that utilize primarily photons, in conjunction with electrons can offer the tremendous bandwidth which is the key to a variety of applications, especially broadband communication systems and networks. This course will focus on the modeling of passive device physics through numerical approaches, the simulation of device terminal performances through mixed analytical and numerical methods and the extraction of device behaviour models. This course will also cover circuit level simulation for a variety of monolithic or hybrid integrated photonic circuits constructed on those devices.

***755 / Modeling and Simulation of Photonic Devices andCircuits II (Active and Functional Devices) / X. Li**

Photonic devices and circuits are key components used for lightwave generation, amplificaton, transmission and detection in communication systems and networks. Photonic devices and circuits that primarily utilize photons, in conjunction with electrons, can offer the tremendous bandwidth which is the key to a variety of applications, especially broadband communication systems and networks. This course will focus on the modeling of active and functional device physics through numerical approaches, the simulation of device terminal performances through mixed analytical and numerical methods and the extraction of device behaviour models.

***756 / Design of Lightwave Communication Systems andNetworks / S. Kumar**

Lightwave communication has emerged as the undisputed transmission method of choice in almost all areas of telecommunication, mainly because it offers unrivalled transmission capacity at low cost. This course will mainly focus on the design and simulation of the physical layer of lightwave communication systems and networks based on the advanced discrete and integrated photonic devices and optical fibers.

***757 / Numerical Techniques in Electromagnetics / M. Bakr**

This course provides a solid understanding of the computational electromagnetic techniques used to model electromagnetic phenomena related to microwave and millimetre-wave engineering, antenna engineering and wireless technology. A systematic approach is adopted in which the complexity and dimension of the explained techniques are increased starting with simple ID problems.

***778 / Introduction to Nanotechnology / C-H Chen. X. Li**

This course provides a fundamental knowledge in nanotechnology. It focuses on the new physical phenomena due to the reduction of device dimension and the new applications as a result of these new phenomena. The topics include nano-materials, nano-processing, nano-electronics, nano-photonics, nano-biotechnology, nano-MEMS and nano-integration. Students will learn what should be considered in the nano-world, what new applications we might be benefited from, and what precautions we need to pay attention when dealing with issues in the nano-world.

Signal Processing

***760 / Stochastic Processes / T. Field**

Concepts of probability, logical relations, conditional probability and expectation, Bayes theorem, Bayesian statistics, central limit theorem; continuous random variables, correlation and higher order statistics; theory of distributions: moments, heavy tailed distributions, Cauchy distribution, characteristic functions, stability / infinite divisibility; Markov property, principles of stationarity, ergodicity; power spectral density and auto-correlation; population dynamics, birth-death-immigration processes, the Poisson process; diffusion processes, the Fokker-Planck equation; Brownian motion and the Wiener process; introduction to stochastic differential equations.

***761 / Advanced Digital Signal Processing / T. Davidson**

Statistical signal processing, nonparametric and parametric spectral estimation, direction finding in sensor arrays, adaptive beamforming, adaptive filtering and filter banks, applications to radar, sonar, communications, and biomedical engineering.

***762 / Detection and Estimation / K.M. Wong**

Hypothesis testing, decision criteria, detection of signals in noise; theory of parameter estimation, Bayes estimate, maximum likelihood estimate, Cramér-Rao bound, linear mean square estimation, Wiener filtering, Kalman filtering, applications to communication and radar systems.

***763 / Signal Space Theory / K.M. Wong**

Signal spaces, discrete signal representations, integral transform for signal representation, representation of linear operators, characterization of signal properties, time-frequency representations of signal.

****764 / Computational Vision / D.W. Capson (cross-listed as Biomedical Engineering *764)***

Formation and representation of pictorial data; Imaging geometry and sensor calibration; Filtering; Edge detection; Binary image processing; Measurement of shape, texture, shading and depth; Time-varying image analysis; Applications in automation, biometrics and document processing.

***765 / Multirate Filter Banks and Wavelets / T. Davidson**

Multi-rate signal processing, M^{th} band and mirror filters, M-band filter banks and perfect reconstruction of signals; filterbank families, design and performance; wavelet transforms, multi-resolution signal decomposition.

766 / Pattern Recognition / M. Kamath(cross-listed as Biomedical Engineering *766)
To study the basic concepts of pattern recognition, algorithms employed and their performance: patterns and transformations. Supervised and unsupervised classifiers.Bayes classifier and discriminant functions. Feature selection/extraction.Parameter estimation and learning.Clustering.Syntactic recognition. Neural networks in pattern classification.

***767 / Multitarget Tracking and Multisensor InformationFusion / T. Kirubarajan**
This course will introduce the advanced concepts and algorithms for multisensor-multitarget tracking under realistic conditions (with imperfect sensors and measurement uncertainties). In addition, this course will deal with multisource information fusion with applications to communications, signal processing and target tracking.

***771 / Algorithms for Parameter and State Estimation/ T. Kirubarajan**
(cross-listed as Computational Science and Engineering *791)
The objective is to present a comprehensive coverage of advanced estimation techniques with applications to communications, signal processing and control. In addition to theory, the course also covers practical issues like filter initialization, software implementation, and filter model mismatch. Advanced topics on nonlinear estimation and adaptive estimation will be discussed as well.

***772 / Neural Networks and Learning Machines / S. Haykin**
Statistical learning theory, including VC, regularization, and Bayesian theories.Algorithms for multilayer perceptrons, kernel-basedlearning machines, self-organizing maps, principal components analysis, and blind source separation.Sequential state estimationalgorithms, including extended Kalman filter, unscented Kalman filter, and particle filters; applications to learning machines.

***774 / DSP System Design / D.W. Capson, N. Nicolici, S. Shirani**
This course addresses implementation aspects required to design custom and semi-custom systems for digital signal processing (DSP). Distinct fields, such as DSP, computer architecture, parallel processing and programmable very large scale integrated (VLSI) digital circuits are brought together. The emphasis is placed on efficient digital architectures for high speed, low area, and power efficient DSP systems.

***775 / Cognitive Dynamic Systems / S. Haykin**
Cognition.Neural information processing.Spectrum sensing.Bayesian filtering for state estimation.Cognitive dynamic programming for control.Cognitive radar.Cognitive radio.Self-organizing systems.

***777 / Advanced Topics in High Fidelity Image and Video Processing / X. Wu**
This course introduces students to the exciting problems of high fidelity image and video processing, and brings them to the frontier andchallenges of this research area. The lectures will cover the theoretical fundamentals (the limits of sampling and reconstruction,mathematical modeling of multi-dimensional signals, etc.), algorithmic

techniques, applications, and open problems. The course willprepare the students for future research endeavours and industrial jobs in the areas of image/video processing, multimedia, medicalimaging, etc.

Power

***783 / Electric Power Transmission and Distribution, Elementsand Systems / TBA**
The transfer of electric power including the design of conductors, with electrical and mechanical considerations, and the determination of power line parameters. Operation of power lines under steady-state and transient conditions with special attention to current and voltage limitations including temperature effects, corona and protection.

790 / Graduate Poster Seminars in Electrical and Computer Engineering
(This is a zero-credit course)
Research poster seminar series presented by graduate students in electrical and computer engineering. All full time graduate students are required to register for this course as outlined in "General Requirements." Grading will be restricted to pass/fail (P/F).

Biomedical Engineering

****779 / Medical Imaging Systems I / H. Peng, T. Farncombe***
(cross-listed as Medical Physics *770)
Medical imaging is important for both clinical medicine, and medical research. This course will provide an introduction to several of the major imaging modalities, focusing on the aspects of imaging physics, signal processing and system design. The topics to be covered include projection-imaging systems (projection X-Ray), backprojection based systems (CT, PET, and SPECT). Ultrasound, optical imaging and MRI will be covered in the second part of this course Medical Imaging System II.

****780 / Medical Imaging Systems II / M. Noseworthy, N. Bock***
(cross-listed as Biomedical Engineering *702)
This course will compliment Medical Imaging Systems I. In this course imaging methods that rely on non-ionizing radiation will be discussed. The course content focuses on magnetic resonance imaging (MRI), in vivo nuclear magnetic resonance (NMR), ultrasound (US), and optical imaging methods. Advanced concepts such as multi-modality imaging approaches, image fusion, and functional medical image processing will be discussed.

***785 / Computer Integrated Surgical Systems / A. Patriciu**
This course will present computer-based techniques and systems that use the information from medical images to support clinicians during surgical interventions. Applications of computer-based techniques for diagnostic, preoperative planning, treatment optimization, execution, and follow up will be presented. The emphasis of the course will be on image-guided interventions.

791 / Sensory and Neuromuscular Engineering / H. de Bruin (cross-listed as Biomedical Engineering *791)

The course isdesigned to give the student a more detailed knowledge of engineering applications to sensory and neuromuscular physiology. Topics include models of the myelinated and unmyelinated nerves including applied stimulating electrical fields; electrical fields in tissue resulting from surface and subcutaneous applied stimuli; surface and subcutaneous electrical fields in tissue resulting from single or populations of active nerve or muscle fibers; models of neuromuscular control; acquisition and analysis of kinesiologicalelectromyographic and electroneurographic signals to determine normal and pathological neuromuscular function; magnetic and electrical stimulation of neural structures; Functional Electrical Stimulation (FES) and Magnetic Stimulation (FMS) in rehabilitation; neuroprostheses and sensory system interfaces.

792 / Medical Visualization(cross-listed as Biomedical Engineering *792)

A course covering the principles and techniques of visualizing anatomical structures from 2D and 3D medical data sets generated by various imaging modalities such as: X-ray, computed tomography (CT), magnetic resonance (MR), functional MR (fMR) and ultrasound. The application of computer visualization/virtual reality to clinical diagnosis, treatment planning and minimally invasive surgery will also be covered.

793 / Cardiopulmonary Engineering(cross-listed as Biomedical Engineering *793)

A course to give the student a more detailed understanding of the cardiopulmonary system and the relevant diagnostic and therapeutic technology. Topics include fluid mechanics of the circulatory and pulmonary systems; linear and nonlinear models of pulmonary function and control; acquisition and analysis of the electrocardiogram including heart rate processing and applications; principles of ventilation and instrumentation design; methods of measuring and analysing cardiac output and pulmonary function; the design and application of pacemakers; cardiac assist devices, and other therapeutic technology.

***794 / Robotic and Telerobotic Control Systems / S. Sirouspour**

Topics to be covered range from the introductory rigid motions and coordinate transformations to advanced subjects such as design of controllers for teleoperation systems.

***795 / Quantitative Electrophysiology / I. Bruce, H. deBruin**

This course provides a solid quantitative understanding of the behaviour of excitable cells, the resulting extracellular fields, measurement of extracellular fields using techniques such as EMG and EEG and functional electrical stimulation of excitable cells for neural and muscular prostheses.

796 / Models of the Neuron / I. Bruce (cross-listed as Biomedical Engineering *796 and Computational Science and Engineering *796)

This course provides a solid conceptual and quantitative background in the modeling of biological neurons and how they function as computational devices. Practical experience will be gained in modeling neurons from a number of perspectives, including equivalent electrical *circuits, nonlinear dynamical systems, and random point-processes, and an introduction to the mathematics required to understand and implement these different engineering methodologies will be given.*

***798 / Biomedical Signal Modeling and Processing / A. Jeremic**
A key to efficient biomedical signal processing is a fundamental understanding of physical models, simplified but adequate mathematical models and statistically efficient signal processing algorithms. This course exposes students to advanced signal processing techniques and illustrates their application to biomedical signal processing and diagnostic imaging.

Special Topics Courses in Electrical and ComputerEngineering

Current developments and specialized aspects of electrical and computer engineering.

***718 / *719** / Special Topics in Computation
****738 /*** *Special Topics in Communication Systems and Networks*
*(cross-listed as Computational Science and Engineering *742)*
***739 /** Special Topics in Communication Systems and Networks
***748 / *749** / Special Topics in Microelectronics
***758 / *759** / Special Topics in Microwaves and Photonics
****768 /*** *Special Topics in Signal Processing*
*(cross-listed as Computational Science and Engineering *768)*
***769** / Special Topics in Signal Processing
***788 / *789** / Special Topics in Power
***799** / Special Topics in Biomedical Engineering

In addition, 600- and 700-level graduate courses in other departments may well be suited to the needs of Electrical Engineering graduate students. Among them are: Computer Science *6GB3; Engineering Physics *6D03, *6E03, *6F03, *6K03, 6S04, *721, *722, *723, *724, *725, *782. Mathematics *745; Mechanical Engineering *724; and Statistics *6D03, *6U03, *741, *742, 743, *744, *754, *761.

Research in Electrical and Computer Engineering

The Department of Electrical and Computer Engineering has established an international reputation for its rigorous program of fundamental and applied research. The main areas of work are telecommunications, signal processing, microelectronics, photonics, computer engineering and power engineering. Many of the faculty are involved in specialized interdisciplinary groups within these and other fields with interaction among other departments in engineering, mathematics, science and business. Financial support for the faculty members of this department comes from a variety of sources including the Natural Sciences and Engineering Research Council (NSERC), federal and provincial centres of excellence programs such as Micronet, OCE and MITACS and from contractual research arising from the department's history of strong industrial interaction. The department has also been successful in attracting several NSERC Industrial Research Chairs and Canada Research Chairs. Most of its faculty members are registered professional Engineers in the province of Ontario and among them, several are IEEE Fellows.

In the area of signal processing, very significant research has been carried out in sensor array processing, statistical signal detection and estimation, adaptive systems, optimum designs, signal and image coding and compression, etc. Applications of such techniques include data communications, transmitter/receiver design, multi-antenna, radar, sonar, speech, image, graphics, video, and sensory-based servo systems; computer vision, multi-camera distributed imaging, and visual computing. There are extensive supportive facilities available including a microwave anechoic chamber.

In the areas of microelectronics, microwaves and photonics, extensive experimental facilities exist in various laboratories for device, circuit and system design and testing. Current areas of research include ultra-high performance CMOS devices and circuits, photodetectors and optical receivers, antennas, computational electromagnetics, microwave circuits and systems, ultrasonic devices, photonic devices and circuits, light wave communication devices, systems and networks, lasers, system-on-a-chip, VLSI testing and design automation. Extensive research efforts are underway into computer-aided design and engineering, optimization techniques and modeling. Researchers in these fields work closely with industry.

In the area of computer and telecommunications networks, current research topics include low power wireless networks, ad-hoc networks, wireless access protocols, optical networks, quality of service, switching and scheduling, multi-media transmission and telemedicine. Researchers in this group collaborate closely with industry, and are establishing several test bed systems.

In computer engineering, the simulation optimization systems laboratory is well known for its contributions to CAD/CAE as well as performance- and yield-driven circuit design methods. Research activity in computational vision is linked closely with the Intelligent Machines and Manufacturing Research Centre (IMMRC), a multidisciplinary group whose interests include sensory-based systems and robotics. Other research areas in computer engineering are design automation and test of embedded computing systems.

Recently, the department has substantially increased its involvement in biomedical engineering and this is continuing to expand. At present the research in this area includes modeling of human hearing, sound processing for human audio systems, modeling of human brain and neuromuscular system, brain and muscle (EEG and EMG) signal processing, modeling of the human cardiopulmonary system, biomedical instrumentation and imaging. A combined approved B.Eng./M.Eng. biomedical engineering program has been implemented for students interested in developing their careers in this area.

Research Facilities

In addition to specialized equipment available in individual research labs, graduate students in the Department of Electrical and Computer Engineering have access to a wide range of advanced computer facilities. Major departmental computational assets include an IBM Blade Center Cluster with 140 compute nodes, a Computer Aided Design (CAD) facility and a System-On-Chip (SOC) design centre. Red Hat Linux is installed on the compute nodes in the Blade Center Cluster along with Matlab, parallel compilers from the Portland Group, and optimization software from ILOG (CPLEX, AMPL, SCHEDULER and SOLVER). The CAD facility consists of 5 Red Hat Linux workstations with application software from Cadence, Mentor Graphics and Synopsys, supplied by CMC, along with proprietary cell libraries and device models from Artisan, DALSA, IBM, STMicroelectronics and TSMC. The System-On-Chip design centre consists of 11 System-Level Prototyping Stations (SLPS) with a variety of Altera and Xilinx development boards.

The department is an NVIDIA CUDA Training Center with 5 Windows PCs with GeForce GTX 470 GPU cards and one with a Tesla C2050 GPU card dedicated to support instruction in CUDA programming for parallel systems.

Further details may be obtained from the department website (http://www.ece.mcmaster.ca) which contains links to the home pages of individual faculty members as well as the various research groups.

ENGINEERING DESIGN

The General Motors of Canada Centre for Engineering Design (GMC-CED) within the Walter G. Booth School of Engineering Practice offers complete facilities to students seeking the Master of Engineering Design (M. Eng. Design) degree in the following fields of study:

- Process Systems Design and Operation
- Product Design
- Sustainable Infrastructure

Enquiries: 905-525-9140 Ext. 26566
Email: design@mcmaster.ca
Fax: 905-528-7901
Website: http://msep.mcmaster.ca/ced/

Staff / Fall 2012

PROFESSORS
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INDUSTRY PROFESSORS
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Harry Mahler, Dipl. Ind. Design, OCAD, M.A.I.D. (Birmingham)
Ivan Miletic, B. Eng., M. Eng., M.B.A. (McMaster)

ASSOCIATE MEMBERS
Vishwanath V. Baba (Business)
Brian W. Baetz (Civil Engineering)
Wael El-Dakhakhni (Civil Engineering)
Carlos Filipe (Chemical Engineering)
Dieter Stolle (Civil Engineering)
Michael Tait (Civil Engineering)

Innovative new designs and the ability to improve performance of existing systems have become a basis for a competitive advantage in the markets. Performance, environmental sustainability, safety, and efficiency are integral parts of the requirements in the design of industrial products, large-scale systems, or software solutions. Within this complex set of constraints, successful engineers and engineering managers must be able to lead transformation of an idea to a complete design by working in interdisciplinary teams. The Master of Engineering Design program provides its participants with technical expertise and leadership capabilities required to invent novel solutions and to lead technically oriented organizations. Strong emphasis on solving engineering problems from industrial practice is accomplished via industrial motivated and supported projects.

The M.Eng. Design program emphasizes development of competencies in:

- Leadership, collaboration, and management skills to lead diverse teams.
- Design thinking and innovations methodologies
- Engineering disciplines leading to breakthrough design and operation of systems in:
  - Sustainable community infrastructure (renewable energy systems, environmental systems, sustainable products and systems design, local economy)
  - Process industries (refining, chemicals, specialty chemicals, pharmaceuticals, power, oil and gas production, and similar)
  - Manufacturing of industrial and consumer products

Admission

In addition to the general requirements for entry into a graduate program in Engineering, students must hold a 4-year engineering undergraduate degree, with at least a B- average (equivalent to a McMaster 7.0 GPA out of 12) in the final year in all courses in the discipline, or relating to the discipline, in which the applicant proposes to do graduate work. Each applicant will also be interviewed as part of the admission process.

Strong letters of recommendation are also required. Each applicant will also be interviewed as part of the admission process. Professional work experience will be highly desirable.

Bachelor of Technology students are also required to take the Graduate Record Exam.
- Verbal >550
- Quantitative >550
- Verbal and Quantitative >1200
- Analytical Writing >3.5

Candidates may be enrolled on a full- or part-time basis. Full-time students will complete the degree in twelve consecutive months of study. Students are admitted for September or January. Part-time students will normally be expected to complete the program in two years.

Prospective applicants who did not attain the required standing in their undergraduate degree, but who have at least four (4) years of relevant work experience, should discuss their situation with the program director. If the experience is deemed sufficient, the director may then recommend an interview. Evidence of ability to do graduate work will still be required. (See Sections 2.1.1 Admission Requirements for Master's Degree and 2.1.3 Admission of Students with Related Work Experience or Course Work beyond the Bachelor's Degree in the Graduate Calendar.)

Curriculum

Candidates will be required to complete satisfactorily the equivalent of at least three full courses.

The curriculum has five main components:

1. **Leadership and Management Capabilities** courses that will enable M.Eng. Design graduates to deal with complex situations in the work environment, to lead teams, and to manage projects.

2. **Interdisciplinary engineering courses** in product design, project management, and risk management.

3. **Core technical courses** that provide expert knowledge intargeted technical areas.

4. **Elective courses** that allow students to acquire broader expertise in the technical areas which are at the centre of their studies.

5. **An industrially oriented project** that solves complex problems requiringsynthesis of knowledge from several disciplines and presenting the students with an opportunity to develop the solution in an industrial environment.

<u>PROCESS SYSTEMS DESIGN AND OPERATION</u>

Master of Engineering Design program in the field of Process Systems Design and Operation provides advanced competencies for engineers and supervisors typically working in:

- Process Design
- Advanced Process Control
- Plant Operations
- Process Industry Oriented R&D
- Control Systems and Software

The following course requirements need to be fulfilled by thecandidate:

1. Leadership and Management: Candidates are required to take the following:
   ***734 /** Leadership and Management Development

2. Interdisciplinary Engineering: It is recommended that the candidates take the equivalent of one half course selected from the following courses:
   #730 / Reliability & Risk Management and
   #733 / Project Management
   ***760 /** Design Thinking

3. Core Technical Courses
   Candidates are required to take two half courses.

Recommended courses for candidates focusing on *Process Design, Process Control, or Plant Operations* include:

***751 /** Process Design and Control for Operability
***752 /** Process Modeling and Optimization
***6C03 /** Statistics for Engineers
***754 /** Process Design and Integration for Minimal Environmental Impact
CHEMENG*752 / Optimization of Chemical Processes
CHEMENG *765 / Multivariate Statistical Methods for Process Analysis and Monitoring

Recommended courses (two or more half courses) for students with a background or interest in *Control Systems Engineering* are:

CAS *6CD3 / Distributed Computer Systems
CAS*6EB3 / Database Management System Design
CAS*704 / Embedded, Real-Time Software Systems
CAS*703 / Software Design
CHEMENG *6E03 / Digital Computer Process Control
ECE*726/ Local Area Networks in Manufacturing Environment
ECE *732 / Non-linear Control Systems
ECE *771 / Algorithms for Parameter and State Estimation
ECE *772 / Neural Networks and Learning Machines

4. Elective Technical Courses

Candidates are required to take two half courses which should be selected from graduate courses offered by departments within the Faculty of Engineering. Candidates are required to have their elective course selection approved by the Director of the Program.

PRODUCT DESIGN

Innovation and creative system, solutions, or product design are emphasized through problem solving via interdisciplinary teams in a design studio environment, while learning about the use of materials in product design and design for manufacturing are led by the faculty who are also members of McMaster's advanced centres (including Centre for Automotive Materials, Manufacturing Research Institute, Institute for Polymer Production Technology and the Centre for Advanced Polymer Processing and Design). The interdisciplinary nature of the program enables its participants to work on a variety of designs, such as industrial machinery, consumer products, automotive, etc.

The following course requirements need to be fulfilled by thecandidates:

1. Leadership and Management

   Candidates are required to take the following:
   ***734 /** Leadership and Management Development

2. Core Technical Courses

   Candidates are required to take two design half courses:
   ***760 /** Design Thinking
   ***761 /** Design Innovation
   ***765 /** Design Development

3. Elective Technical Courses

Candidates are required to take three half courses which should be selected from graduate courses offered by departments within the Faculty of Engineering. Candidates are required to have their elective course selection approved by the Director of the Program.

SUSTAINABLE INFRASTRUCTURE

Candidates in this field of study cover various aspects of the design of sustainable communities, including:

- Public realm spaces (parks, sidewalks, recreation facilities)
- Storm water management
- Housing and energy efficient buildings
- Development of local business
- Sustainable transportation systems
- Sustainable energy generation

The following course requirements need to be fulfilled by thecandidates:

1. Leadership and Management

   Candidates are required to take:
   ***734 /** Leadership and Management Development

2. Interdisciplinary Engineering

   Recommended courses include:
   #730 / Reliability and Risk Management and
   #733 / Project Management
   ***760 /** Design Thinking

3. Core technical Courses

Candidates are required to take four half-technicalcourses, which should be selected from graduate courses offered by departments within the Faculty of Engineering. Suggested courses in sustainable energy systems and manufacturing are:

SEP *6I03 / Sustainable Manufacturing Processes
SEP *705 / Green Engineering, Sustainability and Public Policy
SEP *745 / Sustainable Community Infrastructure I
SEP *746 / Sustainable Community Infrastructure II
SEP *747 / Energy Efficient Buildings
SEP *748 / Development of Local Sustainable Communities

Candidates are required to have their elective course selection approved by the Director of the program.

Courses

Courses identified with an asterisk (*) are half courses. Courses identified with a pound (#) sign are quarter courses.

****6C03 / Statistics for Engineers / Staff(cross-listed as Chemical Engineering *6C03)***
Linear regression analysis in matrix form, non-linear regression, multiresponse estimation, design of experiments including factorial and optimal designs.Multivariate statistics.Special emphasis on methods appropriate to engineering problems.

#730 / Reliability and Risk Management / Staff
The course presents a broad treatment of the subject of engineering decision, risk, and reliability. Emphasis is on (1) the modeling of engineering problems and evaluation of systems performance under conditions of uncertainty; (2) risk-based approach to life-cycle management of engineering systems; (3) systematic development of design criteria, explicitly taking into account the significance of uncertainty; and (4) logical framework for risk assessment and risk/benefit tradeoffs in decision making. The necessary mathematical concepts are developed in the context of engineering problems.

***731 / Analytical Tools for Energy Management / Staff**
The course is designed to provide analytical tools to newprofessionals entering the world of energy management. It provides an overview of energy management, understanding of energy costs, appreciation for where they are incurred and how to reduce them. The context for energy management in a commercial or industrial facility with energy usage that is significant and involves complex systems. Topics covered include energy audits, life cycle costing, renewable energy systems, distributed generation, and improvement of efficiency through an understanding of combustion systems, process energy use, lighting, maintenance practices, and control systems.

***732 / Sustainable Energy – Technology and OptionsSelection / Staff**
Assessment of potential current and future energy systems, covering resources, extraction, conversion, and end-use, with emphasis on meeting regional and global energy needs in the 21st century in a sustainable manner. Renewable and conventional energy technologies are presented (solar, wave and tidal, wind, hydropower, biomass, geothermal, nuclear, fossil) and their attributes described within a framework that aids in evaluation and analysis of energy technology systems in the context of political, social, economic, and environmental goals.

#733 / Project Management / Staff
Project Management is a critical skill in today's business environment. This course covers the basics of project management techniques and tools to improve project success. Students will learn how to apply effective project management to a variety of common business situations, including starting a company, bringing a product to market, constructing a physical facility, and developing a major piece of software, among others. Case studies and guest speakers will be used to explore real-life examples of project management successes and failures.

***734 / Leadership and Management Development / V. Baba**
Managerial competence is a function of knowledge, skills, and experience relevant to management. The purpose of this course is to develop skills in diagnosing situations that require change in organizational life and to facilitate such changes. Within the context of organizational behaviour, the course will emphasize the acquisition of personal, interpersonal, and group skills that are required to lead and manage people effectively in modern organizations.

***744 / Holistic Considerations for Design of Structures / Staff**
Buildings are complex systems that require at the design and major retrofit stages careful consideration of safety, serviceability and aspects dealing with environmental factors, energy consumption and movement of moisture. The design of buildings and other structures must also take into account durability of materials, life-cycle cost and general principles of sustainability.

***745 / Design of Sustainable Community Infrastructure I/ B. Baetz**
This course will give the underlying theory and practical applications for understanding the design of the following elements of a sustainable community: the public realm (streets, sidewalks, parks and open space); urban energy systems.

***746 / Design of Sustainable Community Infrastructure II/ B. Baetz**
This course will give the underlying theory and practical applications for understanding the design of the following elements of a sustainable community: local food production systems; urban forestry; stormwater management systems; pedestrian zone and bikeway infrastructure; by-product management systems for recycling and composting.

***747 / Energy Efficient Buildings / S. Chidiac**
The objective of the course is to provide students with a good understanding of (1) building energy sources, (2) energy efficient technologies for commercial and industrial-type buildings, and (3) energy efficient buildings. Topics covered: Building major energy sources and areas of end use including building envelope, HVAC, distribution system, lighting system, internal loads, etc.; building energy balance, energy audit of buildings, energy conservation measures, building simulation tools, design of integrated systems.

***748 / Development of Local Sustainable Communities / Staff**
Local economy as a basis for sustainable communities.Deciding on the role of the community (thinkers, makers, traders) and development of economic competitive advantage and the associated business clusters.Community corporations.Pro-community local governance.Regeneration of livable cities. Case studies on Ontario regional economies.

***750 / Model Predictive Control Design and Implementation / Staff**
Majority of advanced control designs employed in practice use the Internal Model Control (IMC) structure and Model Predictive Control (MPC) concepts. The course presents theory and best implementation practices for control model identification, controller design, testing, and implementation. Upon completion of this course, the engineer will be able to perform the following: identify linear models for control, design and implement MPC controllers for an integrated plant, and optimize the process using the MPC steadystate features.

***751 / Process Design and Control for Operability / Staff**
Process design involves tradeoffs to achieve performance over a range of operations due to uncertainty, variability of inputs, and a range of production goals. A flexible design functions acceptably over the range and well at the typical conditions. Processes safety (seven layers, HAZOP, LOPA, quantitative analysis), effect of structure on reliability and plant dynamics.Classical supervisory control methods and typical applications to major equipment and systems.

***752 / Process Modeling and Optimization / V. Mahalec**
Architecture of simulation programs, solution algorithms, integration of simulation models from different simulators. Steady-state and dynamic simulation via sequential modular and equation-oriented algorithms.Optimization of steady-state and dynamic performance, sensitivity of the optimum, multi-objective optimization.Analysis of plant data, gross error detection, parameter estimation to match the plant performance.On-line monitoring and optimization of process performance.

***754 / Process Design and Integration for Minimal Environmental Impact / Staff**
The course focuses on integration of process units and on the design of Energy Utility Systems, Heat Exchanger Networks (HEN) and Water Distribution Systems and presents methodologies that lead to energy efficient, water saving and economically attractive designs. Methods for heat integration (HEN, utility selection, heat engines, heat pumps, refrigeration cycles, and pinch analysis), cogeneration and integrations with industrial sites, water and cooling minimization and their applications.

***760 / Design Thinking / R.V. Fleisig, Staff**
This course will explore the creative design process, tools and methods that will enable students to discover, identify, and analyze opportunities and develop those opportunities into innovative design solutions. Based on a series of self-contained exercises and small projects, students will work to research a well-conceived design concept by the end of term. Prerequisite: Instructor permission

***761 / Design Innovation / R.V. Fleisig, Staff**
This course will explore the creative design process from concept to design. Students will learn processes, tools, and methods for prototyping, analyzing, visualizing, and validating a design with the goal of delivering innovative design solutions. Students will work in small teams to develop a specification by the end of the term, supported by scheduled gate reviews, in-class presentations, and peer review. The outcome of the course will be a final presentation where students will demonstrate their appearance model. The course is studio-based with a lecture component. Prerequisite: *760

***763 / Special Topics in Engineering Design / Staff**
Studies selected from specialized areas of research or representing special areas of expertise in areas of engineering design with regard to either process systems and operations, product design or sustainable infrastructure.

***764 / Visual Thinking / Staff**
This course will explore the use of visual tools and methods to enhance the creative design process. Students will learn to represent, map, organize and analyze complex product and system topics in a clear, holistic manner. The ability to visualize research information will enable students to identify design issues, discover opportunities and define design directions and to clearly present their ideas to others. The outcome of the course will be a final presentation where students will present their design analysis of a specific topic. The course is studio-based with a lecture component. Prerequisite: *760

***765 / Design Development / Staff**
This course will explore the inventive systems design process from problem to specifications using established design practices from industry. Students will identify stakeholder needs, explore one or more technological design spaces, model their design, and validate it. The outcome of the course will be specifications and one or more identified engineering problems for the practicum. Students will work in small groups, supported by scheduled gate reviews, in-class presentations, and peer review. The course is studio-based with a lecture component. Prerequisite: *760

***770 / Total Sustainability Management / L. Belkhir**
This course introduces sustainability within a unified framework of Total Sustainability Management that will teach the student how to deeply embed sustainability into the enterprise through the use of Design principles, Bill-of-Rights of the Planet and through public policy. This approach will apply to not only a company product but also to its business strategy and business model. Furthermore, the course will teach the student a problem-solving approach that combines innovation, design and policy to emphasize the synergetic interplay between them. The student will learn how to think of sustainability as a “Way of Thinking.” The course will make liberal use of appropriate case studies, and call on several internal and external speakers who are recognized subject-matter experts.

ENGINEERING ENTREPRENEURSHIP AND INNOVATION

The Xerox Centre for Engineering Entrepreneurship & Innovation (XCEEI) within the Walter G. Booth School of Engineering Practice offers complete facilities to students seeking the Master of Engineering Entrepreneurship and Innovation (M.E.E.I.) degree.

Enquiries: 905-525-9140 Ext. 26566
Email: innovate@mcmaster.ca
Fax: 905-528-7901
Website: http://www.businessinnovation.ca/program.html

Staff / Fall 2012

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David K. Potter, B.Sc., Ph.D. (Waterloo) / Director, and Don Pether Chair in Engineering & Management

ADJUNCT PROFESSOR
S. Steven Treiber, B.Eng. (McGill), M.A.Sc. (Toronto), Ph.D. (McGill)

ENTREPRENEUR-IN-RESIDENCE
Alan Barrell, B.Sc. (London), DBA (Bedforshire), F.R.S.A.M.C.
B.V. Phani, B.E.(Mech) (Osmania), Ph.D. (IIM, Calcutta)

The Master of Engineering Entrepreneurship and Innovation program is a fast paced program aimed at highly motivated students.

Admission

Applications for admission will be made directly through the Walter G. Booth School of Engineering Practice. In addition to the general requirements for entry into a graduate program in Engineering, candidates applying to the Master of Engineering Entrepreneurship and Innovation program must hold an Honours Bachelor's degree in engineering or closely related discipline, with at least a B- average (equivalent to a McMaster 7.0 GPA out of 12) in the final year in all courses.

Strong letters of recommendation are also required. The delivery of the program relies heavily on the synergy created between members of student teams, and successful operation of the program requires that each cohort have an appropriate blend of skills and experience. Therefore, each applicant will be interviewed. A strong performance in the interview is a critical requirement for admission.

Bachelor of Technology students are also required to take the Graduate Record Exam.
• Verbal >550
• Quantitative >550
• Verbal and Quantitative >1200
• Analytical Writing >3.5

Candidates may be enrolled on a full- or part-time basis. Students are admitted for September only.

Prospective applicants who did not attain the required standing in their undergraduate degree, but who have at least four (4) years of relevant work experience, should discuss their situation with the appropriate program director. If the experience is deemed sufficient, the director may then recommend an interview. Evidence of ability to do graduate work will still be required. (See Sections 2.1.1 Admission Requirements for Master's Degree and 2.1.3 Admission of Students with Related Work Experience or Course Work Beyond the Bachelor's Degree in the Graduate Calendar.)

A candidate is required to complete successfully two one-term advanced engineering courses and the five compulsory Engineering Entrepreneurship and Innovation module courses. A faculty advisor will assist the student in selecting relevant engineering courses. Students will normally be required to complete two graduate level (700-level) engineering courses in fulfillment of the requirements for Advanced Engineering Studies. Advanced engineering studies are an integral component of the program and are offered by various departments in the Faculty of Engineering and beyond. The objective is to acquire leading-edge engineering skills and apply them to the enterprise project.

Innovation and Entrepreneurial Skills Development

Five compulsory enterprise modules will focus on providing the Master's degree candidate basic skills to select an idea with good potential, manage the innovation process, then create and manage the business outcome. The skills will broadly cover all the business life cycle from start, growth and sustainability. The modules will develop an understanding of both the innovation and the entrepreneurial processes through lectures, workshops and hands-on work and will enable the student to fully exploit the potential of the engineering enterprise project. Each module is considered the equivalent of a half-course as defined by the School of Graduate

Studies, but will contain elements of lecture, group work, presentation and other activities as defined in the course outline. The module courses will be delivered in an intensive format; and it is expected that students will take the module courses in sequenced numerical order. The module courses are:

***6E03/**Entrepreneurial Processes and Skills (Module 1) / R. Loutfy
***6EE3 /**Breakthrough Technology Venture Development (Module 2) / D. Potter
***722 /** Positioning and Shaping an Enterprise (Module 3) / L. Belkhir
***723 /** New Venture Business Strategy (Module 4) / Staff
***724 /** Taking a New Venture to Market (Module 5) / S. Treiber

Engineering Enterprise Project

The Engineering Enterprise Project will run throughout the entire study period and will result in both a business and a technical plan for an engineering prototype product (ideally with an actual prototype device or software produced) with an identified customer base and a plan outlining the way to commercialization. The project will bring together the two complementary streams of activities, one technical and the other entrepreneurial, to bring an idea to the proof of concept phase. The Entrepreneurial course stream, which will run coincidentally with the advanced engineering studies, will guide the technological work performed in the research laboratory so that the concept becomes, by the end of the degree, the nucleus of a business proposition. The Engineering Enterprise Project will have three phases, which will end with project gate assessments to determine the project's readiness to proceed to the next phase:

Phase 1 - Project Preparation: Market research to arrive at a proposed product or service with clear value proposition; define the market for the intended product or service revealing competitive threat, opportunities, and margins and volumes projections; draw up development plans for the product or service indicating the required resources and estimated investment cost; seek the resources within the university and without; build a team of support that might include a partner.

Phase 2 - Technical Research and the Development of the Engineering Prototype: Develop an engineering research plan, identifying key issues and opportunities (with the assistance of academic technical and business supervisors); conduct technical research and development; implement the engineering research plan within the research group in the host-engineering department; build a development network within the engineering research community; ready the technology for transfer to market; conduct initial market engagement to get customer feedback and reactions.

Phase 3 - Technology Transfer to Market: Apply for IP protection; develop a path-to-market strategy; develop a business case; present to funding institutions and explore business arrangements; plan for business start-up. Each phase has two equally important components, one technical and the other business:

The Phase 3 evaluation will be a defense of your project in an oral examination to your board (technical mentor, enterprise advisor, business advisor and your business mentor). Candidates are required to complete and pass through each phase in order to graduate.

Peer Evaluation and the Enterprise Project

The ability to effectively work in a team environment is an important learning outcome of team-based project work on the Enterprise project. Candidates will be mentored on their progress in this aspect by their enterprise advisor based on input from their peers in the project team and from the observations of the enterprise advisor. Team member evaluations will be collected in confidence from team members by the enterprise advisor, or their designate, on a six-month basis. Every six months the Enterprise Advisor will review the performance of the individual candidate in the team with the candidate. The enterprise advisor will generate an assessment of performance. To successfully complete the program, the candidate must maintain an average rating of “Good” over the span of the enterprise project.

Enterprise Development Lab

The MEEI program is constructed in such a way as to allow students from different engineering disciplines to work in a common learning environment – the Enterprise Development Lab. The Lab is equipped with state-of-the-art communications equipment designed to facilitate both internal and external collaboration with faculty, colleagues, mentors, technical supervisors and private sector representatives.

Courses

Courses identified with an asterisk (*) are half courses. Courses identified with a pound (#) sign are quarter courses.

*** 6E03/ Entrepreneurial Processes and Skills / R. Loutfy**

This module course will develop an understanding of thefundamentals of sustainable businesses. Students will develop an awareness of and skills in innovation and entrepreneurial behaviour. Emphasis will be placed on becoming a more effective team player, becoming more aware of one’s own learning style and entrepreneurial orientation, and understanding the process of business idea generation, development and evaluation.

***6EE3 / Breakthrough Technology Venture Development/ D. Potter**

This course will introduce students to the concepts of new venture creation, and will provide an understanding of the responsible use of capital, basic capability in the process and techniques of market research, and appreciation of intellectual property value and protection issues. Learning outcomes include understanding the process of business planning and valuation and understanding the main types of risk that affect the nascent entrepreneurial venture.

***722 / Positioning and Shaping an Enterprise (Module 3)/ L. Belkhir**

Learning outcomes of this module course will include an understanding of the role of technology-based business in the economy; understanding the financial dimension of the venture; understanding the nature of capital investment and role of banks and VC industry; understanding business and managerial accounting; appreciating operational and resource issues; understanding project management and how the innovation process may be managed; understanding how manufacturing units may be set up and managed; and developing the ability to formulate an exit strategy.

***723 / New Venture Business Strategy (Module 4) / Staff**

The focus of this course is understanding the new venture value proposition and how to market it, including understanding market dynamics and competitive forces facing new venture and strategies to create customer value, understanding the role of IT infrastructure in driving the enterprise productivity, and understanding e-business as a channel.

***724 / Taking a New Venture to Market (Module 5) / S. Treiber**

The final module course in the program will address the skills and knowledge needed to launch and sustain the new venture. The module will provide an understanding of how to manage the new venture strategically for growth and sustainability; how to put together a high performance team; the role of value-chain management and timing; and the critical factors that contribute to business survival and longevity.

***725 / Practical Project Management for Today's BusinessEnvironment / Staff**

This course covers the basics of project management techniques and tools, as well as advanced, adaptive, and emerging approaches to improve project success. Students will learn how to apply effective project management to a variety of common business situations, including starting a company, bringing a product to market, doing primary research and development, constructing a physical facility, and developing a major piece of software, among others. Case studies, guest speakers, and hands-on exercises will be used to explore real-life examples of project management successes and failures.

***727 / Technology Entrepreneurship for Engineers and Scientists / Staff**

This is a general course taught by successful technological entrepreneurs for graduate scientists and engineers to increase their awareness of technology entrepreneurship. Entrepreneurship is a challenging career but can be rewarding and this course deals with the life experiences of successful entrepreneurs while providing a menu for how to start and run a successful small to medium sized technology-based enterprise. Lectures take the students through the step by step process of the start-up and operation of a business with a special focus on technology-based businesses. There is heavy emphasis on real-world examples and case studies. The course will be centred on a team project that consists of selecting a business, and developing a business plan to start and operate the business.

***728 / Legal Issues for the Technology-Based Enterprise**
This course provides students with an understanding of all of the relevant legal issues. In the case of IP, students will be provided with the basic tools that will allow them to identify intellectual property, protect that property by applying the necessary types of legal protection such as patents, trademarks and copyright registrations and to then transfer or permit the use of the IP by others. For enterprise formation, the course will provide practical legal tools for enterprise formation, incorporation, contracting and rules that affect its day-to-day business.

***748 / Development of Local Sustainable Communities / Staff**
Local economy as a basis for sustainable communities.Deciding on the role of the community (thinkers, makers, traders) and development of economic competitive advantage and the associated business clusters. Community corporations. Pro-community local governance.Regeneration of livable cities. Case studies on Ontario regional economies.

***770 / Total Sustainability Management / L. Belkhir**
This course introduces sustainability within a unified framework of Total Sustainability Management that will teach the student how to deeply embed sustainability into the enterprise through the use of Design principles, Bill-of-Rights of the Planet and through public policy. This approach will apply to not only a company product but also to its business strategy and business model. Furthermore, the course will teach the student a problem-solving approach that combines innovation, design and policy to emphasize the synergetic interplay between them. The student will learn how to think of sustainability as a “Way of Thinking.” The course will make liberal use of appropriate case studies, and call on several internal and external speakers who are recognized subject-matter experts.

ENGINEERING PHYSICS

The Department of Engineering Physics offers programs of study leading to the M.A.Sc., M.Eng. and Ph.D. degrees in Engineering Physics. Areas of specialization include Photonics and Nuclear Engineering.

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Faculty / Fall 2012

PROFESSORS
Adriaan Buijs, Baccalaureate (European School, Karlsruhe, Germany), M. Eng, Ph.D. (Utrecht)
Daniel T. Cassidy, B.Eng. (McMaster), M.Sc. (Queen's), Ph.D.(McMaster), P.Eng.
Harold K. Haugen, B.Sc. (Acadia), M.Eng. (McMaster), Ph.D. (Aarhus) / Joint appointment with Physics and Astronomy / Chair
Adrian H. Kitai, B.Eng. (McMaster), Ph.D. (Cornell), P.Eng. / Joint appointment with Materials Science and Engineering
Rafael N. Kleiman, SB (M.I.T.), Ph.D. (Cornell)
John C. Luxat, B.Sc., M.Sc. (Cape Town), Ph.D. (Windsor), P.Eng.
Peter Mascher, M.Eng., Ph.D. (Tech. Univ. of Graz), P.Eng.
John S. Preston, B.Eng. (McMaster), M.Sc., Ph.D. (Toronto), P.Eng.
Chang Q. Xu, B.Sc., M.Sc. (University of Science and Technologyof China), D.Eng. (Tokyo)
Shinya Nagasaki, B. Eng., M. Eng., Ph.D. (Tokyo)

ASSOCIATE PROFESSORS
Qiyin Fang, B.S. (Nankai), M.S., Ph.D. (East Carolina)
Andrew P. Knights, B.Sc., Ph.D. (East Anglia)
Ray R. LaPierre, B.Sc. (Dalhousie), M.Eng., Ph.D. (McMaster), P. Eng.
David R. Novog, B.Sc. Eng. (Manitoba), M.Eng., Ph.D. (McMaster)

ASSISTANT PROFESSORS
L. Soleymani, B.Eng. (McGill), M.Sc. (Southern California), Ph.D. (Toronto)
Ayse Turak, B.Sc. (Queen’s), Ph.D. (Toronto)

ASSOCIATE MEMBERS
M.J. Deen (Electrical and Computer Engineering)
M.S. Hamed (Mechanical)
J.E. Hayward (Radiology)

F.M. Hoppe (Mathematics & Statistics)
M.F. Lightstone (Mechanical Engineering)
K. Saravanamuttu (Chemistry & Chemical Biology)

ADJUNCT MEMBERS
Simon E. Day, B.Sc. (Saint Mary's), M. Eng., Ph.D. (McMaster)
David P. Jackson, M.A., M.A.Sc., Ph.D. (Toronto)
W.Y. Kim, B.S., M.E. (Pusan), Ph.D. (Purdue)
L. Leung, B.A.Sc., M.A., Ph.D. (Ottawa)
Nikola K. Popov, B.Eng. (Skopje), M.Sc. (Belgrade), Ph.D. (Zagreb)/ (A.E.C.L.)
Victor G. Snell, B.Sc. (Manitoba), M.Sc., Ph.D. (Toronto) / (A.E.C.L.)
Glenn D. Harvel, B.Eng., M.Eng., Ph.D. (McMaster) / (U.O.I.T.)
Benjamin Rouben, B.Sc. (McGill), Ph.D. (Massachusetts Institute ofTechnology)
Zhiyi Zhang, B.Sc.E., M.Sc. (National University of DefenceTechnology), Ph.D. (Zhongshan)

PROFESSORS EMERITI
Paul E. Jessop, B.Sc. (Waterloo), M.A., Ph.D. (Harvard), P. Eng.
David A. Thompson, B.Sc., Ph.D. (Reading)

Master's Degree

The degree may be earned either with a thesis option (M.A.Sc.) or an industrial internship (M.Eng.) to be decided jointly by the candidate, the supervisor, and the chair. A strong baccalaureate degree with an average of at least B (equivalent to a McMaster GPA of 8.0) in engineering, mathematics, or the physical sciences is generally required for admission to the M.A.Sc. program. For the M.Eng.program, an average of at least B- is required.

M.A.Sc. Degree

A candidate for the M.A.Sc.degree is required to complete a minimum of three half courses (the equivalent of one full course must be at the 700-level) with an average of at least B and a thesis. The thesis topic is chosen in consultation with the supervisor. A minimum of 12 months residence will normally be required.

M.Eng. Degree (Industrial Internship)

A candidate for the M.Eng.degree (Industrial Internship) is required to complete a minimum of two full courses (the equivalent of one full course must be at the 700-level). The candidate must attain a grade of at least B- in each of the selected courses. An on-campus project is to be pursued under the supervision of a member of the Department. The subject area is to be chosen in consultation with the Department Chair and the supervising faculty member.

In addition to the required courses and the on-campus project described above, the candidate for the M.Eng. degree (Industrial Internship) is required to complete EP 733. This involves spending approximately four months in an industrial laboratory carrying out an industry-oriented project under the supervision of a suitably qualified staff scientist. The candidate is usually required to undertake some on-campus study in preparation for the industrial project. The Department of Engineering Physics makes arrangements for the industrial project in consultation with the candidate. Subject to the approval of the Department Chair, the requirement for an on-campus project may be replaced by the addition of the equivalent of one more full course.

UNENE M.Eng. Degree in Nuclear Engineering

The requirement for the M.Eng.in Nuclear Engineering is to complete ten UNENE courses or eight such courses and an industrial project. These may include three ADMI half courses. The UNENE program is offered on a part-time basis.

Ph.D. Degree

The general Regulations for the Degree Doctor of Philosophy appear earlier in the Calendar. Students with a Master's degree are required to take three half courses, at least two of which must be at the 700- level. Students entering into the Ph.D. program directly from a Baccalaureate degree, or transferring into the Ph.D. program without being required to complete the Master's degree are required to take a total of six half courses, of which at least four must be at the 700-level.

During their course of study, doctoral candidates will be required to pass a Departmental Comprehensive Examination. The purpose of this examination is to ensure that the candidate possesses sufficient knowledge and maturity of approach. The Comprehensive Examination will be in two parts. Part I will be an oral examination to test the student's undergraduate level of knowledge and understanding of mathematics, physics, and the engineering sciences.

Part II will take the form of an oral examination designed to examine the student's under-standing of, and approach to, her/his proposed dissertation research. The candidate will normally take Part I within 8 months of admission to the doctoral program, and Part II no later than 24 months following admission. Both parts of the Examination may, at the discretion of the Department, be repeated once. Reporting of examination results will be done in accordance with the Regulations of the School of Graduate Studies.

Courses

Courses marked with an asterisk (*) are half courses. The following courses are offered for graduate credit and are available to senior undergraduate students. Not all of the courses, however, will be offered each year.

6D03 / Nuclear Reactor Analysis / Staff (cross-listed as UN 0802)
Introduction to nuclear energy; nuclear physics and chain reactions; reactor statics and kinetics; multigroup analysis, core thermalhydraulics; reactor design.

***6F03 / Advanced Solid State Devices / A.H. Kitai**
Electronic properties of field effect devices; electronic and optical properties of advanced devices and integrated circuits. Student projects will allow supplemental coverage of devices of particular interest to the class.

6I03 / Introduction to Biophotonics / Q. Fang (cross-listed as Medical Physics *6I03)
This is a survey course on basic principles of light interaction with biological systems and specific biomedical applications of photonics. In the first quarter of the course, basic principles in optics and biology will be briefly covered while emphasis will be on more advanced topics such as lasers and photo detectors, light-tissue interaction, and photobiology. The remaining part of the course will be focused on specific biomedical applications using photonics technology.

***6K03 / Optical Communication Systems / H.K. Haugen**
Propagation of light in an optical fibre.Semiconductor lasers and detectors for optical communications.Analogue and digital coding. Signal to noise considerations. System design.

***6L04 / Industrial Monitoring and Detection Techniques**
Single and two-phase flow diagnostics and monitoring techniques for industrial and power plant operations; radiation monitoring; pollutant monitoring and analysis; nuclear instrumentation for industrial processes.

***6MD3 / Advanced Materials and Next-Generation Devices/ A. H. Kitai**
This course explores the relationship between material properties and device performance. In particular, the design challenges associated with the employing properties such as magneto-resistance, superconductivity, and piezoelectricity in devices will be studied.

***6NE3 / Advanced Nuclear Engineering / J.C. Luxat**
Fission power generation and distribution in a nuclear reactor core.Design and performance of natural uranium, enriched uranium and mixed oxide nuclear fuels. Energy conversion, heat transfer and heat transport in a nuclear reactor core. Thermal margins and safety limits of nuclear fuel and reactor components.Irradiation, corrosion and aging of reactor structural materials. Structural integrity of nuclear components including properties of nuclear materials, stress in piping systems, material creep and fatigue behavior.

6P03 / Nuclear Power Plant Systems and Operation / Staff (cross-listed as UN 0801)
Systems and overall unit operations relevant to nuclear power plants; includes all major reactor and process systems; nuclear power plant simulator; self-study using interactive CD-ROM.

***6S03 / Introduction to Lasers and Electro-Optics / C.Q. Xu**
Electro-magnetic radiation; optical modulation and detection; non-linear optics; coherence; optical resonators; laser gain media; laser systems; mode locking.

***6X03 / Introduction to Photovoltaics / R. LaPierre**
This course reviews photovoltaic devices including solar cell operation, characterization, manufacturing, economics, and current and next generation technologies.

The following 700-level courses are offered for graduate credit only.

***704 / Selected Topics in Engineering Physics / Staff**
Current developments and specialized aspects of engineering physics. This course may be taken for repetitive credit.

***710 / Nuclear Reactor Dynamics and Control / J.C. Luxat**
Reactor kinetics: point kinetics model; modal model for space-time kinetics; reactivity feedback mechanisms; reactor transfer functions; the inhour equation; reactor stability; Xenon stability; bulk and spatial power control; load following; control systems for CANDU and LWR reactors.

***713 / Nuclear Safety Analysis and Reactor Accidents / J.C. Luxat**
Degraded fuel heat transfer; fuel failure mechanisms; fission product release and transport from nuclear fuel; leak-before-break and piping fracture mechanics; pipe ruptures; challenges to containment system integrity; severe accident progression and mitigation; off-site release of fission products; applications to CANDU and LWR reactors.

****714 / Nuclear Reactor Safety Design / Staff(cross-listed as UN 0803)***
Safety design and analysis of nuclear reactors based on deterministic and probabilistic assessments. Topics include: concepts of risk; probability tools and techniques; safety criteria; design basis accidents; risk assessment; safety analysis; safety system design; and general policy and principles.

***715 / Advanced Nuclear Reactor Thermalhydraulics / Staff**
Advanced topics of current interest in the area of fission and fusion nuclear reactor primary heat transport system, system safety and the transitional operations.

****716 / Nuclear Reactor Heat Transport System Design / Staff (cross-listed as UN 0804)***
This course covers the fundamentals of nuclear reactor heat transport system design for key reactor types, with emphasis on the CANDU and Light Water Reactor (PWR and BWR) designs. Theoretical topics and their application include reactor thermodynamics, single-phase and two-phase flow, heat and mass transfer, critical heat, flux, pressure drop prediction, flow stability, design of reactor core, reactor vessel, steam generators and primary heat transport pumps. The course also covers experimental techniques, facilities and results. Course assignments are analytical problems related to these topics.

***717 / Pollution Control Plasma Technology / A.A. Berezin, Staff**

Combustion flue gas treatment by energetic electron processes (electron beam/plasma); toxic waste treatments by ionizing radiation: waste water treatment by electron beams and pulse electric discharges; neutron activation analyses; ICP plasma analyses; thermal plasma waste treatments.

***718 / Reactor Heat Transport System Simulation andAnalysis / Staff**

The course covers two-fluid phase modeling of thermal-hydraulic phenomena in the reactor heat transport system including modeling and simulation of postulated accidents, simulation methodology and tools, and development and qualification of selected thermal-hydraulics computer codes, including two-fluid modeling, nodalization schemes and numerical methods, computer code development, CATHENA computer code theory and numerical algorithm. This is a simulation-based course; it includes CATHENA training. Assignments include analytical problems, CATHENA code simulation and analysis, and preparing a CATHENA model and report.

****719 / MEMS Devices: Design, Fabrication, and Applications /R.N.Kleiman***
(cross-listed as Mechanical Engineering *719)

An introductory course that will provide the fundamentals from many disciplines relevant to the understanding and application of MicroElectroMechanical Systems (MEMS) technology. Design topics will include mechanical and biofluidic principles with an emphasis on analytical techniques. Equivalent circuits for MEMS devices, noise analysis, and nonlinear phenomena will be discussed. Fabrication methods will cover bulk and surface micromachining techniques that rely heavily on VLSI processing. Process integration with existing device platforms and materials properties related to MEMS design and fabrication will be discussed. Numerous applications of MEMS technology to problems in science, engineering, and medicine will be presented and analysed.

***720 / Advanced Modeling of Semiconductor Device Fabrication / A. Knights**

This course will explore the physics and technology under-pinning the global semiconductor fabrication industry. The design of processes for nano-, micro- and opto-electronic devices will be covered with description of the fundamental models describing diffusion, ion implantation, polymer processing, thin film deposition and thin film growth. Students will be required to develop models from first principal, as well as design novel process strategies using the industrial compatible software ‘Athena.’ Emphasis on industrial practice will be made with description of six-sigma process development.

***721 / Lasers and Laser Physics / H.K. Haugen**

An introduction to steady-state theories of laser oscillators and amplifiers, spectroscopy of laser media, population inversion mechanism in gaseous and solid-state systems.Characterization of pulsing laser systems.

***723 / Semiconductor Diode Laser Physics / D.T. Cassidy**
An examination of the theory of operation, manufacture, and application of semiconductor diode lasers. Emphasis will be on InGaAsP diode lasers and the application of these devices in optical communication systems.

***726 / Optoelectronic Device Physics / Staff**
Optoelectronic devices and the physics that governs their operation: the electro-optic, acousto-optic, and photoelastic effects; optics in semiconductors: free carrier effects, heterojunctions, quantum wells, electroabsorption; guided wave optics; optical modulators; photonic switching and optical interconnects; Fourier optics.

***727 / Advanced Reactor Physics and Analysis / A. Buijs**
This course is to provide an in-depth understanding of the physics behind nuclear reactors and the techniques to analyse the neutronic behaviour of a reactor. The emphasis will be on CANDU reactors.

***728 / Luminescence and Point Defects in Solids / A.H. Kitai**
Fundamental theory of radiation will be introduced and described in quantum terms. The theory will be applied to practical Solid State emitters with emphasis on point defects and visible wavelength emission and the technologically important materials in light emitting diodes, powder phosphors and electroluminescent thin films will be discussed.

***729 / Thin Film Growth and Deposition / R. LaPierre**
Thin film growth and deposition including thermal evaporation, e-beam evaporation, sputtering, chemical vapour deposition and molecular beam epitaxy; thermodynamics and kinetics of film growth.

***730 / Thin Film Characterization / R. LaPierre**
Characterization techniques of organic and inorganic thin films, including x-ray and electron diffraction, electron microscopy, chemical analysis, ion beam analysis, and optical and electrical characterization methods.

733 / Industrial Project in Engineering Physics / Staff
A substantial project requiring the student to spend approximately four months in an industrial laboratory carrying out an approved project under the supervision of a suitably qualified staff scientist. The candidate is usually required to undertake some on-campus study in preparation for the industrial project. This course is available only to students in the M.Eng. (Industrial Internship) degree program in the department of Engineering Physics.

***734 / Nonlinear Optics / C-Q. Xu**
This course gives an introduction to the basic principles of nonlinear optics, which is useful in understanding the nonlinear optical effects involved in many modern photonic components and devices. It mainly includes a project and an oral examination.

752 / Advanced MEMS Fabrication and Microfluidics / P. Selvaganapathy (cross-listed as Mechanical Engineering *752)

Introduction, Micorfabrication and micromachining.Surface and bulk micromachining, non-conventional machining.Microfluidics, Microchannels, Microsvalves, Micromixers, Micropumps, Droplet actuation, Integrated Systems.

***777 / Advanced Photovoltaics / J. Preston**

Advanced Photovoltaics provides students with a comprehensive overview of the fundamental processes relevant to photovoltaic operation. Specific devices are studied by both numerical simulation and analytic calculation. A connection is made between the material parameters necessary for simulating a device and their independent measurement by a range of characterization techniques. Silicon, III-V, II-VI, organic and nano-based approaches to PV device design are all explored. Students are also introduced to the challenges of integrating different approaches into a solar based electrical generation system.

***782 / Solid-State Electronics / P. Mascher**

Crystallography: binding and structure; free and nearly free electrons, energy bands; electronic aspects of semi-conductors: doping, carrier statistics; point defects; energy levels, atomic configuration, thermodynamics; experimental aspects of defect spectroscopy.

783 / Nuclear Fuel Engineering / P. Chan (cross-listed as UN 0806)

This course covers power reactor fuel design, performance, and safety aspects, and complements existing courses on reactor core design, thermohydraulics and reactor safety design. It includes fissile and fertile fuels; burn-up effects; fuel production (as well as uranium enrichment and reprocessing of spent fuel); quality assurance and CANDU fuel technical specifications; thermal conductivity; fuel chemistry; fuel restructuring and grain growth; fission product behaviour; fuel defect detection and location; fuel performance in operation; and fuel / fuel channel behaviour in design basis and severe accidents.

***784 / Nuclear Fuel Management / B. Rouben**

This is a course on in-core fuel management in nuclear reactors. It covers all aspects of the use of nuclear fuel in CANDU reactors, with comparison to fuel management in Light-Water Reactors. A major objective of the course is to allow students to carry out various types of full-core calculations in realistic CANDU-reactor models.

A selection of Nuclear Engineering related courses offered by other departments is given below.

Electrical and Computer Engineering Course

***782 /** Dynamic Analysis of Power Systems

Materials Science and Engineering Course

***6D03 /** Corrosion

Mechanical Engineering Courses
***706 /** Advanced Heat Transfer I
***707 /** Advanced Heat Transfer II
***708 /** Two-Phase Flow and Heat Transfer
***723 /** Flow Induced Vibrations

Medical Physics and Applied Radiation Sciences Courses
***6R03 /** Radiation and Radioisotope Methodology
***771 /** Isotopes In-Vivo
***772 /** Medical Health Physics
***775 /** Advanced Radiation Physics
***776/** Introduction to Operational Health Physics

Photonics and nano technology related courses offered by other departments include the following:

Electrical and Computer Engineering Courses
***740 /** Semiconductor Theory and Device Modeling
***741 /** Analog Integrated Circuits
***750/** Advanced Engineering Electromagnetics
***754/** Modeling and Simulation of Photonic Devices and Circuits I
***755 /** Modeling and Simulation of Photonic Devices and Circuits II

Physics and Astronomy Courses
***729 /** Condensed Matter Physics I
***730 /** Condensed Matter Physics II
***731 /** Condensed Matter Theory
+*734/ Special Topics in Condensed Matter Physics
***739 /** Advanced Quantum Mechanics I
***740/** Advanced Quantum Mechanics II

Research in Engineering Physics

Research in the Department of Engineering Physics emphasizes new engineering disciplines that have emerged in recent years. In these high technology areas the link between engineering applications and basic science is particularly important. The research activities stress the fundamental physics that relates to the new technologies, as well as its application to practical engineering problems.

The department conducts research in three designated fields:

Photonics
Nano- and Micro-Device Engineering
Nuclear Engineering and Energy Systems

Photonics research activities comprise a broad range of efforts in optoelectronic devices, materials processing, and laser physics and applications. Specific topics include, for example, semiconductor lasers, photo detectors, biosensor development, ultrafast phenomena and processes, display devices, planar light wave structures, nonlinear photonic devices, and optical fiber technologies. Traditionally the department has been strongly focused on III-V semiconductors, but more recently have broadened the scope to research in silicon photonics. Overall the efforts in photonics interface closely with the work in nano- and micro- devices, and in addition link with new directions in energy systems.

Nano- and Micro-Device Engineering is based on a number of materials fabrication technologies, including molecular beam epitaxy (MBE), thin film deposition, plasma processing, and laser machining. The research is aimed at the development of devices for deployment in a number of industrial and medical sectors. The study of fundamental systems is often conducted in parallel with the engineering of targeted devices. Examples of research topics in this area include MEMS (Micro-Electro-Mechanical Systems), high temperature superconductors, microfluidics, defect spectroscopy, low dimensional quantum structures, and biological systems.

Nuclear Engineering and Energy Systems cover a wide range of areas related to long term sustainable energy including nuclear power and alternative energy sources. The specific research areas include nuclear reactor physics, plant thermalhydraulics, critical heat flux, post-dryout heat transfer and rewetting mechanisms, reactor simulations and probabilistic methods, safety system performance, nuclear instrumentation, generation IV reactor designs, fusion technology, and photovoltaics. In addition to the facilities within Engineering Physics, there are opportunities for collaboration with other McMaster Engineering Departments in the areas of wind energy, fuel cells, and pollution control technologies. The NSERC/UNENE Chair and Associate Chair in Nuclear Safety Analysis are also located at McMaster University.

Research Facilities

The department benefits strongly from various McMaster institutes, schools, and facilities including the Centre for Emerging Device Technologies (CEDT), the Brockhouse Institute for Materials Research (BIMR), McMaster School of Biomedical Engineering, the McMaster Institute for Applied Radiation Sciences, and the McMaster Institute for Energy Studies. The technical capabilities available to our graduate students include, for example, “clean rooms” with industry standard capabilities, molecular beam epitaxy, chemical vapour deposition, nuclear radiation detectors, positron lifetime and Doppler-broadening systems, compact and high power lasers, and a wide host of analytical capabilities and data acquisition equipment. The McMaster Nuclear Reactor (5 MW) is located on campus and is the largest academic research reactor in Canada. This provides access to neutron and gamma beam ports, neutron irradiation and neutron activation analysis facilities, neutron radiography, and neutron flux mapping. In addition, there are also facilities for Critical Heat Flux and post-CHF heat transfer experiments, computation fluid dynamics modeling facilities, as well as a variety of numerical computing clusters. For full description of research facilities, please see individual web sites.

University Network of Excellence in Nuclear Engineering (UNENE)

The University Network of Excellence in Nuclear Engineering (UNENE), created through the partnership of four leading Ontario universities, namely, McMaster University, Queen's University, University of Waterloo, and University of Western Ontario, presents a unique, innovative learning experience through a Master's Degree Program in Nuclear Engineering with emphasis on nuclear power reactor technology. UNENE is an alliance of universities, nuclear power utilities, research and regulatory agencies for the support and development of nuclear education, research and development capability in Canadian universities.

The UNENE program is designed to provide practicing engineers the enhanced knowledge, tools, technology as well as business and management skills, necessary to keep them at the forefront of their profession. The UNENE Master's Degree program has the enthusiastic endorsement of industrial partners OPG, AECL, Bruce Power, CNSC, CNS, NSS and COG.

McMaster University Faculty members within the Faculty of Engineering and the School of Business contribute to the extensive selection of UNENE course offerings.

UNENE requires an Honours or Four-Year degree in engineering, science or mathematics and a B- average or better. UNENE also considers any relevant work or research history. Meeting the minimum requirements does not guarantee acceptance.

Individuals who choose to apply for admission to McMaster University will, once their application is approved, be registered within the Department of Engineering Physics on a part-time basis. The Master's Degree awarded by McMaster will be aM.Eng. with a Nuclear Engineering designation.

Enquiries: 905 525-9140 ext. 20168
Fax: 905 527-8409
Email: unene@mcmaster.ca
Websites: http://www.unene.ca
http://engphys.mcmaster.ca/graduate/unene.htm

Courses

The format of the UNENE courses recognizes that the majority of students in UNENE hold full-time jobs in the nuclear industry. Live courses are typically presented in three to four alternate weekend sessions. The concept is to bring the courses to the students, so the location is chosen in an educational centre or appropriate facility near to where the majority of the students work. To cater for students working at sites remote from the GTA, courses can also be given using distance education tools, which in addition allows more flexibility in class scheduling. The course content and requirements are the same in both cases.

UN 0501 / Fuel Management / Staff

Nuclear fuel cycles are studied from mining to ultimate disposal of the spent fuel, including the enrichment processes and the reprocessing techniques, from a point of view of the decision-making processes and the evaluation of the operational and economical consequences of these decisions. For the steps within the fuel cycles, the method of determining the associated costs, in particular those relevant to the disposal of nuclear waste, and the overall fuel cycle costs are described. Burn-up calculations are performed for the swelling time of the fuel within the reactor core. The objectives and merits of in-core and out-of-core fuel management for CANDU Pressurized Heavy Water Reactors (PHWR) and Light Water Reactors (LWR) are analyzed in detail, for the refueling equilibrium as well as for the approach to refueling equilibrium. The course also covers fuel management for thorium-fuelled CANDU reactors and other advanced fuels such as MOX containing plutonium from discarded nuclear warheads, and DUPIC (Direct Use of PWR fuel in CANDU reactors). The fuel management problem is treated as an optimization problem, with objective functions or performance indexes identified, as well as decision variables and appropriate constraints (active and non-active). The course also includes a review of the major work done in this area along with the most important computer codes.

UN 0600 / Industrial Research Project, University of WesternOntario

If they so elect, candidates for the M.Eng. (Nuclear Engineering) Degree may spend approximately four months in an industrial laboratory carrying out an industry-oriented project under the supervision of a suitably qualified staff scientist. Usually there is also a university co-supervisor. The Department will attempt to arrange an industrial project in consultation with the candidate and through negotiation with the candidate's employer. A satisfactory project topic and appropriate arrangements are required for the project to be approved by the Department and it is possible that in some cases this may not be feasible. Upon completion, the candidate will submit a substantial report on the project and make a presentation on it at the university. The industrial research project can only be undertaken after at least half the required courses have been taken. The industrial research project counts as two half courses.

UN 0601 /Control, Instrumentation and Electrical Systems in CANDU based Nuclear Power Plants / J. Jiang

This course covers the basic control, instrumentation and electrical systems commonly found in CANDU based nuclear power plants. The course starts with an overall view of the dynamics associated with different parts of the plant, i.e. reactor, heat transport systems, moderator, steam generator, turbine, and electrical generator. Based on such knowledge, the control and regulation functions in the above systems are then defined. Different instrumentation and measurement techniques are examined, along with control strategies. The time and frequency domain performance characterizations of control loops are introduced with consideration of actuator and sensor limitations. Different controller design and tuning methods and instrumentation calibration procedures are discussed. Two modes of operation of CANDU plants will be analyzed, i.e. normal mode and alternate mode. Advanced control technologies, such as distributed control systems, and Field bus communication protocols are introduced in view of their potential applications in the existing and newly constructed CANDU power plants. The electric systems in the CANDU plant will be examined. The modeling of the dynamics and control devices for the generator will be covered in detail. The dynamic interaction between the CANDU power plants and the rest of the electric power grid with other generating facilities and various types of load will be studied.

UN 0602 / Nuclear Fuel Waste Management / D. Shoesmith

Presently, nuclear fuel waste management involves storage in water pools or dry storage containers at reactor sites. If the fuel is then defined as waste, permanent disposal at an appropriate deep geological site would be considered. This course will describe the physical and chemical properties of the fuel and these approaches to storage and disposal. Key features of the fuel include its chemical and physical structure and properties prior to, and after, in-reactor irradiation, the nature and distribution of radionuclides produced in-reactor, and the chemical and physical properties of the Zircaloy fuel cladding before and after in-reactor exposure. The principles behind pool and dry storage will be described including the design of storage containers and the chemical and corrosion processes that could influence their long-term integrity. The possible permanent disposal scenarios developed internationally will be discussed, with a primary emphasis on those potentially applicable in Canada. For this last topic, the design and fabrication of waste containers and the processes that could potentially lead to their failure, the properties of engineered barriers within the geological site, the essential geological features of the chosen site, and the computational modeling approaches used in site performance assessment calculations will be described.

UN 0603 / Project Management for Nuclear Engineers

Project Management is emerging as perhaps the key core competency in engineering in the 21st century industrial workplace. This course in Project Management will prepare nuclear engineers in the application of this discipline in their work. It is an intensive investigation into the major principles of Project Management slanted towards, but not exclusively about, the management of nuclear engineering projects. The course uses the Project Management Institute's PMBOK (Project Management Body of Knowledge) as a skeleton and expands that coverage with relevant examples from nuclear, software and general engineering. Special emphasis will be placed on Risk Management, particularly in the area of safety-critical projects. The graduate will be well-positioned both to apply the knowledge in their area of engineering and to sit the PMI's PMP examination. The course will be taught by a professional engineer holding the PMP certification, using many case studies from industry and engineering.

UN 0700 / Industrial Research Project, University of Waterloo

If they so elect, candidates for the M.Eng. (Nuclear Engineering) Degree may spend approximately four months in an industrial laboratory carrying out an industry-oriented project under the supervision of a suitably qualified staff scientist. Usually there is also a university co-supervisor. The Department will attempt to arrange an industrial project in consultation with the candidate and through negotiation with the candidate's employer. A satisfactory project topic and appropriate arrangements are required for the project to be approved by the Department and it is possible that in some cases this may not be feasible. Upon completion, the candidate will submit a substantial report on the project and make a presentation on it at the university. The industrial research project can only be undertaken after at least half the required courses have been taken. The industrial research project counts as two half courses.

UN 0701 / Engineering Risk and Reliability / M. Pandey
This course presents a broad treatment of the subject of engineering decision, risk, and reliability. Emphasis is on (1) the modeling of engineering problems and evaluation of systems performance under conditions of uncertainty; (2) risk-based approach to life-cycle management of engineering systems; (3) systematic development of design criteria, explicitly taking into account the significance of uncertainty; and (4) logical framework for risk assessment and risk-benefit tradeoffs in decision making. The necessary mathematical concepts are developed in the context of engineering problems. The main topics of discussion are: probability theory, statistical data analysis, component and system reliability concepts, time-dependent reliability analysis, computational methods, life-cycle optimization models and risk management in public policy.

UN 0702 / Power Plant Thermodynamics / R. Chaplin
Theoretical and practical analysis of the following with particular reference to CANDU plants. -Thermodynamic Cycles: Nuclear versus conventional steam cycles, regenerative feedwater heating, moisture separation and reheating, tubine expansion lines, heat balance diagrams, available energy, cycle efficiency and exergy analysis. -Nuclear Heat Removal: Heat conduction and convection in fuel rods and heat exchanger tubes, heat transfer in boilers and condensers, boiler influence on heat transport system, boiler swelling and shrinking, boiler level control, condenser performance. - Steam Turbine Operation: Turbine configuration, impulse and reaction blading, blade velocity diagrams, turbine seals and sealing systems, moisture in turbines, part load operation, back pressure effects, thermal effects and turbine governing.

UN 0800 / Industrial Research Project, McMaster University
If they so elect, candidates for the M.Eng. (Nuclear Engineering) Degree may spend approximately four months in an industrial laboratory carrying out an industry-oriented project under the supervision of a suitably qualified staff scientist. Usually there is also a university co-supervisor. The Department will attempt to arrange an industrial project in consultation with the candidate and through negotiation with the candidate's employer. A satisfactory project topic and appropriate arrangements are required for the project to be approved by the Department and it is possible that in some cases this may not be feasible. Upon completion, the candidate will submit a substantial report on the project and make a presentation on it at the university. The industrial research project can only be undertaken after at least half the required courses have been taken. The industrial research project counts as two half courses.

UN 0801 / Nuclear Power Plant Systems and Operations / G. Bereznai, G. Harvel
(cross-listed as Engineering Physics *6P03)
System and overall unit operations relevant to nuclear power plants; includes all major reactor and process systems; nuclear plant simulator; self-study using interactive CD-ROM. Two to three class one day meetings will be scheduled.

UN 0802 / Nuclear Reactor Analysis / B. Rouben, E. Nichita
(cross-listed as Engineering Physics *6D03)
Introduction to nuclear energy; nuclear physics and chain reactions, reactor statics and kinetics; multi group analysis, core thermalhydraulics; reactor design.

UN 0803 / Nuclear Reactor Safety Design / V. Snell
(cross-listed as Engineering Physics *714)
Safety design and analysis of nuclear reactors based on deterministic and probabilistic assessments. Topics include: concepts of risk; probability tools and techniques; safety criteria; design basis accidents; risk assessment; safety analysis; safety system design; and general policy and principles.

UN 0804 / Nuclear Reactor Heat Transport System Design / N. Popov
(cross-listed as Engineering Physics *716)
This course covers the fundamentals of nuclear reactor heat transport system design for key reactor types, with emphasis on the CANDU and Light Water Reactor (PWR and BWR) designs. Theoretical tools and their application include reactor thermodynamics, single-phase and two-phase flow, heat and mass transfer, critical heat flux, pressure drop prediction, flow stability, design of reactor core, reactor vessel, steam generators and primary heat transport pumps. The course also covers experimental techniques, facilities and results. Course assignments are analytical problems related to these topics.

UN 0805 / Introduction to Operational Health Physics / D. Tucker
(cross-listed as Medical Physics *776)
An introduction to a number of topics that will be encountered in the practice of health physics. The following topics will be discussed: Dose limitation; dosimetric quantities for individuals and populations; ioinzing radiation risks and hazards; ICRP-60; internal doses and the compartment model; derived air concentrations and annual limit on intake; metabolic models for respiratory system and GI tract, radiation safety at nuclear reactors, particle accelerators, irradiators, X-Ray installations and laboratories; pathway analysis; derived release limits; environmental monitoring, sample collection and preparation, and sources of radiation; atmospheric transport; cost-benefit analysis; derivation of limits for surface contamination.

UN 0806 / Nuclear Fuel Engineering (cross-listed as Engineering Physics *783*) / P. Chan*
This course covers power reactor fuel design, performance, and safety aspects, and complements existing courses on reactor core design, thermohydraulics and reactor safety design. It includes fissile and fertile fuels; burn-up effects; fuel production (as well as uranium enrichment and reprocessing of spent fuel); quality assurance and CANDU fuel technical specifications; thermal conductivity; fuel chemistry; fuel restructuring and grain growth; fission product behaviour; fuel defect detection and location; fuel performance in operation; and fuel / fuel channel behaviour in design basis and severe accidents.

UN 0900 / Industrial Research Project, Queen's University
If they so elect, candidates for the M.Eng. (Nuclear Engineering) Degree may spend approximately four months in an industrial laboratory carrying out an industry-oriented project under the supervision of a suitably qualified staff scientist. Usually there is also a university co-supervisor. The Department will attempt to arrange an industrial project in consultation with the candidate and through negotiation with the candidate's employer. A satisfactory project topic and appropriate arrangements are required for the project to be approved by the Department and it is possible that in some cases this may not be feasible. Upon completion, the candidate will submit a substantial report on the project and make a presentation on it at the university. The industrial research project can only be undertaken after at least half the required courses have been taken. The industrial research project counts as two half courses.

UN 0901 / Nuclear Materials / R. Holt, M. Daymond
A nuclear reactor presents a unique environment in which materials must perform. In addition to the high temperatures and stresses to which materials are subjected in conventional applications, nuclear materials are subjected to various kinds of radiation which affect their performance, and often this dictates a requirement for a unique property (for example, a low cross section for thermal neutron absorption) that is not relevant in conventional applications. The effects of the radiation may be direct (e.g., the displacement of atoms from their normal positions by fast neutrons or fission fragments), or indirect (e.g., a more aggressive chemical environment caused by radiolytic decomposition). This course describes materials typically used in nuclear environments, the unique conditions to which they are subjected, the basic physical phenomena that affect their performance and the resulting design criteria for reactor components made from these materials.

UN 1000 /Industrial Research Project, University of Toronto
If they so elect, candidates for the M. Eng. (Nuclear Engineering) Degree may spend approximately four months in an industrial laboratory carrying out an industry-oriented project under the supervision of a suitably qualified staff scientist. Usually there is also a university co-supervisor. The Department will attempt to arrange an industrial project in consultation with the candidate and through negotiation with the candidate's employer. A satisfactory project topic and appropriate arrangements are required for the project to be approved by the Department and it is possible that in some cases this may not be feasible. Upon completion, the candidate will submit a substantial report on the project and make a presentation on it at the university. The industrial research project can only be undertaken after at least half the required courses have been taken. The industrial research project counts as two half courses.

UN 1001 / Reactor Chemistry and Corrosion / D. Lister
Corrosion and its costs, corrosion measurement, general materials and environment affects. Types of corrosion: uniform, galvanic, crevice, pitting, intergranular, selective leaching, erosion-corrosion, stress-corrosion, hydrogen effects. Corrosion testing: materials selection. Electrochemical principles: thermodynamics, electrode kinetics, mixed potentials, practical applications. High temperature corrosion. Nuclear plant corrosion, fossil plant corrosion, other industrial environments.

ENGINEERING AND PUBLIC POLICY

The ArcelorMittal Dofasco Centre of Engineering and Public Policy within the Walter G. Booth School of Engineering Practice offers complete facilities to students seeking the Master of Engineering and Public Policy (M.E.P.P.) degree.

Enquiries: 905-525-9140 Ext. 26566
Email: msep@mcmaster.ca
Fax: 905-528-7901
Website: http://msep.eng.mcmaster.ca/epp/

Staff / Fall 2012

PROFESSORS

Samir E. Chidiac, B.Eng., M.Eng., Ph.D. (McMaster), P.Eng. / Director, Walter G. Booth School of Engineering Practice, Chair in Effective Design of Structures

Gail Krantzberg, B.Sc. (McGill), M.Sc./M.E.S., Ph.D. (Toronto) / Director, ArcelorMittal Dofasco Centre for Engineering and Public Policy

ADJUNCT PROFESSORS

John R. Ferguson, B.A. (Carleton), M.E.S., Ph.D. (York)

Velma Grover, B.Sc. (St. Bedes), M.Sc. (Kurukshetra), M.Sc., Ph.D. (London)

INDUSTRY PROFESSORS

Nick Markettos, B.Sc. (Sussex), M.Eng. (McMaster)

Vino Vinodrai, B.Sc. Eng. (London), P. Eng.

ASSOCIATE MEMBERS

Brian W. Baetz (Civil Engineering)

Pavlos Kanaroglou (Geography and Earth Sciences)

John Luxat (Engineering Physics)

In today's complex world engineers and scientists are called upon to design technical systems that provide goods and services to society in a safe, efficient and environmentally sound manner. In this context, engineers and scientists can serve as key advisors to and take the lead as decision makers in both the public and private sectors. Therefore, engineers and scientists need more than extensive technical skills; you need an enhanced understanding of public policy and the role of engineering and science in sustainable technological, social, ecological and economic systems.

A professional Master's degree in Engineering and Public Policy (MEPP) is offered within the Walter G. Booth School of Engineering Practice. Engineers and applied scientists from a wide cross-section of organizations who want professional graduate training will find our program goes well beyond a conventional technical Master's to develop candidates as leaders in the public policy area. The ideal candidate will have an undergraduate degree in engineering or applied science and 3-5 years of professional work experience.

Admission

In addition to the general requirements for entry into a graduate program in Engineering, students must hold a 4-year engineering or science undergraduate degree, with at least a B- average (equivalent to a McMaster 7.0 GPA out of 12) in the final year in all courses in the discipline, or relating to the discipline, in which the applicant proposes to do graduate work. Each applicant will also be interviewed as part of the admission process. Professional work experience is desirable but not essential.

Bachelor of Technology students are also required to take the Graduate Record Exam.
• Verbal >550
• Quantitative >550
• Verbal and Quantitative >1200
• Analytical Writing >3.5

Candidates may be enrolled on a full- or part-time basis. Students are admitted for September or January.

Prospective applicants who did not attain the required standing in their undergraduate degree, but who have at least four (4) years of relevant work experience, should discuss their situation with the program director. If the experience is deemed sufficient, the director will recommend an interview. Evidence of ability to do graduate work will be required. (See Sections 2.1.1 Admission Requirements for Master's Degree and 2.1.3 Admission of Students with Related Work Experience or Course Work Beyond the Bachelor's Degree in the Graduate Calendar.)

The Walter G. Booth School of Engineering Practice has the following program objectives for the Master's degree in Engineering and Public Policy (MEPP):

- to provide a high quality educational experience to graduate engineers and scientists in the areas of engineering, science and public policy;

- to foster applied research in the areas of engineering, science and public policy through the successful completion and dissemination of aresearch paper;

- to develop viable, working linkages between engineering, science and fields of study within social sciences and the humanities (public policy, economics, society, and others);

- to nurture a diverse group of students who will be activeparticipants within the broader range of activities in the Walter G. Booth School of Engineering Practice;

- to produce graduates who will provide inspired leadership in the engineering, science and public policy areas within the public, private and NGO sectors.

Candidates may be enrolled on a full- or part-time basis. Full-time students will complete the degree in twelve consecutive months of study, beginning in September or January. Part-time students will normally be expected to complete the program in two years.

Curriculum

The curriculum has four main components:

1. Core courses that provide the content and methodological skills necessary for understanding and analyzing societal issues for which engineering and science can contribute to public policy solutions;

2. Focus elective courses that allow students to deepen their knowledge of a range of engineering, science and social science applications;

3. The completion of a substantive research paper on a problem at the interface of engineering, science and public policy;

4. Attendance and participation at an intensive workshop/seminar week on engineering and public policy.

Research Project - Inquiry/Thesis in Engineering and Public Policy

Students select a research topic at the interface of engineering, science and public policy which is of interest to them and carries out inquiry-driven research; completes a formal research paper and prepares to publish their results for broad dissemination.

Candidates for the MEPP degree will follow a program consisting of the following:

1. Required Courses

Four half-courses:
***701/** Theory and Practice of Policy Analysis: Frameworksand Models
***702/**Systems Engineering and Public Policy
***703/**Applied Microeconomics and Environmental Economics
***709 /** Emerging Issues, Technology and Public Policy

2. Focus Elective Courses

Four half-courses are required for electives. Students may select from the following options:
***6I03 /** Sustainable Manufacturing Processes
***705/** Green Engineering, Sustainability and Public Policy
***706/** Energy and Public Policy
***707/** Communication Technology and Public Policy
***708 /** Special Topics in Engineering and Public Policy
***710 /** International Governance and EnvironmentalSustainability
***711 /** Regeneration of the Natural and Built Environment
***784 /** Statistical Analysis for Public Policy
***785 /** Public Sector Management
***786 /** Organizational Theory and the Public Sector
***790 /** Economic Policy in Market Economics
***792 /** Public Choice

- Up to two graduate engineering half courses from departments within the Faculty of Engineering

- Other courses in other departments and Faculties with approval of the Director of the program.

Courses

Courses identified with an asterisk (*) are half courses. Courses identified with a pound (#) sign are quarter courses.

6I03 / Sustainable Manufacturing Processes / G. Irons
(cross-listed as Materials Science *6I03)
Sustainable development, materials cycles, methods for measuring environmental impact, life cycle analysis, waste treatment and recycling technologies.

***701 / Theory and Practice of Policy Analysis: Frameworks and Models / Staff**
Government structure and mandates for municipal, provincial and federal levels; procedures for legislation and policy setting; process of understanding societal values and preferences; establishment of policy goals and objectives; models and frameworks for the evaluation and analysis of public policy; application of frameworks and models to engineering and public policy problems.

***702 / Systems Engineering and Public Policy / B. Baetz**

Application of linear programming, integer programming and dynamic programming to public policy applications; application of simulation modeling to evaluate scenarios; application of decision analysis approaches and software for micro- and macro-policy analysis problems; coupling of GIS-based approaches with conventional systems engineering tools; project planning and project management; soft systems techniques.

***703 / Applied Microeconomics and Environmental Economics/ Staff**

Marginal benefit/cost analysis; willingness to pay and indifference curves; ecological economics; allocation of environmental services; estimation of externalities; measurement of environmental benefits; taxes, trading permits and other instruments; application of approaches to infrastructure renewal and environmental management problems.

***705 / Green Engineering, Sustainability and Public Policy / Staff**

Green engineering theory and guiding principles; sustainability at the regional and international levels; transportation and land-use interactions; new urbanism design; transit-oriented development; bicycle-friendly planning and design; building design to minimize energy, water and material resources; green building; green manufacturing and product design; sustainability indicators.

***706 / Energy and Public Policy / Staff**

Energy policy; energy planning and forecasting; energy conservation and demand side management; case studies in current topics: utility privatization, nuclear energy generation, air quality issues; renewable energy technologies.

***707 / Communication Technology and Public Policy/ Staff**

International trade and regulation; social issues relating to communication policy; research policy and funding; industrial/economic policy; relevant legislation; innovations in communication technology.

***708 / Special Topics in Engineering and Public Policy / G. Krantzberg**

Studies selected from specialized areas of research or representing special areas of expertise in areas of sustainability with regard to water resource management, transportation, energy, and related fields.

***709 / Emerging Issues, Technology and Public Policy / G. Krantzberg**

Environmental threats that emerge from engineering innovation will be examined from the perspective of public policy development. Institutional effectiveness and policy implications for new programs will address greater interoperability of the institutional framework in various geographic regions. The objective of this course is to engage students in seminars, discussion and debate on contemporary societal issues for which technology and policy can be integrated to generate sustainable solutions.

***710 / International Governance and Environmental Sustainability / G. Krantzberg, Staff**
In a world undergoing rapid environmental changes due to global warming, achieving sustainability is ever more difficult. International governance mechanisms, including the United Nations, NGOs and international treaties, play an increasingly important role. This course examines how policymaking at the international level relates to achieving sustainability, including affordable and sustainable technology and science-based solutions. It will introduce the students to the current debates in the international environmental governance realm, as well as the methods and structures that guide policy formulation.

***711 / Regeneration of the Natural and Built Environment / Staff**
Regenerate. Revitalize. Restore. Renew. All of these terms are used in the evolving field of restorative development. Restorative development involves renewing or reusing the health, beauty, quantity, and functionality of natural, built and socio-economic assets, to enhance their value without depleting or destroying other assets of long-lasting or irreplaceable quality. It is central to sustaining a revitalized Great Lakes basin ecosystem. It is the process by which built and natural environments are either brought back to life, or under-performing ones are revitalized for improved eco-system service performance and a better quality of life. All such initiatives, including the construction of new places, must have eventual restorability embedded in them.

***725 / Practical Project Management for Today's BusinessEnvironment / Staff**
This course covers the basics of project management techniques and tools, as well as advanced, adaptive, and emerging approaches to improve project success. Students will learn how to apply effective project management to a variety of common business situations, including starting a company, bringing a product to market, doing primary research and development, constructing a physical facility, and developing a major piece of software, among others. Case studies, guest speakers, and hands-on exercises will be used to explore real-life examples of project management successes and failures.

***748 / Development of Local Sustainable Communities / Staff**
Local economy as a basis for sustainable communities.Deciding on the role of the community (thinkers, makers, traders) and development of economic competitive advantage and the associated business clusters.Community corporations.Pro-community local governance.Regeneration of livable cities. Case studies on Ontario regional economies.

***770 / Total Sustainability Management / L. Belkhir**
This course introduces sustainability within a unified framework of Total Sustainability Management that will teach the student how to deeply embed sustainability into the enterprise through the use of Design principles, Bill-of-Rights of the Planet and through public policy. This approach will apply to not only company products but also to its business strategy and business model. Furthermore, the course will teach the student a problem-solving approach that combines innovation, design and policy to emphasize the synergetic interplay between them. The student will learn how to think of sustainability as a "Way of Thinking." The course will make liberal use of appropriate case studies, and call on several internal and external speakers who are recognized subject-matter experts.

ENGLISH

The Department of English and Cultural Studies offers programs leading to the M.A. and Ph.D. degrees in English. Completed applications should reach the Department by January 15th. Programs begin annually in September.

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Faculty / Fall 2012

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Susan Fast, B.M. (Western Washington), M.A., Ph.D. (Iowa)
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Lorraine York, B.A., M.A., Ph.D. (McMaster) / Senator William McMaster Chair in Canadian Literature and Culture

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Richard Morton, B.A. (Wales), B.Litt. (Oxford)
Graham Petrie, M.A. (St. Andrews), B.Litt. (Oxford) / Cross appointment in Art, Drama and Music
Graham Roebuck, B.A. (Durham), M.A. (McMaster), Ph.D. (London)
Michael Ross, M.A., Ph.D. (Harvard)
Ronald Vince, B.A. (McMaster), M.A. (Rice), Ph.D. (Northwestern)/ Cross appointment in Art, Drama and Music
Chauncey D. Wood, A.B. (Union College), M.A., Ph.D. (Princeton)

M.A. Degree

A candidate for the M.A. in English has two program options: (1) course work only, or (2) course work and a thesis. Candidates choosing the first option will complete four full graduate courses or their equivalent, three courses in the fall and winter terms and one course in the summer term, with grades of at least B- in each. Candidates choosing the second option will take two full graduate courses or their equivalent over the fall and winter terms, with grades of at least B- in each, write a satisfactory thesis of 25,000 words (100 pages), and successfully defend the thesis in an oral examination, which will normally take place in August or early September.

The M.A. degree normally requires one full year to complete. The minimum admission requirement is a four-year undergraduate degree with a major concentration in English, Cultural Studies or a related discipline, and with an average of B+ in at least 6 full (or their equivalent courses beyond the introductory level in English, Cultural Studies or the related discipline. In recent years, successful candidates have typically had averages in the A range in their upper-year English courses. Candidates who have not passed a full university course in a language other than English must pass a reading examination in such a language during the M.A. year.

Ph.D. Degree

The Ph.D. Degree Program normally entails four years of study. The admission requirement is an M.A. with marks of at least A- in two of three courses. In recent years, successful candidates typically achieved an average of A (at least 85%) in their upper-level undergraduate and M.A. coursework. In the first year of the program, Ph.D. candidates will successfully complete three full-year graduate courses or their equivalent.

The University regulations require that Ph.D. candidates take a Comprehensive Examination; in the English Department, this examination takes place in the second year of study. Ten areas of study have been defined by the Department of English and Cultural Studies:

1. Medieval Literature
2. Early Modern English Literature
3. Eighteenth-Century British Literature
4. Nineteenth-Century British Literature
5. Twentieth-Century British and Irish Literature
6. American Literature
7. Canadian Literature
8. Postcolonial Literature
9. Critical Theory
10. Cultural Studies

A Ph.D. candidate in English is required to take the Comprehensive Examination in the area, chosen from the above list, of her or his intended dissertation research. This will involve writing two papers, a Field Survey and a Topic Paper, and defending both in an Oral Examination. The Field Survey should show broad expertise in the wider field of knowledge the candidate's research will engage. The Topic Paper describes how the candidate's dissertation intervenes in that field and the particular contribution it will make. Both papers are to be researched and written concurrently by the candidate, are to be between 25 and 30 double-spaced pages in length, and are due no later than February 27 of the second year of study (i.e. at the beginning of the 5th term). The Oral Examination of both papers will follow within 10 days of submission. The candidate's mark in the Comprehensive Examination will be calculated on the average of the grades for the Field Survey, the Topic Paper, and the Oral Examination.

In addition, each Ph.D. candidate is required to complete a set of bibliographic workshops from the end of April to the end of May during the second year of the program. The workshops are designed as problem-based learning whereby students engage in research into bibliographical issues relevant to their dissertation field. Students must attend all of the workshops in order to receive a passing grade.

These workshops are meant to complement two other sets of professionalization programs in the Department: 1) pedagogical instruction conducted in the teaching workshops offered at the beginning of each year for all teaching assistants, in preparation for supervised tutorial work throughout the program; 2) the Professionalization Workshops given each year on writing grant proposals, writing thesis proposals, publishing articles and giving conference papers, CVs, job applications and interviews.

The Department also has a second-language requirement for the Ph.D. degree. Candidates who have not passed a full university course in a language other than English must complete such a course or pass a translation examination with the aid of a dictionary.

During the third and fourth year of the program, the candidate will write a scholarly thesis normally of between 200 and 250 pages (not including bibliography), and will defend it at an Oral Examination.

Courses

Required Courses for All Graduate Students

All graduate students, including part-time students, must complete the following courses within the first twelve months after their admission to graduate studies at McMaster: SGS #101-Academic Research Integrity and Ethics and the SGS #201-Accessibility for Ontarians with Disabilities Act (AODA). The purpose of SGS #101 is to ensure that the standards and expectations of academic integrity and research ethics are communicated early and are understood by incoming students. The purpose of SGS #201 is to ensure that students gain an understanding of, and learn how to identify and reduce attitudinal, structural, informational, technological, and systemic barriers to persons with disabilities. A graduate student may not obtain a graduate degree at McMaster without having passed these courses. In the event that a student fails either course, he/she must retake it at the earliest opportunity. The course descriptions for SGS #101 and SGS #201 may be found in Section 11.

<u>Note</u>: Ten full-year graduate courses or their equivalent are usually taught in a given year. Courses marked with an asterisk (*) are half courses. The course load may include up to two half courses taken outside of the Department, in each case to be approved by the Department. A more detailed description of those courses offered in the upcoming year can be obtained after April on the Department website.

AREAS OF STUDY
Studies in Medieval Literature: 710, 714, 718, *740
Studies in Early Modern Literature: 721, *723, 732, *733, *736, *737, *752, *753, *757, *763
Studies in Eighteenth-Century British Literature: *713,*741, *747, *748, *749, *758
Studies in Nineteenth-Century British Literature: *705, *728, *750, *759
Studies in Twentieth-Century British and Irish Literature: *762, *793
Studies in American Literature: *772, *798
Studies in Canadian Literature: *707, *760, *761, *771, 780, *782, 783
Studies in Postcolonial Literature: *742, *784, *787, *788, *789
Studies in Cultural Studies and Critical Theory: *700, *701, *704, *711, *712, *713, *715, *716, *717, *719, *720, *724, *725, *726, *727, *729, *730, *731, *739, *744, *745, *754, *755, *756, *757, *758, *764, *765, *766, *767, *769, *771, *774, *776, *779, *791, *795, *797

***700 / Emotion and Culture / J. Adamson**

An exploration of the affect theory elaborated in Silvan Tomkins's massive four-volume work *Imagery, Affect, Consciousness* and the ways in which it might be fruitfully applied to literary and cultural analysis. The first part of the course will examine Tomkins's hypothesis concerning the psychological nature of ideo-affective positions, while the second part of the course will involve an application of affect theory to George Eliot's *The Mill on the Floss*, after which students will extend this analysis to an author or work of their own choice.

***701 / Visionary Women / C. Grisé**

This course explores the writings of women who can be defined as visionaries based on their feminist, religious, scientific, philosophical, or social vision. Starting with medieval religious visionaries, we will then examine writings that promote social change or envision a world or society in a new way. We will cover writings from a variety of historical periods and genres first of all to assess what kinds of visions women have produced through history, and then to evaluate their ability to reconceive the world around them.

***705 / Comparative Studies in Nineteenth Century Literature I/ J. Adamson**

This course will focus on literary works—fiction, poetry, and essays —by some of the most important writers of the first half of the nineteenth century. The approach will make an eclectic use of theory and methodology, but will be based, above all, on an understanding of the works in terms of their metaphoric and narrative structure, as well as their affective and ideo-affective significance. A list of helpful theoretical readings will be provided.

***707 / Northrop Frye and the Social Function of Literature / J. Adamson**

This course will explore the work of Northrop Frye's mid to late career, after the publication of *Anatomy of Criticism* (1957): the period during which Frye's attention turned more fully to the social function of literature and the exploration of its particular authority in society.

710 / Old English / A. Savage

Areas covered include the emergence of Germanic languages; the structure of Old English (poetry and prose will be read in the original); theories of the existence and transmission of Old English "literature" before Anglo-Saxon literacy; the influence of oral on written language; the relationship between Latin and vernacular literature.

****711 / Celebrity/Culture / L. York (cross-listed as CSCT *711)***

This course engages the pervasive phenomenon of celebrity and poses questions about its operations in the field of culture. It will focus on influential theories of stardom and ideology, power, and cultural value that see celebrity operating variously within culture, and audiences, in turn, acting and signifying upon celebrity. Students will be encouraged to develop a framework for using a specific study of a celebrity or celebrity phenomenon to assess theoretical texts. This course will consider the workings of celebrity in academia.

****712 / Childhood in Cultural Theory and Popular Culture / S. Brophy (cross-listed as CSCT *712)***

Childhood is a contested site of symbolic, moral, and material investment in contemporary culture. Focusing on three topics — gender and sexuality, delinquency, and consumption — and with reference to a variety of media, we will consider how cultural theory questions the governing myths of childhood and attempts to theorize children as cultural agents.

****713 / Cosmopolitanism and Nationalism in the Eighteenth Century / E. Zuroski Jenkins (cross-listed as CSCT *713)***

This course considers the role of cosmopolitanism in eighteenth-century British culture, particularly its relationship to the emergent discourses of modern nationalism and imperialism. How do authors of fiction and poetry use cosmopolitan figures to think about travel and exploration, diaspora and colonization, foreignness and exoticism, commerce, the global, the self, and the human?

714 / The Romances / A. Savage

A study of representative English romances, 13th to 15th centuries, including indigenous as well as Arthurian and "Roman" matter. Generic forms are traced through the chanson de geste, Breton lai, chronicle, fabliau, and saint's legend, while themes analyzed include chivalry, hagiography, and courtly love.

715 / Modern and Post Modern Slavery / S. Searls Giroux (cross-listed as CSCT *715)

Although most people consider slavery to be a historical aberration confined to the distant past, the practice of enslaving people by violence and by holding them against their will continues to the present. This course offers a critical and historical investigation of the economic and political conditions of slavery, as well as the broader socio-cultural contexts that enable and legitimate its ongoing existence.

716 / Bob Dylan and American Culture: Memory, Consciousness and Meaning / R. Monture (cross-listed as CSCT *716)

Through a critical examination of selected songs, essays, and auto/biography, this course will assess the significance of Bob Dylan's work within popular music and culture.

717 / Global Sex / S. SearlsGiroux (cross-listed as CSCT *717 and Globalization *717)

This course explores the culture of neoliberalism in terms of its specifically gendered dynamics. It will engage three related moments that map the transformation of human relations, moving out from the most intimate of human bonds to the broadly political: (1) the shifting nature of human connectedness—of intimacy, family, community, national unity; (2) the commodification of sexual relations recast as sexual revolution for some, sexual slavery for others; and (3) the emergence of rigidly fundamentalist and patriarchal discourses globally.

718 / Women and the Book in the Middle Ages / C. Grisé

Medieval women were readers, patrons, translators, owners, and sometimes writers of books; their contributions to literary production and reception challenge our modern notions of literature and literary culture. This course will examine several aspects of medieval literary production and reception, considering the ways in which gender, literacy, class, sexuality, and life choices influenced women's relationships to the medieval book.

719 / Public Intellectuals and Their Work: Intellectual Practicesin Culture Studies and Politics / H. Giroux (cross-listed as CSCT *719)

This course will examine the role of a select group of cultural studies theorists who have attempted to link theory with important social issues and in doing so have provided a deeper understanding of the purpose and meaning of the role of public intellectuals. The course will focus on the political rationale for their work, the institutional conditions that make such work possible, and how the work functions as a particular form of intellectual practice and mode of cultural politics. The work of a number of cultural studies intellectuals will be examined, including that of Richard Johnson, Stuart Hall, Paul Willis, Paul Gilroy, Edward Said and Angela McRobbie.

720 / Looking Within: Films about Filmmaking / J. King (cross-listed as CSCT *720)
This course concentrates on the presentation of actors, the ensemble, writers, producers, the studio system and audience in cinema. Issues such as reflexivity and meta-cinema would be treated, but the focus is on films that deal specifically with the making of and showing of films.

721 / The Self and Other in Elizabethan Poetry / M. Silcox
An exploration of the formation and representation of selves in poetry of the late sixteenth century. Beginning with the relationship between writer and culture, we then discuss how signifying systems such as genre, language and style become the means by which issues of gender, politics and subjectivity develop. Genres such as sonnet sequence, epyllion, satire, pastoral, epidiectic (focusing upon Elizabeth I), historical, complaint, and religious verse will be included.

***723 / Ways of Knowing: Representations of Magic in Shakespeare and his Contemporaries / H. Ostovich**
This study of English drama and history examines how Shakespeare and his fellow playwrights understood knowledge, whether through religion, folklore, politics, or science. How did people in early modern England represent and come to terms with "reality" and the apparently impossible? Can thinking — for good or for ill — produce tangible and material changes in day-to-day life? Does discourse produce levels of 'reality'? How did theatre help to explain the unexplainable?

724 / Reproduction, Citizenship, and the Nation/State / N. Attewell (cross-listed as CSCT *724)
Through readings of anglophone cultural and theoretical texts from a variety of contexts, this course offers a critical study of reproduction and its place in discourses of citizenship and national identity.

725 / Romanticism, War, and Peace / D. Clark (cross-listed as CSCT *725)
This course explores the symptomatic presences of war and the auguries of a just peace in Romantic literature and culture.

***726 / Narrative Theory / J. Donaldson**
This course offers an investigation into narrative theory from early classical antecedents to the present time. On the one hand, we will focus on narrative form and narrative kinds (mythoi and genres) and on the other hand on the ontology of words in sequence, on the illusion of consecutive prose, and on the larger implications of temporal verbal relationships, as for instance in the theory of typology and the meta-literary conditions of echo and allusion.

727 / The New Constellation of Race: Sovereignty, Citizenship,Social Death / S. Searls Giroux (cross-listed as CSCT *727 and Globalization *727)
This course seeks to map the new trajectories of race theory in a post-civil rights, post-apartheid, post 9/11 world.

***728 / Comparative Studies in Nineteenth-Century Literature II / J. Adamson**

This course will focus on literary works—fiction, poetry, and essays—by some of the most important writers of the second half ofthe nineteenth century. The approach will make an eclectic use of theory and methodology, but will be based, above all, on anunderstanding of the works in terms of their metaphoric and narrative structure, as well as their affective and ideo-affective significance. A list of helpful theoretical readings will be provided.

****729 / Cultural Studies and the Politics of Cultural Pedagogy / H. Giroux (cross-listed as CSCT *729)***

This course will examine the intersection of cultural studies and critical education in both the early and later work of a prominent number of cultural studies theorists and educational theorists. The course will examine the primacy of pedagogy in the early work of prominent cultural studies theorists such as Raymond Williams, Stuart Hall, and Paul Willis and how such work not only provided a way to make the political more pedagogical but also gestured towards connecting work in higher education with a broader set of social issues and public commitments.

****730 / Indigenous Literature of North America / R. Monture (cross-listed as CSCT *730)***

An examination of indigenous literature in North America over the past two centuries, with particular emphasis on cultural traditions, literary representation, and writing as resistance.

****731 / Anxiety Disorders: The Cultural Politics of Risk / S. O'Brien (cross-listed as CSCT *731 and Globalization *731)***

Through a variety of critical and imaginative works, this course will consider some political, cultural, affective, and environmental dimensions of contemporary "risk" society.

732 / Ben Jonson in Context: Gender, Transgression, andSocial Identity in the Plays of Jonson and hisContemporaries / H. Ostovich

This course offers a chronological reading of Jonson's plays and masques, along with plays by his contemporaries, with a focus on gender, transgression, and social identity. The range of study includes influences on Jonsonian drama, stage history and theatrical performance, and satirical tactics and targets.

***733 / Gender, Transgression, and Social Identity in EarlyModern Comedy / H. Ostovich**

Should society aim at greater toleration or more stringent controls? Jonson, Middleton, Chapman, and others suggest answers in explorations of marriage, gang-formation, social-climbing, capitalism, cross-dressing, consumerism, and fraud, including abuses of learning (witchcraft), law (manipulative contracts), and faith (puritanism). This course focuses on how comedy depicts ways of projecting, containing, and coping with social change.

***736 / Rhetoric and Subject in Early Modern Devotional Poetry /M. Silcox**

This course will explore relationships between language —particularly as it is schematized in rhetoric — and subjectivity in early modern devotional poetry. Drawing on various theoretical models of religious subjectivity, we will consider such topics as: vocabularies of the inner life;

the influence of rhetorical notions of the poet; the construction, reconstruction and deconstruction of relationships with God and society; the gender of devotion to God; and the effects of sectarian and political allegiances on religious poetry.

***737 / Speaking Pictures: Emblems, Metaphor and Language in Early Modern Writing / M. Silcox**

Metaphor, crucial to what language is and how it operates, is the basis for an interpretive understanding of the world. Early modern emblems embody a metaphoric process that permeated the writing of the time and exemplify the culture's relation to the symbolic. Exploring metaphor in the works of paired emblematists and poets, we will consider topics such as early modern concepts of language, knowledge, mimesis, the relationship between the concrete and the abstract, and the relationship between the individual mind and the world.

****739 / The Archive and Everyday Life / M. O'Connor (cross-listed CSCT *739)***

An exploration of the intersecting fields of archive theory and everyday life theory and an examination of the practice of archival work in selected artists, writers and scholars.

****740 / Medieval Discourses of the Self, 1000-1200/ B. Kaczynski, A. Savage (cross-listed as History *740)***

An interdisciplinary seminar, designed for students interested in a range of theoretical approaches to the past. We will examine a series of problematic medieval texts as contested sites of medieval selfhood: the correspondence of Heloise and Abelard, the writings of Hildegard of Bingen, Andreas Capellanus' The Art of Courtly Love, and Geoffrey de Monmouth's History of the Kings of Britain.

***741 / The Sexuality of Genre / E. Zuroski-Jenkins**

This course provides an introduction to the diverse range of fiction that flourished in eighteenth-century Great Britain—including travel narratives, oriental tales, prostitution narratives, and the Gothic. It also covers topics and methodologies in the history of sexuality and studies of the novel genre.

****742 / Mapping South Asian Masculinities / C. Chakraborty (cross-listed as CSCT *742)***

This course focuses on masculinities in moments of conflict and crisis in South Asia to explore how masculinities are embedded in and enable the operation of large scale political-historical projects/processes such as colonial rule, nation-formation, construction of civil society and religious fundamentalism. Reading South Asian literary and cinematic texts, it will examine masculinities in articulated relation to other social categories: among them, caste, class, religion, ethnicity and sexuality.

****744 / Gender, Violence and Visual Culture / A. Dean (cross-listed as CSCT *744)***

This course involves the critical analysis of representations of gendered violence drawn from visual culture, including documentary film, photography, visual and performance art, advertising, television, Hollywood cinema, and public monument. We will explore how feminist scholars, activists and cultural producers might intervene in visual cultures of gendered violence *to analyze, contextualize, and produce examples of such culture that draw attention to the dangers of making gendered identities that conflate "female" with "victim" and "male" with "violence" pre-exist an act of violence itself.*

745 / Theorizing Care: Dependency, Representation, Ethics / A. DeFalco (cross-listed as CSCT *745)

This course considers depictions of caregiving in contemporary film and literature in tandem with various works of ethical philosophy. The course brings a variety of disciplines into dialogue, including ethics of care philosophy, theories of witnessing and obligation, animal studies, literary studies and cinema studies in its focus on the theorization and representation of care in contemporary Western culture at the turn of the century.

747 / Discourses of Empire 1700-1820 / P. Walmsley (cross-listed CSCT *747 and Globalization *747))

This course will consider how British and Colonial literatures articulated the process of forging a world empire. Our central project will be to map the shifting identities of self and other, and metropolis and colony, throughout the eighteenth century. We will read a wide range of texts—not only novels and poems representing imperial encounters, but also travel books and early slave narratives—and the course will provide ample opportunity for reference to McMaster's rich collection of books and periodicals from this period.

***748 / The Invention of Britain / P. Walmsley**

This course will consider how literature of the eighteenth century expressed a radically new nationalism in step with Britain's rise as a modern imperial nation-state. We will look at a wide range of texts — literary criticism, essays, utopias, novels, poems, travel books, political tracts, and economic treatises -- and we will consider such issues as the renewed importance of pastoral, the sustained resistance of Scottish ethnicity, the articulation of an English literary heritage, and elevation of women within the national allegory of progress.

749 / Getting and Spending: The Birth of Consumer Culture / P. Walmsley (cross-listed as CSCT *749)

This course will consider how eighteenth-century British and Colonial literatures articulate the opportunities and the dangers of an emergent consumer culture, focusing on ideas of money, luxury, shopping and labour.

750 / Gothic, Sensation and Victorian Discourses of the Body/ G. Kehler (cross-listed as CSCT *750)

This three-unit course will explore the diversity in sensational and gothic treatments of bodies, bodies both literal and metaphoric, individual and collective, normative and "diseased." In particular, Gothic and Sensation writing compulsively explores (figures of) physicality as a means to interrogate the legitimate or desired composition of family and nation.

***752 / Making History and the History Play: Early ModernRepertory and the Queen's Men / H. Ostovich**

This course examines the repertory of the Queen's men, the theatre company patronized by Elizabeth I, 1583-1603, and their impact on Shakespeare and other playwrights of comedy, romance, and history plays.

***753 / Rethinking the Renaissance: The Faerie Queene / M. Gough**

Topics may include genre, allegory and allegoresis, gender and sexuality, empire, and colonialism. Spenser scholarship will also introduce us to the "new" Renaissance Studies.

****754 / The Cultures of Modernism / N. Attewell (cross-listed as CSCT *754)***

A critical examination of early twentieth-century Anglo-American literature, criticism, and ethnography.Explores the formal, generic, and thematic contours of modernist thinking about culture.

****755 / Neoliberalism and the Limits of the Social / H. Giroux (cross-listed as CSCT *755)***

This course will analyze the history, ideology, and cultural politics of neoliberalism and its impact on democracy and the demise of the social state. It will also critically engage the work of some of its major theorists and what the relevance of this work might be for constructing a new understanding of a publicly engaged notion of theory and social change.

****756 / The Secret Life of Things in the Eighteenth Century / E. Zuroski Jenkins (cross-listed as CSCT *756)***

Considers emergent literary discourses about inanimate objects and non-human animals and their role in social life in eighteenth-century Great Britain, attending to the way writers identify and animate "things" in relation to persons and subjects, and vice versa. It will also introduce students to methodologies in the study of material culture in the context of literary and cultural studies.

****757 / Gender, Civility, and Courtliness in Early Modern Europe / M. Gough (cross-listed as CSCT *757)***

This seminar studies early modern discourses of gender and proto-Orientalism in connection with emerging notions of civility at European courts, particularly those of England and France. How did class intersect with gendered, religious, and ethnic difference in the formation and contestation of early modern civility? In what ways was European civility inflected by emerging contacts with the Islamic world? What role did elite women's cultural production play in practices of civility, defined as prowess in "arms" but also excellence in "letters," including music, dance, poetry, plays, and masques?

****758 / Literature as Witness / G. Kehler (cross-listed as CSCT *758)***

This course explores a selection of the theories of witnessing and trauma alongside of the witness literature of a diasporic, persecuted minority, the so-called Russian Mennonites, many of whom live on the Canadian prairies and who have become leading voices in Canadian and international literature.

759 / Victorian Natures / G. Kehler(cross-listed as CSCT *759)

This course relies equally on Victorian texts and current criticism to investigate British successes and failures in coming to terms with "nature," both theirs and others'.

***760 / White Civility: The Literary Project of English Canada/ D. Coleman**

This course studies early Canadian literary and social texts in order to understand how dominant categories such as whiteness and Britishness were created and naturalized as normative in Canadian culture.

761 / Framing CanLit / D. Coleman (cross-listed as CSCT *761)

This seminar focuses on the interpretive frameworks we bring to our interpretations of Canadian texts by asking students to select specific critical or theoretical perspectives and explain why they are crucial or important for reading texts that have become canonical to "CanLit."

762 / Queer Historicisms and British Cultural Memory / S. Brophy (cross-listed as CSCT *762)

A critical examination of British queer film and fiction since the 1980s. Diverse approaches to representing the historical will be explored in light of queer theory and diaspora/postcolonial theory.

***763 / Studying the Book Before 1800 / C. Grisé**

This course provides a thorough grounding for students in early primary source research—history, theory, criticism, and practice. Students develop a survey of cultural production and reception through to 1800 as well as examine specific aspects of this tradition through readings, case studies, and student work. Students design an individual research project on a primary text (or group of texts) of their own choosing from the Middle Ages to the eighteenth century.

***764 / A Problem Like Maria / C. Grisé**

Examines literary depictions of nuns from the Middle Ages to today, exploring larger cultural and theoretical questions of gender, the body, sexuality, race and national identity, and space.

765 / Biopolitics: An Introduction / H. Giroux (cross-listed as CSCT *765 and Globalization *765)

This course will analyze how the concept of biopolitics is developed in the work of some of its major theorists and what the relevance of this work might be for constructing a new understanding of a publicly engaged notion of theory and social change.

766 / Feminist, Queer, and Trans Theory / M. Gough(cross-listed as CSCT *766)

This seminar sets out to imagine effective ways for feminist, queer, and trans theories to meet, ally, and perhaps intermingle. We will examine areas of distinction and contention between these three discursive sites; discuss key topics, such as normativity and identity, about which all three fields have had important things to say; and ask how feminist, queer, and trans theorists separately and together might make effective intellectual and political interventions across the fields of critical race studies, postcolonial studies, gender studies, and sexuality studies.

767 / Regarding Animals: Theories of Non-Human Life / D. Clark (cross-listed as CSCT *767)

This course explores the question of the otherness of non-human animals through a reading of twentieth- and twenty-first century theory and philosophy.

769 / Science Fiction: Mindworlds and the Boundaries of theHuman / A. Savage (cross-listed as CSCT *769)

Speculative fiction explores the multiple ways in which boundaries are breached by imagination and science. This course examines dissolving or movable boundaries in a variety of fictions, sites, or technologies, including neuroscience, philosophy, virtual worlds, cybernetics, and intra-species relations.

771 / Canadian Literary Celebrity / L. York (cross-listed as CSCT *771)

This seminar investigates the workings of celebrity in the contemporary Canadian literary arena, focusing on the relationship between the marketplace and literary value.

***772 / American Poetry / J. Donaldson**

This course offers a consideration of a limited selection of representative American poets from 1850 to the present. The focus in any particular term will be on one or another specific historical period, thematic or formal concern, within this range.

774 / Derrida's Wake: On The Futures of Deconstruction/ D. Clark (cross-listed as CSCT *774)

How does one say adieu to Jacques Derrida? Exploring the legacies of Derrida's life and work, this course is organized around five over-lapping questions: mourning, responsibility, democracy, justice, and animality. We will read materials from thinkers with whom his writings are in a critical dialogue, including Marx, Levinas, Kant, and Benjamin.

776 / Racial Formation: Selected U.S. Projects / D. Goellnicht (cross-listed as CSCT *776)

Drawing on recent theories of racial formation, this course examines a number of significant moments in American racial history with the aim of understanding some of the complex ways in which "race" has operated, and continues to operate, as a discursive system that has profound material effects on the lives of Americans.

779 / The Times We Live In / S. O'Brien (cross-listed as CSCT *779 and Globalization *779)

This course looks at changing conceptions of time in the late 20th/early 21st century in the context of globalization. We will survey a range of literary texts, films and social movements (e.g., Slow Food) that explore ideas about temporality, with a focus on the ways in which culture resists and/or supports such trends as acceleration, synchronization and the erosion of boundaries between private and public time.

780 / Writing Ethnicity and the Canadian Nation / D. Coleman

This seminar traces a genealogy of Canadian ethnic literary history, beginning with the construction of Anglo-Canadian normativity in fiction by writers of British descent around the turn of the century and then examining how “third solitude” writers have challenged and diversified concepts of the Canadian nation from the 1914-1918 War to the present.

782 / Contemporary Canadian Poetry / L. York

This course engages various theoretical frameworks for the study of contemporary Canadian poetry. Issues of concern will include: canonicity, gender, ethnicity, sexual orientation, post-colonialism, and identity politics.

783 / Novels of the Margin / R. Hyman

This course considers the continuing dialectic in the twentieth century Canadian novel between types of "peripheries", geographical, political, sexual, ethnic, racial, and religious, and the various "centres" of power on which they are dependent.

784 / Decolonizing Bodies / C. Chakraborty (cross-listed as CSCT *784 and Globalization *784)

An examination of the representations of the body in postcolonial literary and visual texts from Africa and South Asia.

787 / Post-colonial Ecologies / S. O’Brien(cross-listed as CSCT *787 and Globalization *787)

This course will consider issues central to ecocritical and post-colonial theories, with a specific focus on topics of language, political sovereignty and the relationship between “self” and “other” in contemporary post-colonial English literature.

788 / Writing Diaspora: Literature, Community, and Displacement / D. Coleman (cross-listed as CSCT *788 and Globalization *788)

This course examines critical debates in contemporary cultural studies over the best way(s) to conceptualize the experiences of people who have left their places of birth or places of cultural origin in an era of “globalization.” It examines the representation of these experiences in literary works (memoirs, short stories, poems, and novels) by M.G. Vassanji and Dionne Brand about people who move between cultural locations on the assumption that literary works condense and intensify the questions and problems that characterize such cross-cultural movements.

789 / Studies in Asian North American Literature, Culture,and Identity / D. Goellnicht (cross-listed as CSCT *789)

This course examines selected topics (e.g. national versus transnational/diasporic subjectivities, gender formation) in Asian American and/or Asian Canadian literature and culture, with a focus on issues of identity. The specific topics will vary from year to year.

791 / Rethinking Politics: Thinking Past War, Democracy, and Terror / H. Giroux (cross-listed as CSCT *791)

This seminar addresses how the notion of politics is being redefined within a changing global public sphere. How politics is addressed is central to matters of agency, social justice, as well as notions of individual and collective struggle. The course attempts to understand how politics is being addressed as a site of struggle through various deployments around race, globalization, education, and resistance.

793 / Oh Behave! Post-war Sexualities / S. Brophy (cross-listed as CSCT *793)

A critical study of sexualities in British film, fiction, and culture of the 1950s and 60s. We will consider how key figures such as the teenager, the working woman, the single mother, the migrant, the homosexual, the servant, the playboy, and the secret agent mediated a rapidly transforming post-war social landscape.

***795 / Living with HIV/AIDS: On the Discourses of the Pandemic / D. Clark**

The objective of this course will be rigorously and responsibly to reflect upon the work of writing and reading narratives in the midst of the AIDS pandemic, this through a careful consideration of selections from the proliferating archive by which HIV and AIDS is conceptualized, witnessed, and experienced. In particular, we will examine a range of recent theoretical discussions and memoirs by activists, caregivers, and people living with AIDS, each of which differently grapples with what Eve Sedgwick has called “the terrible accident” of HIV.

797 / Politics of Our Times / P. Rethman (cross-listed as CSCT *797)

The goal of this graduate seminar is to tackle the question of “the political,” especially the ways in which it is used, conceptualized, and understood in the present. Drawing on critical theory and thought, the course aims to interrogate the historical and epistemological conditions from which politics emerge. In marking these conditions, it also aims to map alternative orientations for the crafting of (our) futures.

***798 / Language and Metaphor / J. Donaldson**

A study of language modes and metaphor. The focus will be on the varying impact of metaphoric expression among descriptive, conceptual, rhetorical, and imaginative modes of language. Our treatment will touch on a variety of related areas of interdisciplinary study, including but not limited to cognitive theories of mind, biology, evolutionary theory, grammar and linguistics, genre theory, and the visual arts.

FRENCH

The Department of French offers graduate work leading to the M.A. degree in French Language and Literature.

The French Department offers a new area of concentration, “Francophonie et diversité.”

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Faculty / Fall 2012

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Jane A.C. Rush, B.A. (Toronto), M.A., Ph.D. (U.C.L.A.)
Nicholas Serruys, B.A., M.A. (Western), Ph.D. (Toronto)

PROFESSORS EMERITI
Caroline Bayard, L. ès L., M. ès L. (Toulouse), M.A., Ph.D. (Toronto)
Pierre M. Conlon, B.A., M.A. (Auckland), D. de l'U. (Paris), D. Litt. (McMaster), F.R.S.C.
Madeleine Jeay, L. ès L. (Bordeaux), M.A., Ph.D. (Montréal)

M.A. Degree

The following programs are available for the M.A. in French on a full- or part-time basis. Admission requirements conform to the general University regulations. Applicants whose specialization is in linguistics, French or Francophone literatures and cultures, are encouraged to apply to the M.A. program. The M.A. degree normally requires a full year to complete.

A. M.A. with Thesis

The candidate is required:

1. to obtain a grade of at least B- in each of *four* half courses. Exceptionally, after consultation with the Department, onegraduate course at the 700-level may be taken outside of the Department in a related subject.

2. to write, under the supervision of a member of the Department, a thesis that would normally amount to 80-120 double-spaced typewritten pages. The thesis should be on an approved subject, embodying the results of original research and showing independent critical judgement. The student must successfully defend this thesis at an oral examination normally conducted in French.

B. M.A. with Project

The candidate is required:

1. to obtain a grade of at least B- in each of *six* half courses. Exceptionally, after consultation with the Department, one graduate course at the 700-level may be taken outside of the Department in a related subject.

2. and to write in French, under the supervision of a member of the Department, a project that would normally consist of an essay amounting to approximately 25 double- spaced typewritten pages. The project must be on an approved subject. Thestudent must successfully defend this project at an oral examination conducted in French.

Additionally, all M.A. students must pass the workshop on **Instruments and Methods of Research in French Literary Studies**. This compulsory workshop introduces students to the methods of bibliography. A "Pass" or "Fail" will be recorded on students' transcripts for the workshop.

With the approval of the Graduate Program Committee a student may select a course of study under French *730 Reading Course.

Registration in Program

By January 15 of the academic year of initial registration, full-time graduate students must declare their choice of Program A or B. Students opting for Program A must have a thesis subject and thesis committee approved by January 31. Students opting for Program B must have their project subject or comprehensive subject areas as well as their examining committees approved by April 15.

Part-time graduate students must declare their choice of Program A (M.A. with Thesis) or B (M.A. with Project) on completion of four half courses and must, before registering in their final courses, have their thesis subject, project or comprehensive subject areas, and examining committee approved by the Department.

Ph.D. Degree

The Ph.D. Degree Program will normally be four years in length. Students will beadmitted to the Ph.D. program with a completed M.A. in French literature orlinguistics, or in a program deemed equivalent. Equivalence will be granted on acase by case basis in consultation with the School of Graduate Studies. Studentsmust obtain a minimum B+ average or equivalent at the Master's level to beconsidered for admission. All applicants will be required to submit official transcripts, two letters of recommendation, and a detailed statement of interest.As a rule, part-time studies will not be an option at the Ph.D. level. However, inexceptional circumstances, permission to pursue the doctorate part-time mightbe granted, provided the student adheres to a rigorously scheduled plan ofaction for completion of all degree requirements within a reasonably limitedtimeframe.

Note: Applicants to the French Graduate programme are exempted from theTOEFL requirement.

Fields in the program

The Ph.D. program, "Francophonie et diversité", comprises the following threefields:

1. Francophone* Theories, Languages and Literatures of the 20th and 21st centuries.

2. Colonial and Post-Colonial Contexts in the Francophone World.

3. Discourse and Representation of the *Ancien Régime* and 19th Century.

Note: 'Francophone' includes France and other French-speaking countries andregions.

Program Requirements

The program will be four years in length. By the end of their courses and/or firstyear of residency, students will select a thesis supervisor who will in turnrecommend, for the student's approval, at least two other colleagues – to amaximum of four – as members of the supervisory committee. The GraduateStudies Committee, normally comprised of the Graduate Chair, the Chair of thedepartment, two faculty members and two students (one from the MA, one fromthe Ph.D. program), will also vet supervisory committees.During their third year of the program, students may elect to study or doresearch abroad, audit classes in other disciplines, at McMaster or at otheruniversities, or participate in a field work/internship program in a Francophoneregion or country. To spend a period of time in a Francophone region or country,students must obtain the written approval of their committee and of the Schoolof Graduate Studies.

1. <u>Course Work</u>

All graduate students, including part-time students, must complete the course*SGS-101 - Academic Research Integrity and Ethics* within the first twelve monthsafter their admission to graduate studies at McMaster. The purpose of this courseis to ensure that the standards and expectations of academic integrity andresearch ethics are communicated early and are understood by incomingstudents. A graduate student may not obtain a graduate degree at McMasterwithout having passed this course. In the event that a student fails this course,he/she must retake it at the earliest opportunity. The course description for *SGS-101* may be found in Section 11 of the Calendar.The Ph.D. Degree Program itself includes six half-courses (three units each) ofwhich two are required. The two required half-courses are thefollowing: *Introduction to Literary Theory* and *Research Methods and ProfessionalPractices*.

2. <u>Language Requirement</u>

Candidates will successfully pass a proficiency examination in a language otherthan English or French. The choice of language should be made by the candidatein consultation with her/his supervisory committee. Successful completion of athree-unit, doctoral-level course in another discipline more relevant to thecandidate's research topic may be substituted for the language requirement withthe approval of the candidate's supervisory committee. This requirement may befulfilled at any time before completion of the degree.

3. <u>Comprehensive Field Examinations</u>

Ph.D. candidates in consultation with their supervisory committee will choosetwo areas of concentration: the first will be literary and theoretical in nature andthe second interdisciplinary. Candidates will submit an extensive bibliographyfor each area of concentration and will be assessed by way of a writtenexamination. Candidates will be given one week to complete a 10- to 15-pagepaper for each area. Full-time students will write these examinations withinthe first twenty months of their program, that is, before the end of April of theirsecond year of residency, assuming the student began residency in September ofthe first year. These exams are intended as opening stages of the doctoraldissertation. For each examination, candidates must prove their proficiency inthe French language and their competence in their selected areas of specialisation. They must display in-depth knowledge, not only of the primarytexts, but also of the existing scholarship in their areas of concentration. Candidates must obtain a passing grade. In the event of a failing grade,candidates will have one opportunity to rewrite their exams; this second andfinal attempt should occur within three months of the date of their firstexamination.

4. <u>Thesis Project</u>

Students will prepare a 25-page thesis project in consultation with their thesissupervisor. This project will then be presented and examined by the candidate'ssupervisory committee. An oral defence of the project, conducted by thesupervisory committee, must be successfully completed before the candidate canproceed with research and preparation of the thesis manuscript. Thisrequirement should be completed within the first 24 months of the candidate'sprogram.

5. <u>Doctoral Thesis</u>

During the third or fourth year of the program, candidates will write a scholarlythesis of approximately 250 pages (including notes and bibliography), and willdefend it at an Oral Examination. The oral examination of the thesis willnormally be conducted in French.

Required courses:

Introduction to Literary Theory

This seminar is an introduction to text analysis methods and critical approachesused in French and Francophone studies. It is designed to familiarize students with the conceptual tools necessary to investigate different cultural texts. Topicsaddressed may include: discourse analysis, ecocriticism, feminism, genre poetics, narratology, post-colonial theories, post-structuralism, pragmatics, psychoanalysis, queer theories, reception and reader-response theory, Russianformalism, semiotics, etc.

Research Methods and Professional Practices

This course considers practical aspects of research. Il includes advanced trainingin the use of library resources and online databases, in research techniques forinterdisciplinary projects, in writing conference proposals and journal articles, and inpreparing grant and job applications. The objective of this course is to impartstudents with effective research and professional skills.

Courses

All of our graduate courses are half courses. The definitive list of courses offered during each academic year will be made available the previous Spring. Please consult the Department or its website. The following courses are offered for graduate credit only.

***701 / La poésie française contemporaine / J. Stout**

Grâce au développement du modernisme et du postmodernisme en France, les poètes ont pu découvrir une grande diversité d'approches à l' expression de la subjectivité et à l'exploration du langage. Nous étudierons les stratégies textuelles que les poètes ont employées afin de changer l'espace de la page tout en repensant ce qui constitue la subjectivité lyrique.

***702 / Sociolinguistique et francophonie / Staff**

Après une définition socio-historique du concept de francophonie, nous examinerons le statut, les usages et les fonctions du français dans diverses situations tirées de l'espace francophone mondial. Ceci nous permettra d'aborder certaines notions sociolinguistiques telles que la diglossie, la véhicularisation, l'aménagement des langues et les politiques linguistiques. Sous l'effet du contact interlinguistique, on constate l'émergence de nouvelles variétés de français qui remettent en question le concept de norme unique et centralisatrice. De ce fait, nous essaierons de voir quels préjugés ou attitudes peuvent être associés à ces variétés régionales ou minoritaires.

***703 / MonstersPhysical and Moral during the Ancient Régime or Reproduction Gone Wrong / J. Rush**

The course would emphasize the study of monsters from earlier times to the 17th and 18th Centuries through various conflicting views of reproduction (the molecular view as opposed to the more traditional view of the humours, preformation as opposed to epigenesis) and how this is expressed in literature and various scientific texts of the Ancient Régime. The notion of monster is linked to the conception of nature: the debate between intelligent design versus materialism comes to the forefront in the Age of Enlightenment. The study of the physical monster canal so be linked to the moral monster—a by-product of its “organization“ —and the role of education in curbing the moral failings of such a being.

***705 / Introduction to LiteraryTheory / Staff**

This seminar will focus on text analysis methods and critical approaches used in French and Francophone studies. It is designed tofamiliarize students with the conceptual tools necessary to investigate different cultural texts. Topics addressed may include:ecocriticism, feminism, genre poetics, narratology, post-colonial theories, post-structuralism, pragmatics, psychoanalysis, queertheories, reception and reader-response theory, Russian formalism, semiotics, discourse analysis, etc.

***706 / Le corps dans le texte français pré-révolutionnaire/ J. Rush**

Suite aux recherches de M. Bakhtine sur le carnavalesque, une nouvelle critique s'est penchée, entre autres, sur l'importance du corps. La période qui suit les nouvelles découvertes scientifiques sur la reproduction produit un nombre important de textes littéraires pré-révolutionnaires qui accentuent le corps et la sexualité. Ce cours se propose d'examiner des textes marqués du signe de l'hybridation, textes où le littéraire s'imbrique dans le médical et le biologique, le politique et le philosophique. Qu'il s'agisse des oeuvres d'un Diderot, d'un Venette ou d'un Montesquieu, ces textes hybrides présentent le corps comme lieu expérimental de séduction, d'exotisme et de libertinage, mais également comme centre d'investigation biologique, médicale et philosophique.

***707 / Modern Lesbian and Gay French Writing / J. Stout**

This course will explore the representation of queersexualities in major French literarytexts of the nineteenth and twentieth centuries. Links to contemporaryQueerTheorywillbeemphasized in class discussions.

***708 / Littératures francophones et théories postoloniales / S. Crosta, E. Nshimiyimana**

Les écritures francophones sont nées pour la plupart d'une expérience coloniale et font la lumière sur les défis identitaires rattachés à l'Histoire, à la langue, à la culture et à l'esthétique. Bien des penseurs et écrivains engagés se sont mis à la tâche de proposer de nouvelles voies/voix de réflexion remettant en question les normes sociales, institutionnelles et esthétiques. Ce séminaire examinera un échantillon de textes littéraires et théoriques qui expriment les sentiments d'une résistance excédant les frontières nationales et qui ont contribué à des mouvements de revendication politique et culturelle et / ou à des pratiques d'écriture nouvelles.

***709 / Pragmatique / M. Kliffer**

La pragmatique porte sur le lien entre le code linguistique (grammaire et sens) et les utilisations du langage, familières comme littéraires. Le pragmaticien examine les intentions des locuteurs, les significations implicites, l'organisation du discours, le point de vue, ainsi que d'autres domaines se prêtant à la formulation de principes généraux plutôt qu'à des règles catégoriques. Nous étudierons surtout les apports de la théorie française de l'énonciation (Benveniste, Ducrot..). Quoiqu'elle ne constitue pas une composante linguistique bien définie comme la phonologie ou la syntaxe, la pragmatique est néanmoins indispensable à une théorie compréhensive du langage.

***710 / ResearchMethods and Professional Practices / Staff**

This course considers practical aspects of research. It includes advanced training in the use of library resources and online databases,in research techniques for interdisciplinary projects, in writing conference proposals and journal articles, and in preparing grant and jobapplications.The objective of this course is to impart students with effective research and professional skills.

***711 / Voltaire et son siècle / W. Hanley**

Au Siècle des Lumières, la littérature française pose les jalons de la notion de diversité philosophique, politique et sociale. Parmi les philosophes de cette époque qui ont embrassé le plus vigoureusement cette perspective figurait Voltaire. Dans ce cours, nous abordons les questions les plus fondamentales de cette nouvelle façon d'envisager le monde. En examinant les textes de cet écrivain, nous explorons la pensée du XVIIIème siècle et ses répercussions dans le monde occidental.

***712 / Lire le Moyen âge. Entre quête d'origine et découverte d'une altérité: XIIe et XIIIe siècles / Staff**

La fascination que le Moyen âge exerce dans la culture populaire traduit autant la quête d'une origine mythique que la découverte d'une altérité. À partir d'une oeuvre étudiée en profondeur, on se propose de réfléchir à la problématique du statut de la littérature du Moyen âge autour du thème fondamental de la relation à l'autre (femme, animal, étranger) à travers une conception propre de l'amour et de l'érotisme, mais aussi la tentation de la misogynie et de la violence.

***713 / Lire le Moyen âge. Entre quête d'origine et découverte d'une altérité: XIVe et XVe siècles / Staff**

La fascination que le Moyen âge exerce dans la culture populaire traduit autant la quête d'une origine mythique que la découverte d'une altérité. À partir d'une oeuvre étudiée en profondeur, on se propose de réfléchir à la problématique du statut de la littérature du Moyen âge autour du thème fondamental de la relation à l'autre (femme, animal, étranger) à travers une conception propre de l'amour et de l'érotisme, mais aussi la tentation de la misogynie et de la violence.

***714 / Stylistique et linguistique textuelle / Staff**

Ce cours emprunte à des travaux récents de linguistique cognitive du point de vue de l'analyse des grandes unités de la langue en contexte. L'objectif premier est de fournir aux étudiants un cadre conceptuel souple leur permettant d'étudier la production du sens dans les formes aujourd'hui en vigueur en français et en anglais international. Les applications reposent sur l'analyse comparée de textes et la traduction.

***715 / L'Utopie littéraire au Canada français et au Québec / N. Serruys**

De nombreux domaines s'occupent de la question de l'utopie : la théologie, la philosophie, la théorie politique, l'anthropologie culturelle, le féminisme, le postcolonialisme, pour n'en nommer que quelques-uns. Au Canada français et au Québec, sa manifestation en tant que pratique littéraire et objet d'étude évolue de façon importante au cours des derniers 160 ans de ses plus de 400 ans d'histoire. Nous prendrons pour exemples divers textes du XIXe au XXIe siècles (de Napoléon Aubin [1839] à Joël Champetier [2011], en passant par Armand Grenier [1944, 1953], entre maints autres). Ceux-ci seront analysés à la lumière des recherches sur les poétiques des genres (de Bouchard, Fitting, Jameson, Sargent et Suvin) et des études en idéologie (de Bloch, Hamon, Reboul et Ricœur).

***716 / Francophonie et prescriptivisme / M. Kliffer**

Ce cours étudiera les controverses portant sur la standardisation linguistique. Nous nous pencherons sur l'évolution allant d'un modèle strictement hexagonal vers l'actuelle reconnaissance grandissante des parlers situés en dehors de la France. Nous mettrons l'accent sur les tensions se produisant dans les domaines de l'éducation ainsi que dans les pratiques littéraires quant au conflit entre le purisme et l'empirisme langagiers.

***717 / Style et histoire dans les textes littéraires du XIXe siècle/ G. Moyal**

Ce cours portera sur l'étude de l'histoire comme forme de discours scientifique, axée néanmoins sur des structures et des effets de style proprement littéraires. À son inception en pleine période romantique l'histoire dépend pour sa forme et sa justification d' un autre genre, lui aussi en pleine évolution: le roman lequel, depuis longtemps, se charge de véhiculer et d'illustrer différentes philosophies et idéologies. Dans la période étudiée, l'idéologie joue un rôle central à la fois dans la France d'après la grande Révolution et l'Empire, et dans les colonies et protectorats qui s'accumulent à grand rythme. Les effets contradictoires de cette expansion coloniale au sein d'un mouvement qui se veut largement démocratique seront un des points d'étude de ce cours.

***718 / Représentations de l' exil dans la litterature francophone / M. Hadjukowski-Ahmed**

Exils, identités, dialogisme, interculturalité et leur expression littéraire au Québec et en France.
Autour d'un axe théorique bakhtinien et d'un questionnement identitaire contemporain (C. Taylor, S. Hall, S. Simon), nous proposons dans ce cours d'examiner divers textes francophones (de France et du Québec) pour en dégager diverses représentations de l' exil, ainsi que les problématiques épistémologiques, éthiques et esthétiques qu'elles soulèvent.

***719 / Écritures de l'Afrique et de la Caraïbe / S. Crosta,E. Nshimiyimana**

Ce cours se propose d'examiner un certain nombre de textes d'écrivains de l'Afrique et/ou des Antilles dans leurs contextes historique, culturel et artistique, pour se concentrer par la suite sur l'étude de leurs projets et pratiques d'écriture. Ce cours vise à explorer les relations intersignificatives entre la nation, la culture et la narration, entre les théories contemporaines et la prodution culturelle des oeuvres littéraires. Ainsi aborderons-nous les discours culturels et littéraires ainsi que les voix plurielles des écrivains qui s'interrogent sur les canons, le genre et les conventions littéraires, sur les assises culturelles de la référence, de l'identité et de la communalité.

***720 / Poésie québécoise / Staff**

Ce cours se concentrera sur l'émergence de la poésie québécoise audébut de ce siècle dans les textes d'Émile Nelligan, profondémentmarqués par une esthétique symboliste. Il continuera avec des textesdes années cinquante, marqués par la grande noirceurde Duplessis, puis avec ceux de la Revolution tranquille et de la contre-culture des années soixante, et finalement seront étudiés les textes qui ont démarqué l'écriture féminineet migrantedes années soixante-dix à nos jours.

***721 / Le roman québécois contemporain / M. Ahmed**

Au Québec, la questioin identitaire est profondément ancrée dans salittérature, surtout dans le roman, et a connu de notables transformations au cours des années. Nous en analyserons les divers aspects, les enjeux, les transformations et leur expression. Nous examinerons les liens dialogiques que la question identitaire entretient avec le contexte politique, social et culturel du Québec, mais aussi avec l'américanité, la francophonie et les questions mondiales. Nous verrons comment s'inscrivent les différents facteurs qui contribuent à la construction identitaire, tels que l'histoire, l'espace, la sexualité, l'ethnicité, la langue, la culture ou le statut migratoire.

***722 / De l'anticipation à l'utopie : la science-fiction canadienne-française et québécoise / N. Serruys**

La science-fiction (SF) se lit notamment pour le plaisir d'évasion qu'elle offre en mettant en scène des visions d'autres mondes. Celles-ci se caractérisent par l'idéalisation sociopolitique (l'utopie), le révisionnisme historique (l'uchronie) et la conjecture futuriste (l'anticipation). Cette littérature constitue un défi cognitif en stimulant le raisonnement et une réflexion détournée sur certains acquis scientifiques et idéologiques. Cela, dans la mesure où elle spécule sur les enjeux logistiques et éthiques de la création du meilleur des mondes possibles. Elle s'interroge sur ce qui aurait pu être et sur ce qui pourrait être compte tenu d'actions et d'événements inédits, ou bien elle sert d'avertissement contre les imprudences technoculturelles et sociopolitiques des êtres humains ou humanoïdes. A partir de péripéties originales, s'articule un questionnement sur les avantages et les inconvénients des progrès scientifiques et sur le partage équitable des bénéfices des savoirs. Ce questionnement représente les aspirations et les inquiétudes contemporaines. Nous examinerons la manifestation de ce discours particulier au Canada français et au Québec à la lumière de la poétique des genres (Bozzetto, Suvin, Stockwell), entre autres théories littéraires.

***723 / L'évolution du roman moderne / J. Stout, Staff**

Ce cours examinera l'évolution du roman moderne depuis Diderot jusqu'au Nouveau Roman, à la lumière des considérations suivantes: les jeux et stratégies narratifs, les rapports entre narrateur et narrataire, locuteur et allocutaire, l'ambiguïté, le rôle du lecteur.

***724 / La littérature et les arts : cultures contemporaines en France et en Europe / E. Grodek**

Le texte et l'image participent à un réseau de relations réciproques dont la complexité a toujours interpellé les philosophes, les théoriciens et les artistes eux-mêmes. Les rapports entre la littérature et les arts visuels sont multiformes et se réalisent tant sur le plan thématique (qui est extérieur au code) que sur celui qui tient compte des particularités du système-même des signes employé (le langage verbal ou le langage visuel). L'étude de ces rapports engage, entre autres, une réflexion sur le processus de la création, l'étanchéité des genres, les relations transesthétiques, le caractère transcendant ou immanent de l'art, le concept de la représentation. Ce dernier s'impose comme un concept pivot qui permet d'articuler la relation de l'art à la réalité et des arts entre eux. Ce même concept de représentation fonctionnera aussi comme un pivot de la structure de l'ensemble de ce cours. D'un côté, nous examinerons certains aspects des relations entre la littérature et les arts visuels, en particulier la peinture, de l'autre, nous nous pencherons sur la méthodologie de recherche documentaire, les bibliographies et les bases de données, qui constituent, elles-mêmes, un système de représentation, celui notamment de nos connaissances.

***725 / Écriture des femmes / Staff**

Ce cours portera sur l'écriture des femmes françaises et francophones. Selon l'année où on l'offrira, il s'agira de l'étude de textes de femmes du Moyen Age, du dix-septième, dix-huitième, dix-neuvième ou vingtième siècles, ainsi que du Québec, d'Afrique ou desAntilles. Ces textes seront étudiés dans leur contexte social et historique. L'apport possible des théories féminines/féministes de l'écriture des femmes à l'étude de tel ou tel corpus précis sera également discuté dans le cours.

***726 / Le théâtre français et francophone / Staff**

Dans ce cours, nous analyserons des oeuvres du théâtre français ou francophone. Nous étudierons l'évolution du théâtre en tant que genre, ainsi que différentes théories du théâtre pertinentes aux oeuvres choisies.

***727 / L'être humain et l'animal dans les littératuresfrancophones / Staff**

Objet sans voix, relégué au fond du paysage romanesque, l'animal passe sous silence dans les études littéraires. Pourtant, il y est, ils y sont en grand nombre. En nous penchant sur les œuvres d'écrivains francophones, nous découvrirons un bestiaire d'animaux domestiques et sauvages qui trouve écho dans divers écrits philosophiques (Exemple: Deleuze et Guattari, Derrida, etc.). L'étude des œuvres littéraires supposera une double réflexion, d'une part, sur le rapport entre l'être humain et l'animal, et d'autre part, sur le réel et l'imaginaire.

***728 / Romanticism, Realism and the Evolution of French Liberalism in the Early 19th Century / G. Moyal**

This course will examine the roleplayed by the developingcurrents in French literature in furthering (or hampering) the ideological agenda of French liberalism in the first half of the nineteenthcentury. As the evolution of thatmovementis, to a large degree, dependent on the British constitutional model and on the development of English "public spirit," the role of translation (literary and cultural) willoccupy a significant part of the course content.

***730 / Lectures Dirigées / Staff**

Ce cours est conçu comme un cours d'études indépendantes dans un domaine d'études françaises ou francophones, en littérature ou en linguistique, qui ne fait pas l'objet d'un cours figurant déjà dans l'annuaire.

GENDER STUDIES AND FEMINIST RESEARCH

Candidates may be accepted for graduate work leading to an M.A. degree or a Graduate Diploma (Ph.D.) in Gender Studies and Feminist Research. Both programs are dedicated to furthering understandings of the importance of gender as a category of analysis in scholarly inquiry. Our work is interdisciplinary and draws together those who study women and gender issues from across campus and the larger community.

The following four themed areas provide a focus for the program: Literature, Culture, and the Arts; Ethics, Spirituality, and Eco-feminism; Work, Politics, Social Movements, and Public Policy; and Sexuality Studies.

Enquiries:
Dr. Susan Fast, Director, Gender Studies and Feminist Research
Email: gsfrdir@mcmaster.ca

Office of Interdisciplinary Studies
Togo Salmon Hall 308
Email: gsfr@mcmaster.ca
Telephone: 905-525-9140, Ext. 27734
Website: http://gsfr.mcmaster.ca

Faculty / Fall 2012

PROFESSORS

Jane Aronson, B.Sc. (New Univ. of Ulster, N. Ireland), B.S.W., M.S.W.(McGill), Ph.D. (Toronto) / Social Work
Roy Cain, B.S.W., M.S.W., Ph.D. (McGill) / Social Work
David Clark, B.A., M.A., Ph.D. (Western) / English and Cultural Studies
Daniel Coleman, B.Ed., M.A. (Regina), Ph.D. (Alberta) / Englishand Cultural Studies
Nancy Doubleday, Ph.D. (Queen's) / Philosophy, Peace Studies
Susan Fast, B.M. (Western Washington), M.A., Ph.D. (Iowa)/ English and Cultural Studies
Donald Goellnicht, B.A. (Queen's), M.A., Ph.D. (McMaster) / Englishand Cultural Studies
Stephen Heathorn, B.A. (Toronto), M.A. (McMaster), Ph.D. (Toronto) / History
Mary O'Connor, B.A. (McGill), M.A., Ph.D. (Toronto) / English andCultural Studies
Helen Ostovich, B.A., M.A., Ph.D. (Toronto) / English and CulturalStudies
Eileen Schuller, B.A. (Alberta), M.A. (Toronto), Ph.D. (Harvard) /Religious Studies
Lorraine York, B.A., M.A., Ph.D. (McMaster) / English and CulturalStudies

ASSOCIATE PROFESSORS

Christina Baade, B. Mus. (Northwestern), M. Mus., Ph.D.(Wisconsin-Madison) / Communication Studies and Multimedia
Donna Baines, B.S.W. (Calgary), M.S.W. (Carleton), Ph.D. (Toronto) /Labour Studies
Karen Balcom, B.A. (Carleton), M.A. (Dalhousie), Ph.D. (Rutgers) /History
Nancy Bouchier, B.A., M.A., Ph.D. (Western) / History
Sarah Brophy, B.A. (Wilfrid Laurier), M.A., Ph.D. (McMaster) /English and Cultural Studies
Juanita DeBarros, B.A. (Toronto), M.A., Ph.D. (York) / History
Diane Enns, Ph.D. (Binghamton) / Philosophy
Ruth Frager, B.A. (Rochester), M.A., Ph.D. (York) / History
Susan Searls Giroux, B.A., M.A.T. (Miami), Ph.D. (PennsylvaniaState) / English and Cultural Studies
Melinda Gough, B.A. (McGill), M.A. Ph.D. (Yale) / English andCultural Studies
Catherine Graham, B.A., M.A., Ph.D. (McGill) / School of the Arts (Theatre and Film)
Cathy Grisé, B.A. (Trent), M.A., Ph.D. (Western) / English andCultural Studies
Janice Hladki, Ph.D. (Toronto) / School of the Arts (Theatre and Film)
Grace Kehler, B.A. (Regina), M.A., Ph.D. (Western) / Englishand Cultural Studies
Tracy McDonald, B.A., M.A., Ph.D. (Toronto) / History
Susie O'Brien, B.A. (Queen's). M.A. (Queensland). Ph.D. (Queen's) /English and Cultural Studies
Lisa Platt, B.F.A. (Connecticut), M.F.A. (California-San Diego) /Communication Studies and Multimedia
Celia Rothenberg, B.A. (Wellesley College), M.A. (Oxford),Ph.D. (Toronto) / Religious Studies
Brigitte Sassen, B.A. (Toronto), M.A., Ph.D. (Pennsylvania State) /Philosophy
Christina Sinding, B.A. (Western), M.A. (McMaster), Ph.D. (Toronto) /Health, Aging and Society, Social Work
Robert Storey, B.A. (Toronto), M.A. (Dalhousie), Ph.D. (Toronto) /Labour Studies
John Stout, B.A. (British Columbia), Ph.D. (Princeton) / French
Jean Wilson, B.A. (McMaster), B.Ed., M.A., Ph.D. (Toronto) /Linguistics and Languages

ASSISTANT PROFESSORS

Nadine Attewell, B.A. (Toronto), M.A., Ph.D. (Cornell) / English and Cultural Studies
ChandrimaChakraborty, B.A. (Calcutta), M.A., M.Phil. (Jawaharlal)Neru), Ph.D. (York) / English and Cultural Studies
Shayne Clarke, B.A. M.A. (Canterbury), Ph.D. (U.C.L.A.) /Religious Studies
Amber Dean, B.A. (Alberta), M.A. (Simon Fraser), Ph.D. (Alberta) / English and Cultural Studies
Eugenia A. Zuroski Jenkins, B.A. (Columbia), M.A., Ph.D. (Brown) / English and Cultural Studies

M.A. Degree

The one year Master's program leads to the degree of Master of Arts in Gender Studies and Feminist Research.

To be eligible for the Master's program students must have an undergraduate honours degree or equivalent with a minimum B+ average. Eligible students will indicate in a statement of interest what in their academic or experiential background prepares them for graduate level work in the program.

For a full description of application materials and procedures, see the Gender Studies and Feminist Research website (http://gsfr.mcmaster.ca)

Part Time Studies

Applications for part-time studies in the M.A. program will be considered. Applicants for part-time studies will provide a brief written explanation of the special circumstances that make it impracticable for them to complete the degree on a full-time basis.

The program requirements for the part-time Master's are the same as those for the full-time Master's, but may be completed over a maximum timeframe of 5 years, in accordance with McMaster's School of Graduate Studies policy. Coursework may be completed in any sequence, but the <u>three core courses</u> must be completed prior to the independent research project.

Program Requirements

The M.A. program requirements include the following mix of course work, experiential learning, and independent research:

- <u>three compulsory core courses</u> (GENDR ST 700, 701, and 702) (9 units)
- <u>three additional elective courses</u> in gender studies and feminist research (from an approved list) (9 units)
- an independent research project (6 units)

For the independent research project, students may choose from three possible options:

- major research project (resulting in a 20-25 page publishable article and oral presentation)
- a project in pedagogical research (resulting in the compilation of a reading list, preparation of course outline, and written paper of 7-10 pages)
- a knowledge in action project (based on work with a community organization and including the development of a document or tool for use by the group and a 15-page paper)

Independent project proposals must be approved by the Program's Graduate Committee.

Graduate Diploma (Ph.D.)

The Graduate Diploma (Ph.D.) in Gender Studies and Feminist Research aims to enhance the intellectual development and training of students already enrolled in doctoral programs by allowing them to combine disciplinary research with interdisciplinary scholarship from the fields of Gender and Feminist Studies.

The Graduate Diploma option is available to incoming and in-course Ph.D. students in McMaster's Departments of English and Cultural Studies, History, Philosophy, Religious Studies, Social Work, and Sociology.

Students completing the diploma will receive the notation ***Completed Graduate Diploma in Gender Studies and Feminist Research*** on their academic transcript in addition to the doctorate degree from their home graduate unit.

The primary requirement for admission to the Graduate Diploma program (beyond admission to the home department's stand-alone Ph.D. program) is distinction in a Master's degree with sufficient academic background and preparation (at the undergraduate and/or Master's level) in women's, gender, and/or feminist studies. The University requires that applicants' previous graduate work be equivalent to at least a McMaster B+ (77-79%), but higher standards may be set in practice by the diploma student's home department.

For a full description of application materials and procedures see the Gender Studies and Feminist Research website
http://gsfr.mcmaster.ca.

Part-time Studies

Doctoral students who wish to pursue a doctorate in their home department together with the GSFR Graduate Diploma will normally be admitted full-time to both. In the occasional instance when the home department and the GSFR program admits, or converts a student, to part-time studies, the requirements for the diploma program (as for the home department) will remain the same but will be spread out over a longer time period.

Program Requirements

Program requirements for the Graduate Diploma (Ph.D.), in addition to those of the student's home department, are:

- one compulsory core course (GENDR ST 700) (3 units) (also required for Master's students)

- one additional elective course in gender studies and feminist research (3 units) (from an approved list)
- participation in the Program's Research Symposium, including
    - regular attendance at symposium events, and
    - an oral presentation based on the doctoral student's own research, normally in the third or fourth year of study; and
- a doctoral thesis on a topic related to Gender and/or Feminist Studies.

Students will normally complete the 6 units of diploma coursework during their second year. In order to ensure timely degree completion, diploma students will be encouraged to choose an elective course likely to directly enhance and move forward their thesis research.

Diploma students will normally give their Research Symposium presentation during their third or fourth year.

Language Requirements: To be determined by individual home departments.

Thesis Evaluation Procedures

Students in the Graduate Diploma program must have their thesis topics approved by both the home department and the program in Gender Studies and Feminist Research. The thesis must be on a topic related to the broad fields of Gender Studies and Feminist Research. Approval is granted by the program's Graduate Committee and occurs in conjunction with the home department's regular schedule for doctoral thesis proposal submission and approval. Members of the Gender Studies and Feminist Research program may sit on doctoral thesis supervisory committees, or serve as external examiners of doctoral theses. Such arrangements are at the discretion of the home department.

Courses

Core Courses

All M.A. students must take the following half courses:

***700 / Current Debates in Feminist and Gender Theory**

An investigation of current feminist and gender theorizing at the intersection of gender with race, sexuality, ability, and other categories of social difference. This course offers sustained attention to the intellectual skills of reading feminist and gender theory. It also considers implications of applying theory to feminist and related forms of activism. Specific topics will vary depending on the instructor's area of expertise.

***701 / Doing Research in Feminist and Gender Studies**
This seminar introduces students to faculty researchers from across the McMaster campus to consider exciting new scholarship that engages feminist and gender studies from a range of disciplinary perspectives. As part of the course requirements, students will attend Gender Studies and Feminist Research Symposium events. Readings, assignments, and discussion will consider topics relating to research ethics, epistemologies and methodologies, including questions of theoretical framing and socio-political praxis. Coursework will include assignments designed to help students prepare effective proposals for independent research.

***702 / Knowledge in Action**
This seminar takes up local community outreach and participatory action research within the framework of Gender And Feminist Studies. Readings will theorize experiential education as well as the ethics of advocacy and activism. Students will complete an experiential learning project involving a community organization with a mandate linked to one or more of the program’s four thematic research clusters and with which the Gender Studies and Feminist Research program has ongoing experiential education arrangements.

Elective Courses

***703 / Topics in Gender Studies and Feminist Research**
This course will explore topics related to the areas of Women’s or Gender Studies, feminist research, sexuality studies. Topics will change each year. Course topics include but are not limited to: Gender, Media and Performance; The Politics of Bodies: Disability, Subjectivity and Representation; Queer Theory; Critical Race and Indigenous Feminisms; Transnational Feminisms.

***704 / Independent Study in Gender Studies and Feminist Research**
A course designed to allow students to tailor their learning to address a particular topic or field in women’s and/or gender studies, sexuality studies or feminist research that is not covered by existing elective courses. Open to M.A. program students and students registered in the Ph.D. diploma program in Gender Studies and Feminist Research. Program approval required.

GEOGRAPHY AND EARTH & ENVIRONMENTAL SCIENCES

The School of Geography and Earth Sciences offers programs leading to the degrees M.A., M.Sc., and Ph.D. in Geography; and M.Sc. and Ph.D. in Earth and Environmental Sciences.

Enquiries: 905 525-9140 Ext. 23535
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E-mail: geograd@mcmaster.ca
Website: http://www.science.mcmaster.ca/geo/

Faculty / Fall 2012

DISTINGUISHED UNIVERSITY PROFESSOR
John D. Eyles, B.A., M.Sc. (L.S.E.), Ph.D. (London

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Paulin Coulibaly, B.A.Sc., M.A.Sc., (Nice), Ph.D. (Laval)
Alan P. Dickin, M.A. (Cambridge), D. Phil. (Oxford)
Carolyn H. Eyles, B.Sc. (East Anglia), M.Sc., Ph.D. (Toronto)
Richard S. Harris, B.A. (Cambridge), M.A. (Ohio State), Ph.D. (Queen's)
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Bruce K. Newbold, B.A., Ph.D. (McMaster)
Eduard G. Reinhardt, B.A., Ph.D. (Carleton)
Jack W. Rink, B.S., Ph.D. (Florida State)
Darren M. Scott, B.A. (St. Mary's), M.A. (Western), Ph.D. (McMaster)
James E. Smith, B.Sc., M.Sc. (Guelph), Ph.D. (Waterloo)
Michael J. Waddington, B.Sc. (McMaster), M.Sc., Ph.D. (York)
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Allison M. Williams, B.A. (Bishops), M.A. (Toronto), Ph.D. (York)

ASSISTANT PROFESSORS
Sang-Tae Kim, B.Sc. (Korea), M.Sc. (Michigan), Ph.D. (McGill)
Maureen Padden, B.Sc., M.Sc. (Waterloo), Ph.D. (Geological Institute, Swiss Federal Institute of Technology)
Niko Yiannakoulias, B.A., M.A., Ph.D. (Alberta)

ASSOCIATE MEMBERS
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Sarah Dickson, B.A.Sc., Ph.D. (Waterloo) / Civil Engineering
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Colin B. Seymour, DCT(RT) (Guy's Hospital), B.L. (King's Inn),M.Sc., Ph.D. (Trinity College Dublin) / Medical Physics
John C. Weaver, B.A. (Queen's), M.A., Ph.D. (Duke) / History

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Richard Bourbonniere (NWRI), M.S., Ph.D. (Michigan)
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Jeff Harris, B.A., M.A. (Carleton), Ph.D. (Ottawa-Carleton)
Charles Jefferson, B.Sc. (Carleton), M.Sc., Ph.D. (Western)
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Gail Krantzberg, B.Sc. (McGill), M.Sc., M.E.S., Ph.D. (Toronto)
George LeBlanc, B.Sc., Ph.D. (McMaster)
Tim Lotimer, B.E.S. (Waterloo)
Bev Leipert, B.A., B.SN. (Saskatchewan), M.S.N. (B.C.), Ph.D. (Alberta)
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James Roy, B.Sc. (Waterloo), M.Sc. (Guelph), Ph.D. (Waterloo)
Scott J. Smith, B.Sc., Ph.D. (McMaster)
Spencer Snowling, B.Eng., Ph.D. (McMaster)
Martin Taylor, B.A. (Bristol), GCE (Leeds), M.A., Ph.D.(British Columbia)
Ross Upshur, B.A. (Winnipeg), M.A. (Queen's), M.D. (McMaster),M.Sc. (Toronto)
Corinne Wallace-Schuster, B.Sc. (Leicester), Ph.D. (Laurier)

PROFESSORS EMERITI
James H. Crocket, B.Sc. (New Brunswick), B.Sc. (Harvard),
Kao-Lee Liaw, B.S. (Taiwan), M.A. (Kansas State), Ph.D. (Clark)
Robert H. McNutt, B.Sc. (New Brunswick), Ph.D. (M.I.T.)

M.A. or M.Sc. Degree in Geography

At the Master's level the following programs are available:

M.A. or M.Sc.

This is the normal route to the Master's degree. A candidate is required:

1. To obtain at least B- standing in one full graduate course (or equivalent). If only two half courses are taken both must be at the 700 level. Supervisors may however require courses beyond the minimum;

2. To present a thesis on an approved topic and to defend this thesis at an oral examination.

M.Sc. Degree in Earth & Environmental Sciences

A candidate is required:

1. To obtain at least B- standing in one full graduate course (or equivalent). If only two half courses are taken both must be at the 700 level. Supervisors may however require courses beyond the minimum;

2. To present a thesis on an approved topic and to defend this thesis at an oral examination.

M.Sc. candidates for degrees in Earth & Environmental Sciences whose previous degrees are not in related fields may be required to pass additional undergraduate courses normally to be taken in the first year of graduate study, as specified by the supervisor and approved by the Director of the School.

Ph.D. Degree in Geography and Earth & Environmental Sciences

A candidate for the Ph.D. must comply with the general regulations and program requirements of the School of Graduate Studies. Students must obtain at least B- standing in one full graduate course beyond any taken at the Master's level. If only two half courses are taken both must be at the 700 level. Prescribed courses or evidence of prior training may be required of students in particular fields of specialization.

The comprehensive examination tests the student's command of the field of specialization and ability to design and defend an original
doctoral research project. The written and oral parts of the examination are normally to be completed by the end of the fifth academic term for students entering with a Master's degree.

Normally, Ph.D. studies are available only to full-time students. In special circumstances, students may be admitted on a part-time basis.

Ph.D. candidates whose previous degrees are not in Geography or Earth & Environmental Sciences may be required to pass additional undergraduate courses as specified by the student's supervisory committee.

Environmental Science

Environmental Science is concerned with the interactions between the physical and biological environment and human activity. Courses and research programs in Earth & Environmental Sciences provide excellent training for students interested in Environmental Science. Additional courses may be taken in other departments such as Biology, Chemistry, Civil Engineering and Physics and Astronomy.

Environmental Studies

The existing courses and research programs in both physical and human geography provide very good training at Master's and Ph.D. levels for students whose interests are in this important area. Students will also be encouraged as part of their program to take relevant courses in other departments (e.g. Anthropology, Biology, Civil Engineering, Chemical Engineering) where environmental interests are strongly represented.

Courses

(Note: Not all courses are offered every year.)

Courses marked with an asterisk (*) are half courses. Courses marked with a plus sign (+) differ in content from year to year and may be taken a second time for credit. The following courses are offered for graduate credit and are also available to senior undergraduate students.

Graduate students registered in 600-level courses will be required to complete additional work (e.g. additional paper, project, or more in-depth analysis of course material) as determined by the course instructor.

All incoming graduate students are required to take either Geog *723 or Earth Sc *708. Students will receive a pass/fail grade and these units will not count toward the required number of units for completion of the graduate program. Students may be exempted from this requirement if they can show evidence of completion of an equivalent course at another university with good academic standing (at least a B+) and obtain permission of the Director.

Human Geography Courses

***6GI3 / Advanced Vector GIS / D. Scott**
Advanced treatment of geographic information systems (GIS) focusing on vector data models and techniques. Real-world problem solving emphasizes business and transportation applications. Global positioning system (GPS) data collection and processing are addressed along with basic programming using Visual Basic for Applications (VBA).

***6HH3 / Environment and Health / N. Yiannakoulias**
Models and methods for research and policy on environment and health.

***6UH3 / Urban Housing / R.S. Harris**
The geography of housing, including the effects of land development, construction, municipal planning and public policy on the urban landscape of housing and homelessness.

Physical Geography and Earth & EnvironmentalSciences Courses

***6B03 / Watershed Ecohydrology / M. Waddington**
A course that emphasizes a watershed ecosystems approach to interactions of hydrological, ecological and biogeochemical processes in the study of the natural ecohydrological function and response to disturbance of stream, riparian and wetland ecosystems. A mandatory field trip will occur.

***6C03 / Advanced Physical Climatology / A. Arain**
This course develops energy and mass exchange processes in the near surface layer, the lower atmosphere and at the earth-atmosphere interface. Sensitivities of these processes to environmental change and feedback mechanisms are examined (seminars and individual presentations are emphasized).

***6CC3 / Environmental Reconstruction Using Stable Isotopes / S.T. Kim**
Stable isotopes are widely used in today's earth and environmental sciences because their unique chemical properties enable us to reconstruct past and current environmental processes. This course will cover the principles of stable isotope geochemistry and introduce the basic analytical techniques in the field of stable isotope geochemistry. Furthermore, this course will also focus on the applications of stable isotopes to paleoclimatology or environmental reconstruction studies.

***6E03 / Coastal Environments / EReinhardt**
Coastal systems and their response to sea level change with an emphasis on the Holocene. Course will include a mandatory local field trip to collect data followed by laboratory analysis.

***6EA3 / Environmental Assessment / M. Padden**
Technical and policy issues involved in the production and the appraisal of environmental impact assessments.

***6K03 / Advanced Mineralogy / J. Rink**
Advanced topics in crystal chemistry and mineralogy, with emphasis on mineral spectroscopes.

***6T03 / Plate Tectonics and Ore Deposits / A. Dickin**
Synthesis of plate tectonics, with application to crustal evolution and genesis of ore deposits.

****6W03 / Hydrologic Modeling / P. Coulibaly(cross-listed as Civil Engineering *6M03)***
Principles of numerical modelling and examination of selected hydrologic models including deterministic, conceptual and statistical models.

***6WB3 / Contaminant Hydrogeology / J. Smith**
Physical and chemical aspects of the fate and transport of contaminants in soils and groundwater, including multiphase flow.

***6Z03 / Exploration Geophysics / J. Boyce**
Principles of subsurface exploration using seismic, magnetic and borehole geophysical methods.Applications in geological research and oil and gas exploration.

The following 700-level courses are offered for graduate credit only:

<u>Human Geography Courses</u>

***714 / Applied Data Analysis for Geographers and Earth Scientists / N. Yiannakoulias**
This course will introduce students to data analysis and statistics with an emphasis on applications in geography and the earth sciences. Topics will include multiple regression, cluster analysis, factor analysis, analysis of variance, data visualization, data management and the principles of statistical inference.

***715 / Special Topics / Staff**
Individual reading course on an advanced level topic. A student may register only once in this course with the permission of The School of Geography and Earth Sciences.

***726 / Feminist Geography / V. Chouinard**
This course examines recent work in feminist geography, with emphasis on issues of theory, method, praxis, and critical assessment of research studies. An introduction to origins of and changing directions in this field is followed by an examination of research in: changing geographies of cities and regions; women and work; housing and household survival strategies; state intervention in women's lives; women, disability and disabling environments; women, space, sexuality and violence; place, politics and identity; methodological issues; and future research directions.

***727 / Disability and Space / R. Wilton, V. Chouinard**

Disability and space is a rapidly developing substantive sub-field in critical social geography. In this course, we examine geographic and other research concerned with disability, space and disabling environments. Different approaches to explanation and to social change are highlighted and assessed.

***728 / Urban Historical Geography / R. Harris**

Study of internal characteristics and external relations of places in nineteenth century eastern North America with particular reference to Southern Ontario.

***729 / Applying Social Theories in Human Geography / R. Wilton**

This course provides an overview of different theoretical traditions within human geography, and the ways in which they are used to engage with, and make sense of empirical data.

***730 / Urban Social Geography / R. Harris**

This course focuses on geographical patterns of residence and activity, primarily in Canadian and U.S. urban areas. It will draw substantially on both empirical research and theoretical conceptualisations, while emphasizing the interrelation between the two.

***733 / Integrated Urban Models: Design, Structure andApplications / P. Kanaroglou**

A review of location and transportation models used in integrated urban models. The performance of known computer implementations of integrated urban models will be evaluated in this course.

***734 / Qualitative Approaches to Health Geography / A. Williams, B. Newbold, R. Wilton**

A range of qualitative approaches (interviews, focus groups, participant observation) will be reviewed as key research methods employed in a health geography context.

***735 / Topics in Urban Geography / Staff**

Discussion of selected aspects of urban spatial structure and location theory.

****736 / Geographies of Health/ J. Eyles***
(cross-listed as Health Research Methodology *735)

This course initially reviews the social theories that underpin the apparently atheoreticalgeographies of health. Specific modules will emphasize key research areas, including but not limited to, environment, place and space, boundaries and access to resources, populationcharacteristics and the role of different actors in shaping health geographies. These actors, including government, business, civil society, will also be examined with respect to their impacts on health status, health inequities and the distribution of costs and benefits to health.

***737 / Activity Analysis: Advanced Travel Behaviour Analysis and Modeling / D. Scott**
Theory, data and methods underlying the activity-based approach to travel behaviour analysis and modeling. The application of activity analysis to future models of urban travel demand is also emphasized.

***738 / Discrete Choice and Policy Analysis / A. Páez**
Discrete choice methods are studied as the technical foundation for the analysis of public and private policy. A particular emphasis is placed on urban policy issues, including travel behavior, energy consumption, and locational decisions. The course covers the micro-economic foundations of discrete choice theory, model specification and estimation, including modern simulation techniques, and applications.

***739 / Spatial Population Analysis / K. Newbold**
Theories and models of migration; characteristics of contemporary migration; movement in space and models of spatial interaction.

***743 / International Housing / R. Harris**
Trends in housing and housing policy internationally since 1945.Economic, social and political aspects.

***746 / Advanced Statistical Methods in Geography / P. Kanaroglou, A. Paez, D. Scott**
Applications of advanced multivariate statistical methods in geographic research, including analysis of contingency tables and regression, logistic and probit models.

<u>Physical Geography and Earth &Environmental Courses</u>

***709 / Radiogenic Isotopes in Earth and Planetary Sciences / A. Dickin**
Nucleosynthesis and radioactive decay.Mass spectrometry. Radiogenic isotopes as chronometers and tracers in crust and mantle evelutin, and in the study of ore deposits. Radiogenic isotopes as environment tracers.Origin of the solar system.

***715 / Special Topics / Staff**
Individual reading course on an advanced level topic. A student may register only once in this course with the permission of The School of Geography and Earth Sciences.

***718 / Advanced Hydrology / A. Arain, S. Carey, P. Coulibaly, J. Smith, M. Waddington,**
This course will examine the fundamentals of hydrology including hydrometeorology, surface water, groundwater, water resources, ecohydrology and hydrological modelling.

***749 / Advanced Environmental Organic Geochemistry /G. Slater**
The course will focus on an advanced treatment of the underlying fundamental concepts in environmental organic geochemistry. Primary focus will be on the basic chemical parameters and kinetic and thermodynamic principles that control the distribution and persistence of

organic chemicals in the environment and therefore the risk that they pose to human and ecosystem health. The same principles control the transport, fate and biological processing of both organic contaminants and natural organic matter. Therefore this course will provide students with fundamental understanding applicable to both contaminated and natural systems. The primary basis for this discussion will be the seminal text Environmental Organic Chemistry by Schwarzenbach et al, with discussion of the application of these principles as reflected in the recent literature. This course is an inquiry-based course.

750 / Advanced Groundwater Flow and ContaminantTransport / J. Smith
(cross-listed as Civil Engineering *770)

This course will cover the theory, equations, fundamental principles, and processes of the flow of fluids and transport of contaminants in soils and groundwater at an advanced level.

***751 / Environmental Micropaleontology / E. Reinhardt**

Microfossils and biogeochemistry as an environmental tool for studying modern and ancient coastal, shelf and lacustrine environments. The course will examine a range of microfossil groups (e.g. ostracodes, diatoms) concentrating on foraminifera and thecamoebians. Course will include a small research project that will involve microscope work.

***752 / Geomicrobiology / L. Warren**

This advanced level course will provide an overview of the emerging conceptual framework of microbial geochemistry and discuss the implications of microbial activity, as it relates to geochemical processes of interest in interpreting the earth's record, as well as contaminant behaviour. Current and emerging techniques available in this field will also be discussed.

***753 / Advanced Environmental Geochemistry / S. Kim, G. Slater, L. Warren**

The course will focus on an advanced treatment of the underlying fundamental concepts in environmental geochemistry of equilibria, kinetics and partitioning, as they apply to both modern and ancient inorganic and organic geochemical processes of interest. It will also highlight available and emerging techniques for investigating past and modern environmental geochemical processes.

***755 / Bio- and Hydro-Meteorology / A. Arain**

Bio- and Hydro-meteorology studies the effect of the atmosphere on carbon and water cycles. The aim is to teach the theory and practical aspects of the energy, water and carbon exchanges from vegetated surfaces, data analysis techniques and surface exchange modeling.

756 / Advanced Methods in Sedimentology and StratigraphicAnalysis / C. Eyles, J. Boyce, E. Reinhardt, J. Rink *(not all instructors will participate every year)

The course will focus on the methods used in understanding sedimentological and stratigraphic successions, whether they are modern, archaeological or deep-time records. It will be structured as a modular course, consisting of anything between 3-5 modules on various topics. Topics include sedimentary environments, isotope stratigraphy & geochronology, sequence stratigraphy, magnetic stratigraphy, seismic stratigraphy and biostratigraphy. Each topic will consist of lectures, core papers and research papers.

****757 / Advanced Statistical and Data Driven Methods in Hydrology / P. Coulibably (cross-listed as Civil Engineering *757)***

The objective of this course is to provide a survey of advanced statistical and data-driven methods in hydrology and water resources engineering, and to apply selected methods to hydrologic modeling and water resources problems solving.

***758 / Advanced Structural Geology / U. Riller**

The aim of this course is to acquaint students with the process-oriented interpretation of various structural geological or related datasets as well as major structural geological or tectonic concepts. Each student in this course will individually conduct a project that is based either on a given structural data set or published material, which will be selected together with the instructor in the beginning ofthe course. The project is expected to be directed towards elucidating a specific geological process based on structural reasoning, calculations or modelling. The progress of the project will be regularly discussed among course participants and the instructor. Thisallows each student to follow up on the development of other students' projects and, thus, to discuss possible thematic links.

***759 / Numerical Modelling in Global Climatology / H. Barker**

Numerical modelling of global climate has evolved much over the past 40 years and has become a mainstay in modern climatology. This course willfocus on numerical modelling of global climate working up from simple global energy balance to one-dimensional radiative-convectiveand latitudinal energy budget models. Idealizations such as DaisyWorld and Predator-Prey models will be used to illustrate feedbackprocesses. Data analysis methods will also be a addressed.

***760 / Exploration Seismology / J. Boyce**

This course will examine current methods and recent developments in the field of reflection seismology. A major emphasis will be placed on the principles and practical aspects acquiring and processing multi-channel seismic reflection data. Applications for oil and gas exploration and investigation of the shallow subsurface for environmental purposes will also be reviewed through case studies.

***761 / Advanced Glacial Sedimentology / C. Eyles**

Current issues in glacial sedimentology including examination of glacial processes, environments and sediments in terrestrial and marine settings, the glacial sedimentary record of the Great Lakes basins and relationships between glacial sediments and urban environmental issues.

***762 / Advanced Geophysical Mapping and Modeling / W. Morris**

Airborne geophysical and satellite imagery for geological mapping application to problems in oil, and mineral exploration and to environmental contaminant mapping.

***764 / Quaternary Dating Methods / W. Rink**

Introduction to a range of dating methods useful over the last 2 million years of earth history. Physical basis of the methods as well as aspects of their application are the main topics, but can also include aspects of the sedimentary context for certain methodologies. Dating methods include radiocarbon dating, argon-argon dating, electron spin resonance dating and luminescence dating.

***765 / Ecohydrology /M. Waddington**

An examination of ecology and hydrology interaction through the study of biogeochemical cycling. (Not an inquiry course.)

****770 / Advanced Analysis of Survey Data / M. Boyle, K. Georgiades, B. Newbold***
(cross-listed as Economics *770, Psychology *770, Sociology *770, HRM *790)

The course is divided into two parts. The objective Part 1 is to have students identify a suitable data set (research study) and develop a proposal describing their secondary analysis project. Students will be helped to develop their 1-2 page proposals which will include: the research question, a brief outline of its relevance and importance; identification of the appropriate data set(s); a brief statement about analytical approach to be used; and the identification of 3-4 key references. The instructors have access to several data sets that can be used for this course. This part will occur between October and December. There will be two class sessions — one in October and the other in November and the opportunity for two individual sessions. The objective of Part 2 is to complete the research paper (review of the literature, analysis of data, write-up and revision of the report) with the purpose of submitting the paper for review to a peer reviewed journal. This part will occur between January-May and include 10 class sessions.

Research in Geography and Earth & EnvironmentalSciences

The School of Geography and Earth Sciences offers research opportunities in the areas of Environment and Health, Social Geography, Spatial Analysis, Hydrological Sciences, Geochemistry and Near-Surface Environmental Processes.

Environment and Health
The McMaster Institute of Environment and Health is located within the School of Geography and Earth Sciences and is directed by one of our faculty members, Dr. Bruce K. Newbold. Areas of research interest include individual and community impacts, environment and health policy, environment and development, and spatial relationships.

Social Geography
Research opportunities in the specialist area of Social Geography include the social aspects of health and health care, feminist geography, disability and space, housing, political economy and urban historical geography.

Spatial Analysis
The application of economic and behavioural theory via quantitative analysis to understand spatial patterns of outcomes in human activity has been a major focus of urban/economic geography at McMaster. Areas of research interest now include transportation, population, urban economics and land use, and health and its determinants.

Hydrological Sciences
The area of physical geography concentrates on physical hydrology, hydro-climatology, boundary layer research, aquatic biogeochemistry, biogeography, soil and vegetation, ground water contamination and near-surface water environments.

Geochemistry
Geochemical research at McMaster is focused on the areas of stable and radiogenic isotopes, physical processes, geochronology and interpretation of physio-chemical records in terrestrial materials. The geological time frame addressed is broad but emphasizes Quaternary and Holocene time.

Near-Surface Environmental Processes (NEP)
The NEP research group focuses on earth and atmospheric processes operating at or close to the Earth's surface and includes research in the fields of physical climatology and hydrology, surficial geoscience (sedimentology, marine processes, paleoenvironmental reconstruction, geophysics), and environmental quality (biogeochemical and contaminant transport, trace gas exchange).

Facilities for Research in Geography

The School of Geography and Earth Sciences is amongst the most advanced in Canada in terms of its experience in training candidates for advanced degrees.

The facilities include: analytic and experimental laboratories for climatology, and geomorphology; a geographic information system laboratory; and a comprehensive map collection.

Facilities for Research in Earth & Environmental Sciences

The School of Geography and Earth Sciences is well equipped with analytical facilities including mass spectrometers, X-ray fluorescence, atomic absorption spectrometers, and gamma ray spectrometer. Transmission and scanning electron microscopes with elemental analysis facilities are available and commonly used. School facilities for Electron Spin Resonance (ESR) and thermoluminescence (TL) age-dating techniques have been used in the study of archaeological sites, earthquake recurrence rates, coastal sediments and hominid evolution.

There are special laboratories for the study of aqueous geochemistry, experimental sedimentology, X-ray diffraction and fluorescence, rock/mineral analysis, radiochemistry, mass spectrometry and fossils.

The School operates a microcomputer laboratory comprising a suite of PC's with associated printers, plotters and flatbed scanners. At the undergraduate level specific courses have been developed around the application of software packages to geological problems.

The School maintains a suite of geophysical equipment for the acquisition of magnetic, gravity and IP/Resistivity data. In addition, an industry standard computing system is used for the imaging of geophysical and remote sensing information and interpretive modeling of potential field data.

The choice of thesis topic is made in light of the interests of the student and the support available from research grants.

GLOBAL HEALTH

The new and innovative Graduate Program in Global Health is an interdisciplinary, cross-cultural and interprofessional M.Sc. degree program. The program strives for synergy in global health, integrating education and research from the Faculty of Health Sciences, Faculty of Social Sciences, and DeGroote School of Business. It is designed to prepare students for the global workforce providing a solid foundation in global health issues, web-based learning and experience in low-and middle-income countries (LMICs).

Students will receive education in the major topics of global health ranging from globalization and management issues, to studies of disease and policy response. The M.Sc. is offered as either course-based or thesis-based depending on the goals of the student.

McMaster University has established a partnership that includes collaborative international learning experience with Maastricht University, The Netherlands. McMaster and Maastricht offering two core courses—Global Health Foundations I and II online by faculty members at both universities. Students from both universities will also join together for the learning symposium/field orientation (service learning) in Term 3.

Term 2 will provide students the opportunity to choose from one of the following three fields of the Global Health program: Globalization and Development, Global Health Management, and Global Diseases.

On completion of this Master's program, graduates will qualify for high-level positions with international health and development agencies.

Enquiries: 905-525-9140 Ext. 22045
Fax: 905-522-5493
Email: globhth@mcmaster.ca
Website: http://fhs-mcmaster.ca/globalhealthprogram

Faculty / Fall 2012

PROFESSORS
Andrea Baumann, B.Sc.N. (Windsor), M.Sc.N. (Western), Ph.D. (Toronto)
Kevin Brazil, B.A., M.A. (Carleton), Ph.D. (Toronto)
Deborah Cook, M.D., M.Sc. (McMaster), F.R.C.P.(C)
Gordon Guyatt, B.Sc. (Toronto), M.D., M.Sc. (McMaster), F.R.CP(C)
Del Harnish, B.Sc., M.Sc. (Queen's), Ph.D. (McMaster)
Mark Loeb, B.Sc., M.D. (McGill), M.Sc. (McMaster)
Peter Szatmari, B.Sc., M.D., M.Sc. (McMaster)
Zhou Xing, M.D. (North Sichuan, P.R.C.), M.Sc. (Tongi, P.R.C.),Ph.D. (McMaster)

ASSOCIATE PROFESSORS

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Padman Jayaratne, B.Sc. (Colombo, Sri Lanka), Ph.D. (Guelph)
Paul Krueger, B.Sc., M.Sc. (Waterloo), M.H.Sc., Ph.D. (Toronto)
John Lavis, M.D. (Queen's), M.Sc. (London School of Economics),Ph.D. (Harvard)
David Price, B.Sc., M.D. (British Columbia)
Ruta Valaitis, B.A., B.Sc.,N. (Windsor), M.H.Sc. (McMaster),Ph.D. (Toronto)
Yonghong Wan, M.D., M.Sc. (Hubei Medical University)

ASSISTANT PROFESSORS

Christy Gombay, B.A., H.Sc., Ph.D. (Toronto)
Susan Jack, B.Sc.N. (Alberta), Ph.D. (McMaster)

ASSOCIATE MEMBERS

Norman Archer (DeGroote School of Business-Information Systems)
Noori Akhtar-Danesh (Nursing)
Vishwanath Baba (DeGroote School of Business– Human Resources& Management)
Mohit Bhandari (Surgery)
Jason Busse
Wiliam Coleman (Political Science, Institute on Globalization and theHuman Condition)
Mahshid Dehghan (Population Health Research Institute, Medicine)
Daniel Drache (Political Science, York University) / Part time
Forough Farrokhyar (Clinical Epidemiology & Biostatistics, Surgery)
Shawn Forbes (Surgery)
Mabel Hunsberger (Nursing)
Andrea Hunter (Paediatrics)
April Kam (Paediatrics)
Charu Kaushic (Pathology and Molecular Medicine)
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Tim O'Shea (General Internal Medicine, Medicine)
Tony Porter (Political Science, Institute on Globalization and theHuman Condition)
Glen Randall (DeGroote School of Business-Strategic Market Leadership & Health Services Management)
Aaron Schat (DeGroote School of Business-Human Resources &Management)
Harry Shannon (Clinical Epidemiology and Biostatistics)
Eli Tshibwabwa (Radiology)

Patricia Wakefield (DeGroote School of Business-Strategic Market Leadership & Health Services Management)
Anne Wong (Anesthesia)
Jianping Xu (Biology)

Fields in the Program

The fields of study in the program are not mutually exclusive, students will choose from a wide spectrum of research interests that cross the boundaries that define the fields. To encourage this cross-fertilization, all students will take the core courses Global Health Foundations I and Global Health Foundations II that bridge the fields. They will also attend the required collaborative seminars that address a variety of issues in Global Health. In addition they will choose fields, electives and do scholarly projects in areas of special individual interest, to enable them to build upon and advance their knowledge of Global Health in a manner that will often cross field boundaries.

The M.Sc. program is designed so that students will meet the following core competencies:

- Develop an understanding of Global Health as a series of dynamic relationships and interrelated themes

- Gain a working knowledge of selected topics within one of the three fields in Global Health
    - Develop a specialized working knowledge of one of these fields
    - Be able to identify the macro dynamics of globalization and their consequences for micro-level health outcomes
    - Understanding the systemic inequalities that permeate the relationships of Global Health through Commerce, Globalization, and Power
    - Build an awareness of the new practices, instruments, insights, and perspectives needed to work in a global environment

- Develop the tools to analyze critically and measure the relationships which define the global meaning of health

- Understand and appreciate the changing roles and responsibilities of old and new actors in theglobal health field (citizens, governments, health professionals, international organizations, private foundations, etc.)

- Use reflective practice as a critical tool for knowledge acquisition, personal and professional growth, and effective intercultural exchange

The three fields in the program are as follows:

a) Globalization and Development

Globalization focuses on cultural, political, social and economic globalizing processes in the contemporary era and how they impact economic development, health, healthcare, and education in LMICs. These processes, often accelerated by information and communication technologies, have redefined in unequal ways how individuals and communities experience and view the world, and how they organize to change the world.

b) Global Health Management

Global Health Management introduces students to management and policy skills, including a fundamental understanding of the capacities needed to manage projects related to health, healthcare, economic development, and education.

c) Global Diseases

The Global Diseases field involves the study of endemic tropical diseases as well as other diseases that tend to afflict LMICs, including HIV/AIDS, tuberculosis, and cancer. A globalization topic that will be emphasized is the threat to public health from existing, new, and re-emerging diseases that may move almost with impunity across national borders through immigration, travel, and global trade. Chronic diseases that affect developed nations are also a threat to health in developing nations, and will be addressed as well.

Finally, all students will be required to attend Global Health *710, a collaborative Learning Symposium/Field Orientation, that will feature a meeting of the entire student class, seminars by experts in the field, student presentations on selected research topics, and fields visits to sites that involve development activities in global health, relevant to the program. This will be followed by compulsory summer field work in relation to the scholarly paper.

Admission

Admission to the M.Sc. Global Health program requires an honours bachelor's degree with at least a B+ from an accredited university (equivalent to a McMaster 8.5 out of 12) in the final year in all courses in the discipline, or relating to the discipline, in which the applicant proposes to do graduate work. All students entering the program must have completed a university level course in statistical analysis with a minimum grade of B-. Students with no background in health may be required to complete a make-up course in health before entering the program. Finally, applicants must have a strong interest in one of the fields offered in the program.

Admission requirements include:

1. One official transcript of academic work completed to date at all post-secondary institutions attended, sent directly from the issuing institution(s). If the final transcript does not show that a completed degree has been conferred, an official copy of the diploma is also required.

2. Two academic letters of recommendation from instructors most familiar with the applicant's academic work, sent directly from the instructors.

3. A personal curriculum vitae (résumé).

4. A written personal essay (submitted online within the application). Theessay should explain why the applicant is seeking graduate education; describe how the applicant plans to benefit from the program; and finally, outlines the selected field of interest from the three tracks offered in the program in order of preference; if no preference, please indicate (no more than 750 words.)

5. An official copy of the applicant's TOEFL (Test of English as a Foreign Language) score or other evidence of competency in English must be submitted (if English is not the applicant's native language). A minimum TOEFL (iBT) score of 92 (550 on the paper-based TOEFL or 237 on the computer-based test) is required.

M.Sc. Degree

The general requirements for the M.Sc. degree appear under the regulations for the Master's degrees near the beginning of this Calendar.

M.Sc. by Thesis

Requirements for thesis-based students include:

1. Completion of the program with at least a B- standing, a minimum of five graduate half courses which must include: GLOB HTH *701, GLOBALST *710, HRM *721, BUS C721, GLOBALST *702, and one additional half course from the selected field of interest decided by the student in conjunction with his/her supervisory committee which may be at the 600 level.

2. Successful completion of the learning symposium/field orientation(GLOB HTH *710).

3. Completion of a thesis on an approved global health issue and defend the thesis at a final oral examination.

M.Sc. by Course Work

Requirements for the course-based M.Sc. degree include:

1. Completion of the program with at least a B- standing, a minimum of eight graduate half courses which must include the five required courses: GLOB HTH *701, GLOBALST *710, HRM *721, BUS C721, GLOB HTH *702; two courses from the selected field of interest and an additional course from the elective offerings.

2. Successful completion of the learning symposium/field orientation and summer field work (GLOB HTH *710).

3. Completion ofa 15-20 page written scholarly paper on a topic approved by the student's supervisor (GLOB HTH 711) and/or a thesis.

Courses

<u>Required Courses - Term 1</u>

GLOB HTH*701 /Global Health Foundations I
This course addresses cross-sectional and interrelated features of the health problems, issues, and concerns in the circumstances or experiences of nations that transcend national boundaries, and that are best addressed by cooperative actions and solutions. The critical relationships among health, health care, education, economic development, and business management will be explored in detail. Ethical issues in global health are also addressed. Discussion and interaction among the participants is strongly encouraged. The course will also include several seminars from recognized researchers in global health and infectious diseases, and from field workers familiar with the aspects of what graduates from this program are likely to encounter in their careers, accompanied by significant interaction and discussion.

GLOBALST*710 / Globalization: An Introduction
An introduction to major theories and debates in the field of globalization studies.

Business*C721 / Health Policy Analysis
This course will examine the field of health policy analysis with particular emphasis on clinical, administrative and government policy. After establishing a framework by which to analyze policy—which will include consideration of stakeholders, pressure groups, values, institutions, and the media—various tools will be studied as means of formulating and evaluating policy. Techniques from business, political science, economics, sociology, epidemiology, and history will be used. Specific policy topics will be presented as illustrations of this management art.

HRM *771 / Fundamentals of Health Research and Evaluation Methods (Online)
This is course is designed to introduce methodological issues to help you critically read scientific reports of health research. It will introduce you to the major components of research activities, including: study designs, selection of study populations, choice of measuring instruments, formulation of research questions, and study interpretation issues such as determination of causality and the effectiveness of clinical and community interventions.

Required Course - Term 2

GLOB HTH*702 /Global Health Foundations II
Program and project management skills are essential to every graduate from this program. This course introduces global health program and project management, and demonstrates their application using real cases from each of the three Global Health program fields. Interaction among, and contributions from students are strongly encouraged. The course will also include regular weekly seminars, presented by students and their supervisors or advisors, resulting from their studies of global health issues, and accompanied by significant interaction and discussion with other students, instructors, and supervisors.

Courses by Field (Term 2)

Global Health Management

Business*C711 /Health Economics and Evaluation
This course will examine the application of economic principles to policy-relevant questions in the area of health and health care. Topics will include applied health economics, economic correlates to health, demand and supply of health care and insurance, health care system financing, alternative payment schemes, economic regulation of the pharmaceutical industry, cost-effectiveness and cost-benefit analyses. QALY's, and means by which to improve value-for-money in the health sector.

Business*I731 /International Business
This course examines the environment analysis of international business and surveys a number of managerial issues related to international operations. Macro strategic decision making and alliance formation are studied as are functional decision making in the areas of finance, accounting, marketing, human resources, sourcing, and production. The course acquaints students with available databases and their use, and requires a research project to be undertaken.

Business*C741 /Health Care Marketing
This course provides an in-depth understanding of the key concepts of marketing and their application to the rapidly changing public and private health care environment. Students build practical skills in: analyzing marketing problems in for-profit and not-for profit health care organizations in Canadian, U.S. and other international settings; and in developing programs and strategies applying marketing tools and principles (such as pricing, promotion,

product/services, consumer behavior, branding, segmentation, social marketing and health promotion). Students also increase their appreciation of the role of data collection, analysis, interpretation, and management in health care marketing decisions. The course consists of case discussion, lectures, guest speakers, readings (cases, articles, textbook), and practical field experience whereby student teams undertake marketing consulting projects in local health care organizations.

Global Diseases

GLOB HTH*707 /Global Burden of Disease
This course will introduce graduate students to the concepts of the global burden of disease. The course will start by examining howdisease burden is measured and the value choices that are implicit in such measurement tools. An overview of diseases and conditionsresponsible for a significant portion of the global disease burden will then be presented, focusing on epidemiology, clinical aspects,management and prevention.

Biology *6P03 / Medical Microbiology
Microbial infectious diseases of humans: ecology, evolution, epidemiology, immunity, pathogenesis and the treatments of these diseases.

Medical Sciences *717 / Vaccines and Vaccine Immunology
Vaccines and vaccine immunology have become an important sub-discipline of modern biomedical practice and research. It becomes increasingly important to both prevention and treatment of infectious diseases, cancer, autoimmune diseases and allergic diseases. This course is designed to provide graduate students with the basic concepts of current human vaccination programs, methods used to develop various forms of new vaccines, and vaccine immunology.

Globalization and Development

GLOBALST *705 / Global Public Policy(cross-listed as Political Science *705)
An examination of policy-making at global institutions and the relationships with other scales of policy formation.

GLOBALST *712 / International Trade and Economic Development
This course studies the economic impacts of world trade on developing countries.

GLOBALST *777 /Global Governance (cross-listed as Political Science *777)
This course examines the institutions and processes of global governance. It considers different theoretical approaches to understanding rule creation and maintenance on a global scale. Approaches and issues that will be examined include: neoliberal and neorealist regime theory; critical theory approaches; international law, the role of corporations and private authority and the activity of global civil society.

Elective Courses

GLOB HTH *715 / Independent Study Course
This half-course is designed to allow students to tailor their learning to address specific knowledge gaps identified by the program orsupervisory committee. In consultation with a faculty member with expertise in the area, a course outline will be developed that is tailor madeto meet the student's knowledge gaps and learning requirements. Students will engage on a faculty member-supervisedexploration of relevant concepts and scholarly literature. It is expected that the level of learning is consistent with expectations for 700-level courses. Please see detailed description on the M.Sc. Global Health Website. *Prerequisite:* Registration in the M.Sc. (Global Health) Program. Proposals are welcome at any time and will normally be approvedwithin 48 hours. The approval (and permission) of the student, instructor and program dean are required.

Business*C722 / Management of Population Health
The Management of Population Health takes a meta-approach to health issues focusing on strategies to improve health and well-being while controlling costs. Several frameworks will be critiqued and concepts studied will include, but will not be limited to the correlates of the health of different populations, the stages of the life cycle, the burden of illness for society, contagions and public health, the congruence between evidence and policy, prevention, community action, and the development of students' critical appraisal skills.

HRM *770 / Mixed Methods Research Designs for Health Services and Policy Research (cross-listed as Nursing *770)
This course introduces students to the major concepts and issues involved in mixed methods approaches to tackle important questions in the field of health services and policy. LearnLink is used as the mode of instruction. A framework for thinking about mixed methods will be developed that provides guidance to decision-making about when and how to use mixed methods and models to study health services and policy problems. The course will provide students with knowledge of the current controversies and major challenges in the use of mixed methods and models of research. Students are expected to design a mixed method study as part of the course and critically evaluate the design options chosen by a classmate.

Required Course – Term 3

GLOB HTH *710 / Learning Symposium and Field Orientation
All students in the Master of Science in Global Health program are required to complete a Global Health Learning Symposium/Field Orientation, working in an approved public or private organization engaged in the prevention of disease, health promotion, health service delivery, health policymaking, or research in a global context. The placement provides the opportunity to become familiar with the kinds of organizations that put into practice the theory, concepts, and

methods taught in the Master's program. This course will take place through field visits, small group discussions and the presentations of the conclusions from project work undertaken during the placement. After three weeks, students will also present their research findings, in order to receive feedback from peers.

Summer Term (May-August) Courses (Both M.Sc. by Course Work and M.Sc. by Thesis)

Students are expected to be well along in the development of a research proposal, including a literature review by the end of the winter term. Indeed, thesis students may have already completed their proposals and begun their research projects, since their course load in the winter term is limited to one required and one elective course. Upon return to McMaster from the symposium, Course Work option students will proceed to complete a scholarly paper, relevant to the field they selected, during the remainder of the summer. This may involve the analysis of secondary empirical data or it may involve a model or conceptual design based on a literature review undertaken prior to the workshop. The scholarly study will be submitted as the student's Master's scholarly paper and may in some cases be suitable for publication in the academic literature.

GLOB HTH 711 / Scholarly Paper ***(For students in the M.Sc. by Course Work Option)***
This full course is designed as an opportunity for graduate course-based M.Sc. students to demonstrate in writing, their ability to integrate ideas that reflect current knowledge in Global Health. The scholarly paper is to determine integrative thinking at a general and abstract level. A student will identify a topic, and in consultation, with a faculty member with expertise in the area, develop a proposal that is individualized to the student's area of interest. The student will then develop the paper under the guidance of a faculty member. The paper must be 15 to 20 pages, excluding references and appendices. The paper does not involve the collection or analysis of primary data or the conduct of research with subjects. It is a scholarly essay, not a thesis. It is critical to the course-based M.Sc. students to demonstrate mastery of the theoretical and methodological understandings that have been acquired during the course work.

Thesis Option

Students taking the thesis option will spend the remainder of the summer and can take the fall term to complete their research and theses, which may involve the collection and analysis of field data or developing major conceptual works based on the literature.

GLOBALIZATION

The Institute on Globalization and the Human Condition offers a program leading to a M.A. degree.

Enquiries: 905 525-9140 Ext. 27556
Fax: 905 527-3071
Email: globalhc@mcmaster.ca
Website: http://globalization.mcmaster.ca

Faculty / Fall 2012

DISTINGUISHED UNIVERSITY PROFESSOR
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PROFESSORS
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Virginia Aksan, B.A. (Allegheny College), M.L.S. (Berkeley), M.A.,Ph.D. (Toronto) / History
Daniel Coleman, B.Ed. (Regina), M.A. (Regina), Ph.D. (Alberta)/ English & Cultural Studies
Robert O'Brien, B.A. (Carleton), M.Sc. (Econ.) (London), Ph.D. (York)/ Political Science
Peter Walmsley, B.A., M.A. (Toronto), Ph.D. (Cambridge) / English &Cultural Studies

ASSOCIATE PROFESSORS
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Chandrima Chakraborty, B.A. (Calcutta), M.A., M.Phil. (Jawaharlal Neru), Ph.D. (York) / English & Cultural Studies
Juanita DeBarros, B.A. (Toronto), M.A., Ph.D. (York) / History
Michael Egan, B.A., M.A. (Simon Fraser), Ph.D. (Washington State) / History
Diane Enns, B.A. (Ottawa), M.A. (Carleton), Ph.D. (SUNY-Binghamton) / Philosophy / Director
Bonny Ibhawoh, B.A. (Bendel State), M.A. (Ibaden), Ph.D. (Dalhousie)/ History
Peter Nyers, B.A., M.A. (Victoria), Graduate Diploma, Refugee &Migration Studies, Ph.D. (York) / Political Science
Susie O'Brien, B.A. (Queen's), M.A. (Queensland), Ph.D. (Queen's) / English & Cultural Studies
Petra Rethmann, B.A. (Vienna), M.A. (Munich), Ph.D. (McGill)/ Anthropology
Susan Searls Giroux, B.A., M.A.T. (Miami), Ph.D. (PennsylvaniaState) / English & Cultural Studies
Stephen Streeter, B.A. (Bates), M.A. (Riverside), Ph.D. (Connecticut)/ History
Donald Wells, B.A. (Western), M.A. (British Columbia),Ph.D. (Toronto) / Labour Studies and Political Science
Rachel Zhou, B.A. LLM (Wuhan, China), M.A. (Toronto) / Social Work

M.A. Degree

Admission to the M.A. degree program requires an average of B+ or better in an Honours program in a Humanities or Social Sciences undergraduate program. Students with degrees in undergraduate programs outside the Humanities and Social Sciences where there is a component of relevant courses will also be considered.

In the M.A. program, studies take the form of course work plus a Major Research Paper. Students take six half courses (or equivalent) at the graduate level, including a required core course plus at least two other Globalization courses. During the fall term, students will take the required introductory course plus two other half courses. They take an additional 3 half courses during the winter term. During the winter term, students will prepare a proposal for their Major Research Paper and identify a potential supervisor and second reader. Students complete the Major Research Paper in the Summer term.

Courses

All courses are half courses. Globalization *710 is required of all students.

***6C03 / Topics in Feminist Scholarship: Refugee Women in Canada / M. Ahmed**
In this seminar, we shall look at the evolution of gender considerations in the refugee determination process, examine refugee generating situations such as inter state and internal conflicts, forced economic displacement, natural disasters, trafficking or gender based persecution, how they affect refugee women's lives in specific ways and in different locations and contexts (ie: from refugee camps to Canada) , and how they respond (ie: trauma, but also resilience, resistance and initiatives). We shall reflect on the methodological and ethical questions we need to address when conducting research with refugee women, as educators and advocates.

***701 / Topics in Globalization Studies I / Staff**
This course will expand the discussion of why globalization should be the focus of interdisciplinary inquiry giving particular attention to an identified key issue area in the field. For each of these areas, readings will be drawn from the social sciences and the humanities.

***702 / Topics in Globalization Studies II / Staff**
This course will expand the discussion of why globalization should be the focus of interdisciplinary inquiry giving particular attention to an identified key issue area in the field. For each of these areas, readings will be drawn from the social sciences and the humanities.

****703 / Acts of Global Citizenship / P. Nyers (cross-listed as CSCT *707)***
This course examines recent debates about a fundamental concept in globalization studies: global citizenship.

***704 / Global Social Policy / Y.R. Zhou**

This interdisciplinary course introduces students to key concepts and issues of global social policy and its connections with globalization processes. It examines trends in global social policy and the diverse experiences of different welfare regimes across the world. Locating social policy within the context of global inequalities, this course also seeks a deeper understanding of the issues of poverty, social exclusion, and deprivation from an international perspective. In discussing the challenges and possibilities regarding the future of welfare, the roles of various non-state sectors (e.g., transnational corporations, international organizations, and international NGOs) in pursuing social justice and human rights in the global context are also addressed.

****705 / Global Public Policy / S. McBride (cross-listed as Political Science *705)***

An examination of policy-making at global institutions and the relationships with other scales of policy formation.

****707 / Religion and Globalization / Staff (cross-listed as Religious Studies *768)***

This course will provide a critical account of debates about globalization as they relate to questions of religious identity, practice, belief and modes of affiliation. Through a combination of theoretical discussion and case studies, the course will provide students with a framework for analysing how religious movements operate on the world stage, both historically and in the contemporary situation. Thematic emphasis, and selection of case studies, will shift from year to year, including (but not limited to) studies of secural nationalism, religious fundamentalism, religion and global media, transnational and diasporic religious public spheres, missionaries and empire, religion and migration, pilgrimage and travel, religion and global environmentalism, or religious themes in world politics.

***710 / Globalization: An Introduction / P. Nyers**

An introduction to major theories and debates in the field of globalization studies.

***711 / Cosmopolitics: Community, Identity and Agency Beyond the State / P. Nyers**

This course examines some of the lively contemporary debates surrounding the concept of cosmopolitanism.

***712 / International Trade and Economic Development**

This one-semester course studies the economic impacts of world trade on developing countries.

****713 / Islam, Diaspora, and Identities in Central Asia 1880 to the present / T. McDonald (cross-listed as History *713)***

This course focuses on Soviet Central Asia but begins with background from the late Tsarist period and ends in the post-Soviet present. Central Asia is the focus for broader discussions on issues of colonialism, identity, gender, nationalism, the Soviet legacy, Islam, diaspora, and the challenges of post-Soviet transition.

714 / The United States and Globalization since the Late Nineteenth Century / S. Streeter (cross-listed as History *714)

This course explores the history of globalization in the modern era emphasizing the role of the United States both internationally and domestically. We begin with the War of 1898, track the rise of the American empire through the so-called Golden Age of capitalism, and conclude with the neoliberal era following the end of the Cold War. The focus is on how and why the United States came to play such a powerful role in shaping globalization; and, it also covers the impact of globalization on the United States itself.

***715 / Globalization and China / Y.R. Zhou**

An examination of China's response to globalization and the social, economic, political and cultural transformations of Chinese society in this globalized era. This course introduces students to the significant transformations of Chinese society since 1978 and their connections with globalization processes.

717 / Global Sex / S. Searls Giroux (cross-listed as CSCT *717 and English *717)

This course explores the culture of neoliberalism in terms of its specifically gendered dynamics. It will engage three related moments that map the transformation of human relations, moving out from the most intimate of human bonds to the broadly political: (1) the shifting nature of human connectedness—of intimacy, family, community, national unity; (2) the commodification of sexual relations recast as sexual revolution for some, sexual slavery for others; and (3) the emergence of rigidly fundamentalist and patriarchal discourses globally.

***718 / Global Actors Beyond the State: Methods and Cases**

This course examines the emergence and effects of global activism beyond that of state actors and associations of states. It introduces methods for analysing global social movements: frame and discourse analyses; historical approaches; case-based and comparative research; network analysis; and approaches that emphasize political processes and opportunity structures. We also examine various cases, including: human rights movements; campaigns against neo-liberal policies affecting the developing world; and international religious mobilizations. Students will work on research papers using research methods appropriate to a case study of their own design.

720 / Topics in Political Culture / P. Rethmann(cross-listed as Anthropology *720)

An examination of the interrelationship between politics and culture. Thematic foci of the course will vary.

723 / Global Environmental History / M. Egan (cross-listed as History *723)

This course examines how the natural environment intersects with major themes in world history, including colonialism, industrialization, and war. It investigates the environmental context and consequences of these and other subjects, with the understanding that the environment is an agent and a presence in human history.

727 / The New Constellation of Race: Sovereignty, Citizenship, Social Death / S. Searls Giroux (cross-listed as CSCT *727 and English *727)

This course seeks to map the new trajectories of race theory in a post-civil rights, post-apartheid, post-9/11 world.

730 / Work and Democracy in the Global Society / D. Wells (cross-listed as Work and Society *730)

This course centers on the transition from a postwar "golden age" of state-regulated labour regimes to a more disorganized capitalism of "flexible" labour regimes. The main dynamics of this transition include a new era of transnational corporate rivalry and collaboration, massive technological change, and a complex new global division of labour. Students will analyze this transition at the level of the workplace, community, nation-state, sub-national industrial districts and the supranational level, including regional trading blocs. Students will assess the impact on labour of key global institutions such as the International Monetary Fund, General Agreement on Trade and Tariffs/World Trade Organization and the International Labour Organization. The course will focus on both "first" and "third world" labour regimes. Finally, the course will examine key labour responses to globalization, including the activities of transnational labour bodies, new alignments between labour and social movements, and emerging forms of transnational labour solidarity. Enrolment is limited to a maximum of 3 students from the M.A. in Globalization Studies, or permission of the instructor.

731 / Anxiety Disorders: The Cultural Politics of Risk / S. O'Brien (cross-listed as CSCT *731 and English *731)

Through a variety of critical and imaginative works, this course will consider some political, cultural, affective, and environmental dimensions of contemporary "risk" society.

746 / Science, Technology, and Nature / M. Egan (cross-listed as History *746)

This reading course explores the historical relationships between science, technology, and the physical environment. Emphasis will be put on how knowledge and machines mediate historical understandings of nature, and how nature influences the production of science and technology.

747 / Discourses of Empire 1700-1820 / P. Walmsley (cross-listed as CSCT *747 and English *747)

This course will consider how British and Colonial literatures articulated the process of forging a world empire. Our central project will be to map the shifting identities of self and other, and metropolis and colony, throughout the eighteenth century. We will read a wide range of texts -- not only novels and poems representing imperial encounters, but also travel books and early slave narratives -- and the course will provide ample opportunity for reference to McMaster's rich collection of books and periodicals from this period.

751 / European/Muslim Encounters in the Pre-Modern World/ V. Aksan (cross-listed as History *751)

This seminar will explore the historical origins and evolution of East/West (Europe/Islam) relations, concentrating on a number of themes. These may include 1) perceptions of religious difference (Christianity and Islam); 2) the narratives of warfare (crusades and jihads); 3) The Orient and the "Turk" in European thought 17th – 19th centuries; 4) The politics and culture of eastern and western empires; and 5) Muslim encounters with the West, medieval and modern.

757 / The British Empire and Global Integration, 1815-1960 / J. Weaver (cross-listed as History *757)

This course considers how assorted types of colonizers working within a loosely-managed empire cooped, dispersed, and displaced subject populations and cultures, attempted to restructure established civilizations, pursued economic and strategic opportunities, moved and managed people in conjunction with plans for "improvement", diffused a language and array of ideas about law, justice and government, and distributed flora and fauna around the world.

758 / Cosmopolitanism and its Critics / J. Ingram (cross-listed as Political Science *758)

761 / Themes in the History of the Post-Slavery African Diaspora/ J. de Barros (cross-listed as History *761)

This seminar examines the social, political, and cultural changes following the end of slavery in the post-slavery African Diaspora. Particular attention will be paid to the significance of gender, race, and class in the creation of new social and national identities.

764 / Global Power, Local Cultures: Comparative Colonialisms in Africa / B. Ibhawoh (cross-listed as History *764)

A comparative study of the processes by which imperial global power and local responses shaped the political, economic and cultural history of Africa in the late 19th and 20th centuries.

765 / Biopolitics: An Introduction / H. Giroux (cross-listed as CSCT *765 and English *765)

This course will analyze how the concept of biopolitics is developed in the work of some of its major theorists and what the relevance of this work might be for constructing a new understanding of a publicly engaged notion of theory and social change.

766 / Islamic Fundamentalism / L. Takim (cross-listed as Religious Studies *766)

The courses will examine the rise and appeal of Islamic Fundamentalism. Why and when did the fundamentalist movements begin? Why do many Muslims find the fundamentalist movements appealing? In documenting the growth and appeal of fundamentalist religious tenets among segments of the Islamic community, it becomes apparent that the fundamentalist enterprise has become or argued that there are more differences than similarities between the fundamentalist movements. Students will read primary sources and recent secondary studies of the topic.

767 / Islam in a Global World / L. Takim (cross-listed as Religious Studies *767)
The course will explore how Islam and Muslims have been affected by the process of globalization. It will initially define globalization and its salient traits and then discuss how globalization impacts Muslims all over the world. It will also examine the various modes through which globalization has touched on the lives of Muslims. We will see that whereas globalization has destroyed territorial boundaries, it has brought to light cultural, ethic, and ideological boundaries that have created tensions within the American Muslim community. The course will also examine how Muslim fundamentalists have used globalization in their desire to universalize their ideology. Students will read primary sources and recent secondary studies of the topic.

768 / Imperialism and Medicine / P.B. Mukharji (cross-listed as History *766)
Empire and modern medicine are both independently acknowledged as having played an important part in shaping our contemporary world. Indeed, in many ways, they continue to do so. Instead of studying them separately, this course explores how these two important institutions of modern world history were related to each other and the legacies that their relationship left behind.

774 / Global Political Economy / Staff (cross-listed as Political Science *774)

777 / Global Governance / R. O'Brien, T. Porter (cross-listed as Political Science *777)

779 / The Times We Live In / S. O'Brien (cross-listed as CSCT *779 and English *779)
This course looks at changing conceptions of time in the late 20th/early 21st century in the context of globalization. We will survey a range of literary texts, films and social movements (e.g., Slow Food) that explore ideas about temporality, with a focus on the ways in which culture resists and/or supports such trends as acceleration, synchronization and the erosion of boundaries between private and public time.

782 / Diasporas, Transnationalism, and Religious Identities/ E. Badone (cross-listed as Anthropology *782 and ReligiousStudies *782)
An examination of religion among immigrant and diaspora communities in the contemporary globalized world.

784 / Decolonizing Bodies / C. Chakraborty (cross-listed as CSCT *784 and English *784)
An examination of the representations of the body in postcolonial literary and visual texts from Africa and South Asia.

786 / Global Futures: Theory, Practice and Possibility (cross-listed as Anthropology *786)

787 / Post-colonial Ecologies / S. O'Brien (cross-listed as English *787)

This course will consider issues central to ecocritical and post-colonial theories, with a specific focus on topics of language, political sovereignty and the relationship between "self" and "other" in contemporary post-colonial English literature.

788 / Writing Diaspora: Literature, Community, and Displacement / D. Coleman (cross-listed as CSCT *788 and English *788)

This course examines critical debates in contemporary cultural studies over the best way(s) to conceptualize the experiences of people who have left their places of birth or places of cultural origin in an era of "globalization." It examines the representation of these experiences in literary works (memoirs, short stories, poems, and novels) by M.G. Vassanji and Dionne Brand about people who move between cultural locations on the assumption that literary works condense and intensify the questions and problems that characterize such cross-cultural movements.

789 / Global Finance / T. Porter (cross-listed as Political Science *789)

HEALTH AND AGING

The Department of Health, Aging and Society offers a program leading to a M.A. degree.

Enquiries: 905 525-9140 ext. 27035
Fax: 905-529-2152
Email: hasdept@mcmaster.ca
Website: http://www.healthagingandsociety.mcmaster.ca

Faculty / Fall 2012

PROFESSORS
Gavin Andrews, B.A. (Wales), Ph.D. (Nottingham)
Margaret A. Denton, B.A., M.A., Ph.D. (McMaster) / Sociology

ASSOCIATE PROFESSORS
Lori Campbell, B.A., M.A. (Western Ontario), Ph.D. (Guelph) / Sociology
James R. Dunn, B.Arts.Sc., M.A. (McMaster), Ph.D. (Simon Fraser)
James Gillett, B.A. (Calgary), M.A., Ph.D. (McMaster) / Sociology / Chair
Amanda Grenier, B.S.W. (Windsor), M.S.W., Ph.D. (McGill)
Michel Grignon, M.Sc. (ENSAE, Paris, France), Ph.D. (Ecole desHautes Etudes en Sciences Sociales, Paris, France) / Economics
Anju Joshi, B.A., M.A. (Dalhousie)
Chris Sinding, B.A. (Western), M.A. (McMaster), Ph.D. (Toronto) / Social Work

ASSISTANT PROFESSORS
Lydia Kapiriri, M.D. (Makerere), M.P.H. (Royal Tropical Inst.),M. Med. Ph. (Makere), Ph.D. (Bergen)
Stephanie Premji, B.A. (Concordia), M.Sc., Ph.D. (Montreal) / Labour Studies

ASSOCIATE MEMBERS
Jane Aronson, B.Sc. (New University of Ulster), B.S.W., M.S.W. (McGill), Ph.D. (Toronto) / Social Work
Roy Cain, B.S.W., M.S.W., Ph.D. (McGill) / Social Work
David Clark, B.A., M.A., Ph.D. (Western Ontario) / English andCultural Studies
Laurie C. Doering, B.Sc, (Queen's) M.Sc., Ph.D. (Saskatchewan)/ Pathology and Molecular Medicine
James W. Gladstone, B.A. (McGill), M.S.W. (British Columbia), Ph.D. (Toronto) / Social Work
Jeremiah E. Hurley, B.A. (John Carroll), M.A., Ph.D. (Wisconsin-Madison) / Economics
Carrie McAiney, B.A., M.A., Ph.D. (Waterloo) / Psychiatry andBehavioural Neurosciences
Christina Moffat, B.Sc. (Toronto), B.A., Ph.D. (McMaster) / Anthropology
Jenny Ploeg, B.Sc.N.,M.Sc.N. (Western Ontario), Ph.D. (Toronto), R.N. / Nursing
Celia Rothenberg, B.A. (Wellesley), M.A. (Oxford), Ph.D. (Toronto) / Religious Studies

Ellen B. Ryan, B.A., Ph.D. (McMaster) / Psychiatry
Byron G. Spencer, B.A. (Queen's), Ph.D. (Rice) / Economics
Rachel Zhou, B.A. (Wuhan University), M.A., Ph.D. (Toronto)/ Social Work

ADJUNCT MEMBERS
Sherry Dupuis, B.Mus. (Queen’s), M.A. (Waterloo), Ph.D. (Guelph)/ Waterloo
Catherine Ward-Griffin, B.Sc.N., M.Sc.N. (Western Ontario), Ph.D. (Toronto) / Western Ontario

PROFESSOR EMERITUS
Carolyn Rosenthal, B.A. (Toronto), M.A., Ph.D. (McMaster) / Sociology

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M.A. Degree

The M.A. offers students a critical social science perspective and an interdisciplinary approach to the study of health and aging.Admission to the M.A. degree program requires an average of B+ or better in an undergraduate Honours degree or equivalent. Upon admission, students will be accepted into the one year course work and research paper option. Students must apply for the two-year course work and thesis option during their first term of studies.

Degree Requirements

Students will have two options for completing their M.A.

A. Course Work and Research Paper Option (one year)

Students will be required to complete six (6) half courses, including:

(i) *701/ Social Science Perspectives on Health and Aging, *702/ Research Methods & Design in Studies of Health & Aging, and *703/ Social Systems, Services and Policy: Critical Perspectives

(ii) Three elective courses offered by Health, Aging and Society or by another department or academic unit (provided thatpermission has been obtained from those departments or academic units). One of the three courses can be taken as anindependent study with a faculty member (*706/ Independent Study). Only two of the three elective courses may be taken in adepartment or academic unit other than Health, Aging and Society.

(iii) A research paper (7500-8500 words, excluding endnotes and bibliography) supervised by a core or associate faculty member.

The research paper will be read by the supervisor and another faculty member. (If the supervisor is an associate member, thenthe second reader must be a core faculty member selected by the supervisor in consultation with the student).

B. Course Work and Thesis Option (two years)

Students will be required to complete four (4) half courses, including:

(i) *701/ Social Science Perspectives on Health and Aging, *702/ Research Methods and Design in Studies of Health and Aging, and *703/ Social Systems, Services and Policy: CriticalPerspectives

(ii) One elective course offered by Health, Aging and Society or by another department or academic unit (provided that permissionhas been obtained from those departments or academic units). This elective course may be taken as an independent study witha faculty member (*706 / Independent Study).

(iii) A thesis that involves original and independent research (20,000-25,000 words excluding endnotes and bibliography)supervised by a core faculty member or an associate member if approved by the graduate committee. The thesis will be orally examined by a committee including the supervisor and two other faculty selected by the thesis supervisor in consultation with thestudent.

Courses

All courses are half (3-unit) courses. HLTH AGE *701, *702 and *703 are required. The 600-level courses are offered for graduate credit. The 600-level courses are also available to undergraduate Honours students. Note: Not all courses are offered in a given year. Please consult the department for current offerings.

***6C03 / Representations of Illness and Aging**
An exploration of representations of health and illness across the life course in the humanities. The focus may vary from year to year, but will examine how health and illness, as it occurs at various stages in the life course, have been represented in literature, art, drama, or music.

***6L03 / Issues in the Social Aspects of Aging**
An advanced exploration of social aspects of aging including gender and health, family relationships and retirement.

***701 / Social Science Perspectives on Health and Aging**
This course is an introduction to current theoretical perspectives in health studies and social gerontology used in research on health and aging in the social sciences.

***702 / Research Methods and Design in Studies of Health and Aging**
This course explores the interdisciplinary methods and design used in conducting social science research on health and aging.

***703 / Social Systems, Services and Policy: Critical Perspectives**
This course examines the intersections between institutional structures, organizational systems, policy formation and implementation as they relate to the fields of health studies and social gerontology.

***704 / Special Topics in Aging**
This course explores current theoretical and/or substantive topics in social gerontology.

***705 / Special Topics in Health**
This course explores current theoretical and/or substantive topics in critical health studies.

***706 / Independent Study**
This course is for independent research or study supervised by a faculty member. Students will determine with their faculty supervisor a mutually agreeable topic. Supervisor and student will set specific learning objectives, how they will be achieved, and how they will be evaluated. Students must produce a piece of scholarly written work that will be evaluated and graded by the supervisor.

***707 / Reading Course**
This course allows students to meet their own specific learning objectives in aging or health studies. Students will work under the guidance of a faculty member to read, evaluate, and critically analyze relevant literature in the topic area that they have selected. Supervisor and student will set specific learning objectives, how they will be achieved, and how they will be evaluated. Students must produce a piece of scholarly written work that will be evaluated and graded by the supervisor.

***708 / Health and Aging in a Global and International Context**
This course examines the institutions and the players that address health and aging related issues on a global and international level in the fields of health studies and social gerontology.

***709 / Socio-Cultural Aspects of Health and Aging**
This course explores the socio-cultural study of health and aging in the fields of health studies and social gerontology such as: consumerism; embodiment; activism and advocacy; beliefs about health; aging and healing; health and the arts; and technology and health and aging.

***710 / Health, Aging and the Media**
This course critically explores approaches to studying the media and media representations in the fields of gerontology and health studies.

***711/ The Health Care System and the Older Person**
This course provides an interdisciplinary analysis of priority issues relating to the health care system and the older person in the field of critical and social gerontology.

***712 / Globalization and Health**
This course examines the impacts of globalization processes on various aspects of health in different social, economic and cultural settings.

***713 / Critical Perspectives on Aging**
This course draws on perspectives in critical gerontology to explore issues related to the political, social, and cultural aspects of aging.

HEALTH MANAGEMENT

The Master of Health Management program is delivered through a partnership between McMaster's DeGroote School of Business and School of Rehabilitation Science (Faculty of Health Sciences) and is offered through distance education on-line, on a part-time basis, and designed specifically for health professionals who are currently employed in a clinical and/or management capacity in any health care sector in Canada or internationally.

Many health professionals seek advanced knowledge and skills in health management as their careers progress. The complexity of the contemporary health care environment and the new demands made upon clinicians has made it necessary for practitioners seeking to move into management to acquire additional knowledge and skills that have evolved since they graduated from their professional programs.

The Master of Health Management (MHM) provides regulated health professionals with a combination of core management skills (accounting, finance, marketing, human resource management etc.) and a broad understanding of the Canadian health care policy development and service delivery environments (health system design, health policy analysis, and evidence based decision-making).

The program curriculum includes graduate course work and critical analysis and synthesis of management research to ensure the development of knowledge and skills for management of health care programs and organizations. By bringing together graduate courses from business and health care, the Master's program prepares graduates to work effectively in health management positions in the future. Students will gain the knowledge, skills and abilities necessary to excel as a middle or senior manager within both the public and private spheres of Canada's health care sector.

The core competencies identified below represent the minimum knowledge and skill expectations students will attain in order to complete the MHM program. These competencies are gained through coursework, self-study, group interaction and other experiential learning activities throughout the program.

1. **Lifelong Learning** (*Understand, demonstrate and promote the necessity for continuous learning among professional*.)

2. **Communication Skills** (*Understand and demonstrate effective communication styles and techniques and use of related technologies.*)

3. **Conceptual Skills** (*Identify, synthesize and analyze information in a coherent and methodical way to advance problem solving and the creation of new information.*)

4. **Awareness of the Political and Healthcare Environments** (*Awareness and appreciation of the complexities and interrelationship between the political and healthcare environments*.)

5. **Organizational Behaviour and Human Resource Management** (*Demonstrate an understanding of how organizations function and human resources plays a key role within organizations.*)

6. **Financial Management** (*Demonstrate an understanding of financial data and related management techniques which support good financial management practices.*)

7. **Research Awareness** (*Awareness and demonstrated understanding of the creation and use of research*.)

8. **Leadership** (*Awareness and demonstration of skills which motivate others to excel within an ethical and supportive environment.*)

Two short residency periods (2-3 days each) will be required of students during their time in the program.

Master of Health Management
McMaster University
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Faculty / Fall 2012

PROFESSORS

Vishwanath Baba, B.Eng (Madras), MBA (Western Illinois), Ph.D. / (British Columbia) / DeGroote School of Business
Susan Baptiste, Dip. OT (England), M.H.Sc. (McMaster) /Rehabilitation Science
Trevor Chamberlain, B.Sc. (Berkeley), MBA (McGill), Ph.D. (Toronto) / DeGroote School of Business
Lynne Geddes, B.Sc.PT (Western), M.R.E. (Toronto) / RehabilitationScience
Mary Law, B.Sc. OT (Queen's), M.Sc. (McMaster), Ph.D. (Waterloo)/ Rehabilitation Science
Patricia Solomon, Dip (PT) (Manitoba), M.HSc. (McMaster), Ph.D. (Waterloo) / Rehabilitation Sciences
Paul Stratford, Cert. (PT) (McMaster), Dip. (PT) (Mohawk), M.Sc. (McMaster) / Rehabilitation Science
Yufei Yuan, B.S. (Fudan, Shanghai), Ph.D. (Michigan) / DeGroote School of Business

ASSOCIATE PROFESSORS

Nick Bontis, BA (Western), Ph.D. (Western) / DeGroote School of Business
Catherine Connelly, B.Com (Hons) (McMaster), M.Sc. (Queen's), Ph.D. (Queen's) / DeGroote School of Business
Brian Detlor, B.Sc. (Hon Comp Sci) (Western), MIS (Toronto), Ph.D. (Toronto) / DeGroote School of Business
Maureen Hupfer, B.Comm. (Alberta), M.A. (Alberta), Ph.D. (Alberta)DeGroote School of Business
Lori Letts, B.Sc. OT (Western), M.A. (Waterloo), Ph.D. (York)/ Rehabilitation Science
Christopher Longo, B.A. (York), M.Sc. (Western), Ph.D. (Toronto) / DeGroote School of Business
Teal McAteer, B.Comm (Queen's), M.I.R. (Toronto), Ph.D. (Toronto) /DeGroote School of Business
Sue McCracken, B.Comm. (Hons) (Queen's), Ph.D. (Waterloo) /DeGroote School of Business
Glen Randall, B.A. (Hons) (McMaster), M.A. (McMaster), M.B.A. (McMaster), Ph.D. (Toronto) / DeGroote School of Business
Debra Stewart, B.Sc. (OT) (Toronto), M.Sc. (McMaster) / Rehabilitation Science
Joyce Tryssenaar, B.Sc. (OT) (Western), M.Ed. (Brock), Ph.D. (Western)/ Rehabilitation Science

ASSISTANT PROFESSORS

Terence Flynn, B.A. (Carleton), M.S. (Syracuse), Ph.D. (Syracuse) / Communication and New Media
Bonny Fung-Ming Jung, B.Sc. (OT) (Toronto), M.Ed. (Brock), Ph.D. (ABD) (Western) / Rehabilitation Science
Patricia Wakefield, B.Sc. (Alberta), M.Sc. (Cornell), M.P.A. (New York), DBA (Boston) / DeGroote School of Business

ASSISTANT CLINICAL PROFESSORS

Constance Mitchell, B.Sc. (OT) (Queen's), M.Sc. (OT) (Dalhousie) / Rehabilitation Science
Nancy Plews, Dip. (PT) (Mohawk), B.HSc. (McMaster), M.P.A. (Queen's) / Rehabilitation Science

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The general regulations for this degree appear under the Regulations for Master's degrees near the beginning of this Calendar.

Admission Requirements

- Regulated health professional (evidence of registration in the applicant's professional affiliation in his/her own province/country). Examples of regulated health professionals include audiologists, dietitians, nurses, occupational therapists, psychologists, physiotherapists, physicians.

- Graduation with a minimum of a B+ average from a 4-year health professional program.

- Two academic and two clinical/work place related references.

- Written application outlining career plans, research interests and suitability for the Master of Health Management Program.

- If the applicant's native language is not English, an official copy of their TOEFL score, or other evidence of competency in English. A minimum TOEFL (iBT) score of 92 (580 on the paper-based TOEFL test or 237 on the computer-based TOEFL test) is required.

Degree Requirements

1. Complete with at least B- standing, six (6) graduate half courses

   a) Completion of five mandatory courses: HM *700, *705, *706, *707, *708

   b) Completion of one elective course. This may be chosen from among on-campus (e.g. Rehabilitation Science Program or Master of Business Administration Program), other distance education courses, including those offered by other universities, and may be geared towards the particular interests of the student. A list of pre-approved courses for electives has been created (see www.MacHealthManagement.com) and approved by the Associate Deans of Graduate Studies (Health Sciences and Business); and

2. Complete one graduate full course: HM 730 scholarly paper to demonstrate integrative thinking in the study of health management at a general and abstract level.

Courses

Courses marked with an asterisk (*) are half courses.

***700 / Health Systems and Policy**
This course is the introductory course for the Master of Health Management program. It will provide students with an understanding how the Canadian health care system is organized as well as how services are financed and delivered. This will be done through an assessment of the Canada Health Act and various pieces of related provincial healthcare legislation. Discussions will include an exploration of the for-profit and not-for-profit mix of services within Canada. In addition, students will be exposed to the principles of evidence-based decision-making and various health policy analysis tools. Current issues and trends in health policy (both within Canada and internationally) will serve as cases to which students apply those tools.

***705 / Evaluating Sources of Evidence for Management andEvaluation**
This course is designed to provide students with the knowledge and skills to understand and critically evaluate sources of evidence used to support decision making within a health care environment. Students will develop knowledge about the principles of evidence-based decision-making, searching the literature, and critically reviewing research methods and

analyses. The course emphasizes the development of skills to apprise, synthesize and communicate evidence in order to use it within management decision-making.

***706 / Health Management Foundations I**

This course will provide students with the knowledge and skills to understand strategic management principles, theoretical perspectivesand practices, and to apply them in the health care industry, in both for-profit and not-for profit organizations in the delivery of healthcare services, tangible products and social marketing programs. Students will become familiar with the strategic management processin the development, implementation and evaluation of strategic plans, programs and activities for: human resources management,marketing to various segments and target markets, and, communications tools and strategies.

***707 / Health Management Foundations II**

Through this course, students will gain knowledge about the fundamental concepts and practical issues related to accounting and finance and their uses in planning, decision making and control in the management of health care organizations. Skills in the basics of financial management and managerial accounting, budgeting and forecasting, including statistical applications, will be developed through discussion, case studies and course assignments.

***708 / Leadership in Health Organizations**

This course explores principles, practices, trends and issues of leadership in health organizations. Current theories of leadership with attention to styles, practices, tasks and models will be covered. Participants will be encouraged to reflect on and analyze their own leadership experiences in light of theories studied. Through the interplay of theory and practical application, participants will gain a deeper appreciation for the requirements, responsibilities, and consequences of effective leadership. The course encourages professional and personal development through action learning that is relevant and transferable to organizations.

730 / Scholarly Paper

This full course is designed as an opportunity for graduate course based students to demonstrate, in writing, their ability to integrate ideas that reflect current knowledge in areas of health management practice, education, research, and/or policy. The scholarly paper is to demonstrate integrative thinking at a general and abstract level. A student will identify a topic, and in consultation with a faculty member with expertise in the area develop a proposal that is individualized to the student's area of interest. The student will then develop the paper under the guidance of a faculty member. The paper must be 25 to 30 pages, excluding references and appendices. The paper does not typically involve the collection or analysis of primary data or the conduct of research with subjects. It is a scholarly essay, not a thesis.

HEALTH POLICY

The interdisciplinary, interdepartmental, interfaculty program in Health Policy at McMaster University offers a Ph.D. in Health Policy.

Enquiries: 905-525-9140 Ext. 22952
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Faculty / Fall 2012

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Stephen Birch, B.A. (Sheffield), M.Sc. (Bath), D.Phil. (York)
Cathy Charles, B.A., M.A. (Toronto), M.Phil., Ph.D. (Columbia)
Amiram Gafni, B.Sc., M.Sc., D.Sc. (Technion, Haifa)
Mita Giacomini, B.S., M.P.H., M.A., Ph.D. (California)
Jeremiah E. Hurley, B.A. (John Carroll), M.A., Ph.D. (Wisconsin-Madison)
John Lavis, M.D. (Queen's), M.Sc. (London School of Economics),Ph.D. (Harvard)
Arthur Sweetman, B.Eng. (McGill), M.A., Ph.D. (McMaster)
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James Dunn, B.Arts.Sc., M.A. (McMaster), Ph.D. (Simon Fraser)
Michael Egan, B.A., M.A. (Simon Fraser), Ph.D. (Washington State)
Michel Grignon, M.Sc. (ENSAE, Paris, France), Ph.D. (Ecole des Hautes Etudes en Sciences Sociales, Paris, France)
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Donald Willison, B.Sc. (Toronto), M.Sc. (McMaster), Sc.D. (Harvard)

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Lydia Kapiriri, M.D. (Makerere, Uganda), MPH (Royal Tropical Institute), M.Med PH (Makerere), Ph.D. (Bergen, Norway)
Hsien Seow, B.S. (Yale), Ph.D. (John Hopkins)
Jean-Eric Tarride, B.A., M.A. (Toulouse), Ph.D. (Concordia)

ADJUNCT PROFESSOR
Susan Elliott, B.A. (Brock), M.A., Ph.D. (McMaster)

Ph.D. Degree

The purpose of the Ph.D. in Health Policy is to train intellectual leaders in the field who will make seminal contributions to policy understanding and practice. The curriculum provides the student with theoretical and empirical tools for answering a range of quest about health policy, and the ability to develop new investigation approaches to move the field forward. An emphasis on theoretical and conceptual frameworks for policy analysis distinguishes this program from health degrees with a primary focus on empirical methodologies or on specific substantive problems.

The Ph.D. program integrates intellectual resources for education and research across McMaster University. Participating faculty members have appointments predominantly in departments within the Faculty of Social Sciences, the Faculty of Health Sciences, and the School of Business. Graduates with a Ph.D. in Health Policy will be well prepared for academic appointments in interdisciplinary departments or institutes. Their training will also prepare them for fruitful engagement with policy makers as providers of useful knowledge, insightful research, and innovative solutions to policy problems. Outside of academia, graduates would be qualified for leadership positions in government, policy consulting, non-governmental organizations throughout the health sector, and private industry.

The program offers three fields of specialization: *Health Economics, Political Studies*, and *Social Organization*.

Health Economics
The economics field addresses the economic analysis of health policies and health systems, as well as the economic analysis of responses to health policies. Topics may include, for example, health resource allocation, configuration of health human resources, economic evaluation of policy options, public and private financing of health care, societal investments in health production, etc. The dominant disciplinary perspective is that of microeconomics, but insight into economic behaviour may also be provided by perspectives such as business, psychology, and others.

Political Studies
The political studies field emphasizes the political aspects of health policy including the influences by political institutions, actors, values, and ideas operating within state and global jurisdictions. Topics of interest, for example, may include the role of historical institutional arrangements in shaping health governance reforms, the impact of global trade agreements on domestic home care and pharmaceutical policy, the role of the public, stakeholders, and prevailing values on policy agendas, etc. Political science is the dominant disciplinary perspective, with related areas including, for example, public policy analysis and administration, comparative public policy, law, political theory and philosophy.

Social Organization
The social organization field includes social science perspectives on the institutions, organizations, culture, and society that form the social fabric of health systems (both for health creation and health care). Topics of interest for example include the generation and use of information, professional roles and behaviour, impacts of technology, political economies of health production, etc. Disciplinary perspectives include sociology, anthropology, business administration or management, and political science.

Admission

Admission to the Ph.D. program requires previous graduate training in a relevant field (e.g., social sciences, health professions, policy, business, legal or administrative professions), with at least an A- grade average in past graduate coursework. A Master's degree is preferred. At least one graduate-level statistics half-course should be passed prior to admission. Students without this preparation in statistics may be admitted, but would be required to take a graduate statistics course in addition to normal program requirements. Successful applicants must also meet all School of Graduate Studies admissions requirements. Current admission procedures, forms, and deadlines are available on the Health Policy program website: http://fhs.mcmaster.ca/hpphd/

Degree Requirements

The Health Policy Ph.D. curriculum has three parts, which will normally be completed over a four-year period: (1) coursework (first and second years); (2) comprehensive examinations (first and second years); (3) the doctoral dissertation, which involves the approval and defense of the proposal for the doctoral research (third year), dissertation research (third and fourth years), and the completion, approval, and defense of the written dissertation (fourth year).

(1) Students must complete between 15 and 36 units (5-12 half courses) of course work. Courses are chosen from the list of recommended courses for each curriculum area (listed below). Required coursework includes 3 terms of the Doctoral Seminar in Health Policy, 2-3 specialty field courses, 0-2 breadth field courses outside the student's specialty field, and 0-4 methodology courses, including both quantitative and qualitative or mixed methods.

Students without prior graduate training in a given area are required to take the maximum number of required courses for that area. Students who have completed some relevant training prior to admission may have relevant course requirements waived at the time of admission to the Health Policy Ph.D. program. A minimum of 5 half-courses (including the 3 doctoral seminar half-courses) may not be waived and must be completed while the student is enrolled in the Health Policy Ph.D. program.

Doctoral seminar
3 terms of HLTH POL 711

Breadth field courses
0-2 half courses, one from each of two fields other than the student's specialty:

Health Economics: HRM *787, ECON/HRM *788; with program permission: HLTH POL *750, HLTH POL *798

Political Studies: HRM *738; with program permission: HLTH POL *750, HLTH POL *798

Social Organization: HIST *759, HRM *729; HLTH AGE *703, HLTH AGE *708, HLTH AGE *709; with program permission: HLTH POL *750, HLTH POL *798

Specialty field courses

2-3 half courses in 1 of the following 3 fields:

Health Economics: Required for all Health Economics field students, unless waived: ECON/HRM *788, ECON *727; Additional choices: ECON/HRM *791, ECON *793, HRM*737; with program permission: HLTH POL *750, HLTH POL *798

Political Studies: Required for all Political Studies field students, unless waived: HRM *738; Additional choices: POLSCI *783, POLSCI *785, POLSCI *702, POLSCI *740; with program permission: HLTH POL *750, HLTH POL *798

Social Organization: Required for all Social Organization field students, unless waived: HIST *759, HRM *729, HLTH AGE *703, HLTH AGE *708, HLTH AGE *709; with program permission: HLTH POL *750, HLTH POL *798

Methodology courses

0-4 half courses, including both quantitative and qualitative or mixed methods:

Quantitative Methods: Required for Health Economics specialty field students, unless waived ECON *761; Additional choices for students in all specialty fields:ECON *762, ECON *795, ECON *770, HRM *727, HRM *751, HRM *762, HRM *723, HRM *731, HRM *740, HRM *737, POLSCI *784, SOCIOL *740, SOCIOL *761; with permission: HLTH POL *750, HLTH POL *798

Qualitative Methods: HRM *745, HRM *758, SOCIOL *743, SOCIOL *742, SOCIOL *744, HRM *705, HLTH POL *747; with program permission: HLTH POL *750, HLTH POL *798

Mixed Methods: HRM *700, POLSCI *796, HRM *770, HRM *705; with program permission HLTH POL *750, HLTH POL *798

(2) Comprehensive examinations are completed during the first and second years of full time study, as the relevant coursework requirements are completed. Students complete three required comprehensive examinations in the following areas:

- Two breadth fields outside the student's specialty area (social organization, political studies, and health economics);
- One chosen specialty area (social organization, political studies, or health economics); and
- Research methods (qualitative and quantitative empirical approaches).

(3) All Health Policy Ph.D. students are required to research, write, and successfully defend a doctoral dissertation, which constitutes an original contribution to knowledge in the field of health policy. The dissertation is developed and completed under the guidance of the student's primary supervisor and a dissertation supervision committee consisting of at least two additional faculty members.

- Normally by the beginning of the third year of full time study, the doctoral dissertation *proposal* is formally presented and defended before a committee;
- The doctoral dissertation research is normally completed during the third and fourth years of full time study, with the completion, approval, and defense of the written dissertation by the end of the fourth year.

Supervision

Each student will be assigned a provisional faculty supervisor upon admission to the program. A final faculty supervisor and a three member supervisory committee will be appointed within 6 months of the student's enrollment in the program. At least two (of three) supervisory committee members must be core faculty members of the Health Policy Ph.D. Program. The faculty supervisor and supervisory committee provide guidance and monitor the student's progress. The supervisory committee is expected to meet with the student twice annually to assess the student's progress and to file a written progress report with the Program.

Additional Regulations

Students and prospective applicants should consult the Graduate Calendar for a complete description of regulations concerning the Ph.D. degree and graduate studies at McMaster University.

Courses

Listed below are courses offered by the Health Policy Ph.D. Program. The descriptions of additional courses relevant to the curriculum are listed elsewhere in the Graduate Calendar, under the primary department or program offering the course.

***711 / Doctoral Seminar in Health Policy / M. Giacomini, J. Lavis**
The Doctoral Seminar in Health Policy is dedicated to the advanced study of health policy problems, ideas, and analytic approaches. It provides an opportunity for doctoral students with diverse experiential, methodological, and theoretical training to focus on common interests and problems that characterize the field of health policy. The seminar will highlight the frontiers of knowledge in the field and foster interdisciplinary communication and integration.

***747 / Qualitative and Conceptual Methods for Health Policy / M. Giacomini**
This course covers principles and methods for qualitative and conceptual analyses in the field of health policy. Qualitative methods include descriptive or interpretive empirical investigation of social and personal phenomena. Conceptual methods analyze concepts and ideas, including their genesis, meanings, and further development for policy discourse. We focus primarily on analysis of qualitative information, and the development of theoretical and conceptual findings. We also address how analytic aims and processes affect the design of qualitative research projects.

***750 / Special Topics in Health Policy / Staff**
This course explores a current health policy topic area in depth applying analytic frameworks from health economics, political studies, or social organization, as well as addressing the relationship of conceptual frameworks to empirical questions and methods in the area. Examples of possible topic areas include: decision making, comparative health systems, environmental health, regulation, privatization, health human resources, public participation,

health policy ethics, technology assessment, knowledge translation, etc. Because course content varies from term to term, students should check with the instructor regarding its applicability to specific Health Policy Ph.D. program curriculum requirements.

***798 / Independent Study in Health Policy / Staff**

The Independent Study is designed to allow students to develop a course tailored to their specialized learning objectives. Students work independently under the guidance of a faculty member to read, analyze, and apply relevant literature to inquiry in health policy concepts, substantive topics, or methods. Please note that the application of this course toward Health Policy program curriculum requirements is conditional on review of the independent study plan by the Health Policy Ph.D. program for relevance to a specialty field or methodology area outlined in the program curriculum.

HEALTH RESEARCH METHODOLOGY

The Graduate Program in Health Research Methodology provides exciting new opportunities for advanced training in research methodology. The program is offered at the M.Sc. and Ph.D. level. Students are encouraged to enroll in full-time study, although requests for part-time studies will be considered at both the M.Sc. and Ph.D. level.

Through coursework and involvement in research projects students are exposed to evaluative frameworks and research methods derived from clinical epidemiology, biostatistics, epidemiology, health economics, health services research, health policy analysis, psychology, sociology, geography, political science, history, bioethics and education.

Trainees are challenged to integrate theory and methods from these alternative disciplinary perspectives to create innovative research and evaluation methods that can contribute to an improved understanding of health and disease (in individuals and populations) and strengthened health services and systems.

Students may choose to specialize in one of the following fields: Clinical Epidemiology, Biostatistics (Ph.D. level), Health Services Research, Population and Public Health and Health Technology Assessment.

For those students wishing to pursue a graduate level diploma in Health Services and Policy Research in addition to their degree, please refer to the Graduate Diploma Programs section at the back of this Calendar.

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Faculty / Fall 2012

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Sam Shulman (Medicine)
Marko Simunovic (Surgery)
Marek Smieja (Pathology and Molecular Medicine)
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Koon Teo (Medicine)
Achilleas Thoma (Surgery)
Suneel Upadhye (Medicine)
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Timothy Whelan (Medicine)
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David L. Streiner, B.A. (City College of New York), M.S., Ph.D.(Syracuse)
Stephen D. Walter, B.Sc. (London), Ph.D. (Edinburgh)

Fields of Specialization

In addition to our regular offerings, the HRM program provides students with the opportunity to ***specialize*** in one of five 'fields of specialization'. The five fields are: clinical epidemiology, biostatistics, health services research, public and population health and health technology assessment. All five fields are offered at the MSc and PhD level except for Biostatistics, which is offered at the PhD level only. The original HRM program, wherein students opt not to declare a field of specialization will continue to be available as ***"HRM Classic"***.

Students in HRM classic pursue a general methods degree, or explore other areas such as medical education research, health informatics or health ethics, to name but a few.

Clinical Epidemiology: P.J. Devereaux, Field Leader
Clinical epidemiology employs sound research principles, tempered with practicality, to find the best answers to "real world" questions about clinical practice and health care. Individuals training in this field (who usually have a clinical background) acquire the skills required to undertake research that addresses fundamental questions about the effectiveness of clinical therapies, usefulness of screening and diagnostic tools, prognosis and disease causation. Issues related to research synthesis and knowledge translation may also be a focus. Individuals training in clinical epidemiology work alongside world leading clinical epidemiologists who are conducting their research in multiple sites around the world and changing the way medicine is practiced globally. The field of clinical epidemiology in the Health Research Methodology Program offers a unique opportunity to learn and work with the best clinical epidemiologists in the world, thus enabling graduates to make profound contributions to the practice of clinical medicine through research.

Biostatistics (Ph.D. level): Eleanor Pullenayegum, Field Leader
The HRM Biostatistics PhD field is specially designed for applicants with an MSc in Mathematics and/or Statistics who wish to pursue doctoral work in Biostatistics. The program aims to provide trainees with the skills they need to conduct independent research into biostatistical topics, provide leadership as biostatistical collaborators in clinical, health systems and population health investigations and effectively teach biostatistics from introductory through to advanced levels. Graduates will possess the following skills: ability to apply biostatistical concepts, techniques and data-analytic strategies across the full spectrum of research questions and study designs; ability to contribute to grant proposals in the areas of research design, data analysis and interpretation; ability to teach biostatistical concepts to research colleagues who are not biostatisticians; and ability to adapt existing statistical techniques or to develop new techniques to solve research design and analytical programs. Graduates may pursue career opportunities in academia, government or private industry.

In addition to coursework related to research design, all students participate in a course on Biostatistical Collaboration. The aim is to develop the skills needed for successful collaborative research in the role of biostatistical consultant. These include communication of biostatistical concepts and the provision of leadership with respect to research design, analysis and reporting.

Health Services Research: Marko Simunovic, Field Leader

Health services research focuses on questions about the most effective ways to organize, manage, finance, and deliver high quality clinical and health care, reduce medical errors and improve patient safety. The research domains utilized by health services researchers may include individuals, families, organizations, institutions, communities, and populations. Graduates acquire a broad range of skills in research synthesis, research design, data analysis and writing for publication that enable them to conduct rigorous research in numerous areas including: patterns of care/process of care, small area practice variation studies, appropriateness of care, knowledge translation, economic analysis of health care, service and system organization, patient experience, theoretical underpinnings of health services organization, management, and financing and delivery. The curriculum emphasizes mixed methods approaches that utilize skills in both quantitative and qualitative research.

Public and Population Health: Joseph Beyene, Field Leader

Canada faces many public health challenges, including emerging and existing infectious diseases and alarming increases in many chronic diseases. Research to address the determinants of these health problems is of paramount importance to maintaining a healthy population. The field of population and public health provides students with the methodological expertise needed to conduct cutting edge research, including investigations into the biological, economic, and social factors that protect, precipitate or perpetuate disability and disease, and to improve public health. Graduates will acquire the following skills: ability to critically appraise and interpret research evidence, formulate research questions, justify research and analysis methods and understand ethical issues involved in research in this field; ability to conduct research into biological, social, cultural, and environmental determinants of health; ability to conduct basic or applied research in public health aimed at improving the health of individuals, communities and populations; and ability to apply population and public health methods across a range of disease conditions.

Health Technology Assessment: Ron Goeree, Field Leader

Health Technology Assessment (HTA) is defined as the evaluation of the clinical effectiveness, cost-effectiveness, and broader impact of drugs, medical technologies, and health systems, both on patient health and the health care system. HTA has gained increasing importance in health care decision making locally and around the world and over the last decade there have been numerous important methodological advances in the techniques of HTA. As a result there is a growing gap between the need for HTA and the availability of skilled researchers to conduct HTAs. The goal of the HTA field specialization is to train individuals who, upon graduation, will have the necessary skills to be actively involved in independent and collaborative research in the field of HTA. Graduates will possess the following skills: a strong foundation in the basic principles of HTA; advanced decision analysis; ability to apply research methods derived from health economics; understand and use basic and advanced biostatistics; and utilize health services research and health policy analysis concepts and methods.

Students will be expected to collaborate with one of the many research groups conducting HTA at McMaster University.

M.Sc. Degree

The general requirements for the M.Sc. Degree appear under the Regulations for the Master's degrees near the beginning of this Calendar.

McMaster's Postgraduate Medical Education Program allows Clinician Investigator Program trainees the opportunity to undertake a Master's or Ph.D. degree as a full-time student (please refer to the Handbook for CIP trainees and the Health Sciences Graduate Programs Policy re CIP Applicants; separate applications are required for both).

A. M.Sc. by Thesis

Requirements for the thesis-based M.Sc. degree include: i) successful completion of at least **five** half courses at the graduate level of which: a) one course must be HRM 721, b) one course must be HRM 702 and c) the remaining required courses may be selected from among the courses offered by the HRM Program; ii) field-specific courses (if applicable); iii) successful completion of a research internship; and iv) submission and successful defence of a thesis. The required courses for the M.Sc. thesis are:

Field of Specialization	Common Courses	Field Specific Courses	Electives
HRMClassic	*721 and *702	n/a	3
Clinical Epidemiology		*743, *730 or *751	1
Health Services Research		*762	2
Population and Public Health		*751	2
Health Technology Assessment		*737, *741	1 (usually *787)

B. M.Sc. by Course Work

Requirements for the course-based MSc degree include: i) successful completion of at least **seven** half courses at the graduate level of which: a) one course must be HRM 721, b) one course must be HRM 702 and c) the remaining required courses may be selected from among the courses offered by the HRM Program; ii) field-specific courses; iii) successful completion of a research internship; and iv) a scholarly paper on a methodological issue, written at the completion of course work.

The required courses for the M.Sc. by coursework are as follows:

Field of Specialization	Common Courses	Field Specific Courses	Electives
HRMClassic		*730 or *751, one of: *723, *727, *731, *733, *737, *743, *745	3
Clinical Epidemiology	*721 and *702	*743, *730 or *751	3
Health Services Research		*762	4
Population and Public Health		*751	4
Health Technology Assessment		*737, *743, *741	2 (usually *787)

A part-time student who receives permission for exemption from the formal research internship requirement must successfully complete an additional HRM graduate half course.

Students are expected to attend and participate in rounds and special events of the Department of Clinical Epidemiology & Biostatistics and HRM student rounds.

Students wishing to be transferred to the Ph.D. program prior to completion of the M.Sc. degree by Thesis option (see section 2.1.2 of the General Regulations of the School of Graduate Studies and the statement entitled "Policy and Procedure for Transfer from the M.Sc. to Ph.D. Health Research Methodology") must have a minimum of an A- average in the M.Sc. curriculum with no grade less than a B, and must submit a critical Transfer Report, embodying a statement of progress and achievement in their research work to date and a proposal for Ph.D. research. The Transfer Report must be submitted within 18 months from entry at the M.Sc. level as a full-time student and 36 months from entry as a part-time student. The student must have successfully completed those courses required for the HRM M.Sc. Degree by Thesis as well as the formal research internship requirement before the Transfer Meeting. Part-time M.Sc. students would normally be expected to become full-time students when successfully transferring to the Ph.D. Approval to transfer will be determined at a meeting of the Transfer Committee at which the student will present his/her work and ideas for Ph.D. study orally.

C. Co-op Option

Full-time HRM thesis or course-based Master's students who have successfully completed at least four half courses may be considered for the co-op option. The number of students selected will be subject to available placements.

To complete the M.Sc. co-op option successfully, the student must work a total of eight months in either one or two work-study placements. Each placement must be approved by the HRM Coordinator. For M.Sc. by thesis students, a project undertaken during a work term may evolve into a thesis topic during the second work placement, subject to the appropriate approvals.

At the completion of each work-term placement, the student must write a report and append a letter of evaluation by the employer.

During the co-op placement, a student will be paid by the employer. A separate co-op fee must be paid prior to placement. A student completing the co-op option will be exempted from the research internship requirement. This option would normally require longer than 2 years to complete.

Ph.D. Degree

While the field of focus is Health Research Methodology, the faculty is a diverse interactive group of researchers specializing in the evaluative and decision sciences in biostatistics/clinical trials; epidemiology/population health/health services; health economics/health policy analysis; and health measurement. Common to these diverse disciplinary interests is a central focus on the development and testing of theory and methods related to health problems. Thus, the program seeks candidates who show high scholarly promise from both clinical and non-clinical backgrounds: clinicians, in virtually all health-related disciplines, and non-clinicians, usually from backgrounds in the social and behavioural sciences. A candidate for the Ph.D. degree must comply with the School of Graduate Studies Regulations for the Degree Doctor of Philosophy, including completion of the equivalent of 1.5 full 700-level courses, as the minimum course requirement.

Students who have not taken courses that represent an introduction to health research methods (HRM *730 or HRM *751 [or their equivalents]) and basic biostatistics (HRM *702 [or equivalent]), and theory and practice of measurement (HRM *727 [or its equivalent]) may be required to take these courses in addition to the regular course load. Students should consult program documentation for the specific requirements for the fields of specialization.

The specific recommended courses would depend on the student's field of specialization, and their interest in exploring focused areas in depth. These courses could be taken from the following list:

(a) Philosophy of Science	HRM *700
(b) Biostatistics	HRM *723, HRM *731, HRM *714,HRM *739
(c) Health Economics	HRM *737 and HRM *787or HRM *788 and HRM *791
(d) Health Policy	HRM *738
(e) Measurement	HRM *727
(f) Epidemiology	HRM *733 and HRM *743
(g) Qualitative Methods	HRM *745
(h) Special Topics	HRM *722
(i) Independent Student	HRM *705
(j) Population Health	HRM *748
(k) Program Evaluation	HRM *762
(l) Research Ethics	HRM *742
(m) Health Technology Assessment	HRM *740
(n) Knowledge Translation	HRM *726

Field of Specialization	Common Courses	Field Specific Courses	Electives
HRM Classic	n/a	n/a	3
Clinical Epidemiology		*742	2
Biostatistics		*739	2
Health Services Research		*751 or *748	2
Population and Public Health		*748	2
Health Technology Assessment		*740	2 (usually *787, *743)

Other course offerings may be considered; students will be encouraged to consider existing courses in the Faculties of Health Sciences, Business, Science, and Social Sciences.

Candidates must also:

1. Obtain a grade of at least B- in all courses.

2. Pass a Comprehensive Examination between twelve and twenty-fourmonths following the start of doctoral studies at McMaster. The examination will test the student's ability to acquire, evaluate critically, handle and conceptualize major issues in the discipline or sub-discipline to which their field of research belongs. They must include at least two of theaforementioned areas but these cannot be related directly to the thesis topic.

3. Complete a dissertation or thesis on an approved topic based on research carried out within the program, and defend the thesis at a final oral examination. The thesis will demonstrate the student's ability to develop new methodology, or to advance one or several competing existing methodologies in a challenging new area of health care/health services research.

Students may be asked to meet additional requirements of the program, including participation in special seminars or colloquia.

Courses

Courses marked with an asterisk (*) are half courses; courses marked with a plus sign (+) may be taken more than once at the M.Sc. level or Ph.D. level but only one of the two courses can be counted towards the minimum course requirements of the program at each level. Students taking HRM +*722 cannot also receive credit for any subsequent regular course offering on the same topic. HRM courses are available to students registered in other programs, although all courses are not offered every year. Some courses have limited enrolment and prerequisites.

Approved courses from other graduate programs may be taken for credit when appropriate and with permission of the supervisor.

***700 / Philosophy of Science for Health Research**

This course introduces students to the theoretical and methodological foundations of health research, a field currently characterized by the paradigms of the biomedical, public health, and social sciences. Topics covered in the course include: the logic of scientific inference, theorizing and empiricism in scientific knowledge, ontological and epistemological foundations of common health research methodologies, theories of scientific progress, and the role of values, ideology, and technology in science.

***702 / Introduction to Biostatistics / L. Griffith**

Basic statistical concepts and techniques as they apply to analysis and presentation of data in biostatistical and epidemiology practice. The course covers: graphical presentation of data, elementary probability, descriptive statistics, probability distributions, and introduces hypothesis testing using parametric and non-parametric methods. Specific techniques covered include z-tests, t-tests, ANOVA, contingency tables, regression and correlation.

***703 / Introduction to Biostatistics: Laboratory Section**

Basic statistical concepts and techniques as they apply to the presentation and analysis of data encountered in laboratory oriented research. Topics include: descriptive statistics; graphic display principles; elementary probability; univariate distributions: normal, *t*, chi-square, F; hypothesis testing, confidence intervals, sample sizes and assumptions for means and proportions generated from one, two or many samples; transformations; regression and correlation; analysis of variance; experimental design principles and analyses. This course is evaluated on a pass/fail basis. Antirequisites: HRM *701, HRM *702.

+*705 / Independent Study in Clinical Epidemiology and HealthResearch Methods / S. Hanna

This course is designed to allow students to either tailor their learning to the specific topics in clinical or health care, health policy and research methodology relevant to their clinical or health care and research interests and do advanced work in this area. The topic studied may be synergistic with the student's thesis topic but must not represent a major overlap with it. Under the guidance of a faculty member, the student will critically examine the pertinent literature. Students will prepare a term paper and give a seminar on a selected topic.

****711 / Health Economics and Evaluation / C. Longo (cross-listed as Business C711)***

This course examines the application of economic principles to policy-relevant questions in the area of health and health care. Topics will include applied health economics, economic correlates to health, demand and supply of health care and insurance, health care system financing, economic evaluation in the pharmaceutical/medical devices industries, costing methodologies, cost-effectiveness and cost-benefit analyses, QALYs, decision analysis, modeling and means by which to improve value-for-money in the health sector.

***713 / Health Quality Improvement**

This course will expose students to principles of quality improvement (QI). It allows them to gain experience in using QI tools, develop an appreciation of the role that people management and teams play in QI, become proficient in conducting QI studies in the Health Care arena and become familiar with the QI literature applied to Health Care. Students will become familiar with the principle software for statistical QI methods and learn the principles of reduction of variation, robustifying processes and resisting human error. This course is evaluated on a Pass/Fail basis.

***714 / Methods for the Analysis of Longitudinal Data /P. Contoyannis**

This course considers the design and content of longitudinal health surveys and national and provincial health databases. It provides students with skills in exploratory analysis of longitudinal data, discusses the use of dynamic/transitional models, examines attrition and selection issues, and considers approach to the analysis of models for categorical and count data.

***721 / Fundamentals of Health Research and Evaluation Methods / M. Levine, A. Lytwyn**

The course will cover the basic concepts in formulating a research question, literature review, study design, selection of study sample, outcome measurement, research ethics and knowledge translation. The course will provide students the opportunity to develop ahealth research question and determine the appropriate quantitative methodology for a research question that involves human participants or human participant data. Research designs that will be discussedinclude randomized clinical trials, cohort and case-control designs and the evaluation of diagnostic test properties.

+*722 / Selected Topics in Clinical Epidemiology andPopulation Health Research Methods / S. Hanna

This special topics course will present leading edge thinking regarding controversies in health, health care, and population health research.

***723 / Regression Analysis / S. Hanna**

This is a second level course in statistical methods, concentrating on regression models of various types. Topics covered include various main techniques of simple and multiple linear regression, and techniques such as use of dummy variables, covariance adjustment, residual analysis and assessment of model fit. A similar agenda is followed for logistic regression, appropriate for binary outcome variables. We also consider some advanced topics and related methods.

****724 / eHealth: Fundamentals of eHealth and the CanadianHealth Care System / A. McKibbon (cross-listed as eHealth *724)***

This tutorial-based course will cover a broad range of eHealth topics from the perspective of health care delivery. Topics include a definition of eHealth; health care data; hospital and primary care information systems (i.e., electronic health records [EHR] systems); specialty components of an EHR system; how health professionals use data; human/cognitive factors in *development and implementation of eHealth applications, standards, vocabulary and nomenclatures and how used; aggregation of health information, especially for research purposes; patient information systems and consumer eHealth; research and evaluation of eHealth applications and research using eHealth applications; implementation issues and privacy, security, and confidentiality; and the future of eHealth.*

***726 / The Science and Practice of Knowledge Translation: Foundations / M. Brouwers**

This is an overview course aimed to introduce graduate students to the science and practice of knowledge translation and exchange(KT). This course will be of interest to graduate students who wish to pursue an academic career in the field of KT, students whoseprimary research is in another domain but wish to strengthen their KT-related skills, and students who are interested in doing KT as partof their professional activities. This course is part of the Health Services Research field of the HRM graduate program.

***727 / Theory and Practice of Measurement / G. Norman, L. Grierson**

Principles of subjective assessment in topic areas ranging from educational evaluation to patient-based measurement of health attitudes or health status. Discussion includes: principles and methods of constructing rating scales and approaches to assessing the measurement properties of such scales. Special emphasis on assessment of reliability and validity—various forms of reliability (test-re-test, interobserver, split-halves), distinction between reliability and agreement, and indirect methods to assess validity of an instrument in the absence of a “gold standard.” Advanced topics in generalizability theory will be introduced. Format is that of lecture, plus small group discussion.

***728 / Genetic Epidemiology and Statistics / S. Anand**

Genetic epidemiology overlaps with molecular epidemiology. It is the epidemiological evaluation of the role of inherited causes of disease in families and in populations; it aims to detect the inheritance pattern of a particular disease, localize the gene, and find a marker associated with disease susceptibility. Gene-gene and gene-environment interactions are also studied in genetic epidemiology of a disease. Genetic epidemiology is “ a science which deals with the etiology, distribution, and control of disease in groups of relatives and with inherited causes of disease in populations.” (Morton NE, 1982)

***729 / The Canadian Health Care System in ComparativePerspective**

This course provides an overview of the Canadian health care system by examining its origins, institutional structures (i.e., governance, financing and service delivery), key elements (e.g., allopathic, physician and hospital centre), and reform challenges. Our analysis of the Canadian system is comparative, drawing on relevant evidence about the US, UK and Australian health systems. The course has two parts. In the first half, we review the evolution and structure of the Canadian, US, UK and Australian health systems. The second half of the course reviews a series of key health reform challenges in Canada from a comparative perspective: reform in the financing of health care, reform in the delivery of primary care, reform in the delivery of home and aged care, and reform in the coverage of pharmaceuticals.

***730 / Introduction to Research Methods for RandomizedControlled Trials / P. J. Devereaux**

This course will introduce students to the main elements of clinical trial design, execution and analysis. At the end of this course, students should have a firm grasp of clinical trial methodology at a level that would allow them to prepare successful grant applications.

***731 / Advanced Linear Models for Health Data**

The course focuses on some advanced statistical techniques for the analysis of health studies that have continuous outcomes. Although these techniques are useful for many kinds of research, students interested in observational, repeated-measures, and longitudinal studies will find them especially helpful. The goal of the course is to give students the tools to develop multivariate linear models of health outcomes. The curriculum is divided into 3 modules: (1) fundamental topics in linear regression; (2) multilevel models and growth curve analysis for clustered and longitudinal data; and (3) structural equation modeling with latent variables. We take a conceptual, rather than mathematical, approach using a combination of lectures with problem-based discussion. Assignments emphasize computer analysis and interpretation of real data.

***733 / Statistical and Methodologic Issues in RandomizedClinical Trials / J. Hamid**

This course will consider monitoring statistical issues relating to the design, analysis and interpretation of randomized clinical trials. Specific topics will include issues in sample size determination, large simple trials, factorial designs, cluster randomization, cross-over trials, missing data in RCTs, meta-analysis, non-inferiority trials, subgroup analysis, composite outcomes in RCTs, stopping rules, cost-effectiveness analysis, statistical analysis of cost-effectiveness data, and repeated measures in RCTs.

****735 / Geographies of Health/ J. Eyles (cross-listed as Geography *736)***

This course initially reviews the social theories that underpin the apparently atheoretical geographies of health. Specific modules will emphasize key research areas, including but not limited to, environment, place and space, boundaries and access to resources, population characteristics and the role of different actors in shaping health geographies. These actors, including government, business, civil society, will also be examined with respect to their impacts on health status, health inequities and the distribution of costs and benefits to health.

***737 / Economic Analysis for the Evaluation of Health Services / A. Gafni**

This course is a practical “How To” course in techniques for economic evaluation of health care programmes. The methodology of cost-benefit analysis, cost-effectiveness analysis, cost-minimization analysis and health status index models is examined in detail and several applications of each are reviewed during the first half of the course. During the second half of the course, each student is expected to complete an economic evaluation of a specific health care programme or intervention.

***738 / Health Policy Analysis / J. Abelson**

This course introduces students to the interdisciplinary field of health policy analysis, providing the concepts and tools needed to be able to critically appraise and conduct policy analyses at a variety of policy levels (e.g., clinical, administrative/managerial or public policy). Students learn how to analyze the relative roles played by different actors in the health system and explore the independent and combined influence of three major determinants of health policy: ideas, interests and institutional structures. Each week a different analytic concept is presented, discussed and applied to a particular problem or case study.

***739 / Biostatistical Collaboration / L. Thabane**

This course provides an overview of the strategies needed for effective biostatistical collaboration with clinical investigators. Topics covered include: strategies of eliciting information required to assist with study design from clinical collaborators; ways to translate the research questions into statistical questions; strategies to facilitate provision of statistical support on design, sampling and analytic plans; approaches of communicating the sampling plan, experimental design, statistical analysis to collaborators; methods to facilitate provision of support on statistical programming; strategies to facilitate provision of help with write-up of methods and reporting of results of studies.

***740 / Advanced Decision Analysis in Health TechnologyAssessment (HTA) / R. Goeree**

This is an advanced course in methods for Health Technology Assessment (HTA). It is a combined theoretical and practical 'hands-on' course that teaches students the essential components of contemporary HTA. Students will be exposed to national and international HTA agencies and government decision making bodies, and their HTA guidelines and requirements. The course covers areas of systematic literature reviews, economic evaluation, analyses of uncertainty, value of information analyses, Bayesian decision analyses, quality assurance in economic appraisal, budget impact analysis, and knowledge translation. There is a heavy emphasis in this course on 'hands-on' learning-by-doing with computer application of 'real world' practical examples to cement student learning.

***741 / Introduction to Health Technology Assessment/ D. O'Reilly**

Health Technology Assessment (HTA) has the tremendous potential to transform the delivery of health care services, and improve health outcomes and quality of life. Decisions about whether to purchase and use new health technologies should be based on high-quality evidence of its impact on health outcomes, the health care system, and cost-effectiveness. Payers of health care face the challenge of aligning decision making with the best available evidence. Upon completion of this course, students will be equipped with the skills to evaluate the quality of an HTA, to critically appraise it to make a judgment about a study's methods, results and conclusions. Additionally, students will become adept in conducting HTAs and be mindful of the barriers to, and facilitators of, evidence-based decision making in the real world.

***742 / Ethical Issues in Research Involving Human Subjects / L. Schwartz**

This course is designed to prepare students to think creatively and proactively about ethical and legal issues in the design, conduct, analysis, and dissemination of research. Topics are divided into two categories: 1. ethical treatment of research participants and; 2. research integrity. Sessions will involve case discussion and critical analysis of ethical issues and the relevant principles, guidelines and laws. Exercises will coach students through mock-submission to a Research Ethics Board and provide insight of how REBs function.

***743 / Systematic Review Methods / G. Guyatt, D. Cook**

This course about research synthesis focuses on comparisons between alternative interventions. Rigorous review methods will be highlighted, such as searching for potentially relevant articles, selecting primary articles using explicit, reproducible criteria, appraisal of study architecture, quantitative data synthesis and interpretation. Old and new concepts and controversies in review methods will be highlighted. The work of the Cochrane Collaboration and in particular the Cochrane handbook, forms the underpinning of much of the material.

****745 / Qualitative Research Methods / S. Boblin, P. Baxter (cross-listed as Nursing *745)***

This course introduces learners to theoretical traditions and corresponding methods of qualitative research using health and health care research as examples. Specific topics covered include: key paradigms underlying qualitative research, types of research questions best answered by qualitative methods, the role of theory in qualitative research, sampling objectives and procedures, methods of data collection, methods of analysis and interpretation, and ethical issues and responsibilities of qualitative researchers. Criteria for evaluating qualitative research will be discussed and applied to specific research studies. Learners will gain "hands on" experience using qualitative methods through in-class and take-home exercises.

***748 / Population and Public Health / P. Raina**

This course provides an overview of core concepts and methods in population and public health. We will discuss the concept of population health and explore the methods used to define, measure, and investigate health outcome and health determinants at a population level. The applications of this approach to public health will be discussed.

***750 / Practical Bayesian Design and Analysis in ClinicalStudies / E. Pullenayegum**

The intention of the course is both to introduce students to Bayesian ideas and to equip them to design, analyse and interpret clinical studies from a Bayesian perspective. Instruction will consist of both seminars and computer labs using WinBUGS. WinBUGS is not "point-and-click" software, so students will need to write short sections of code. Examples will be provided, and an instructor will be present in the lab sessions to provide advice.

***751 / Observational and Analytical Research Methods / A. Mente**

The course is designed to introduce students to the basic concepts and methods used in observational (non-experimental) studies toconduct needs assessments (e.g., prevalence of disease or order), to understand the determinants of health (e.g., association between independent/exposure variables and dependent/outcome variables in analytic research) and to emphasize concepts that are essentialto the conduct of epidemiologic studies including internal and external validity, random variability, bias, effect modification, causality,and generalisibility. The topics will focus on three broad areas: i) the formulation of research questions and use of theory to explicatethe relationships among key variables; ii) study design options, sampling, measurement and analysis; and iii) the control of error.

****758 / Qualitative Research Methods for Analysing and Interpreting Data (cross-listed as Nursing *758 and Rehabilitation Science *758)***

This intermediate-level course builds on prior knowledge about qualitative research approaches and their philosophical basis. The emphasis in this course will be on how the approaches affect data analysis and interpretation, as well as presenting findings in written and oral formats. The course is based on active involvement of learners through student-directed discussions and hands-on experiences, guidance and facilitation by graduate faculty with expertise in qualitative research, and interdisciplinary collaboration with faculty and classmates.

***759 / Survival Analysis in Health Research / N. Akhtar-Danesh**

This course will cover the main statistical issues in survival analysis. Specific topics of the course are Kaplan-Meier curves, log-ranktest, Cox Proportional Hazard Model, Stratified and Extended Cox Model, Parametric Survival Models, Recurrent Events, CompetingRisks, Relative Survival Analysis, and Model Evaluation. Depending on time and the students' progress and interests, newadvancements in survival analysis will be discussed.

***762 / Approaches to the Evaluation of Health Services**

This course will introduce students to the major concepts and methods involved in program evaluation and will examine different methodologist's approaches to evaluation of programs. A framework for thinking about evaluation theory will be developed that allows students to explore how different theorists attempt to tackle fundamental problems in the field. A wide range of quantitative and qualitative design options will be discussed. The course will provide students with knowledge of the current controversies and major challenges facing this field.

****770 / Mixed Methods Research Designs for Health Services and Policy Research / D. Sherifali (cross-listed as Nursing *770)***

This course introduces students to the major concepts and issues involved in mixed methods approaches to tackle important questions in the field of health services and policy. LearnLink is used as the mode of instruction as well as two-classroom sessions at McMaster. A framework for thinking about mixed methods will be developed that provides guidance to decision-making about when and how to use mixed methods and models to study health services and policy problems. The course will provide students with knowledge of the current controversies and major challenges in the use of mixed methods and models of research. Students are expected to *design a mixed method study as part of the course and critically evaluate the design options chosen by a classmate.*

***771 / Fundamentals of Health Research and EvaluationMethods (Online) / J. Boyko**

This course is designed to introduce methodological issues to help you critically read scientific reports of health research. It willintroduce you to the major components of research activities, including: study designs, selection of study populations, choice ofmeasuring instruments, formulation of research questions, and study interpretation issues such as determination of causality and theeffectiveness of clinical and community interventions.

***772 / Introduction to Research Methods for Randomized Controlled Trials (Online) / J. Boyko**

HRM *772 is an essential introductory course for aspiring clinical trial researchers. The goal is to introduce participants to the mainelements of study design, execution and analysis with emphasis on the formulation of appropriate research questions and clinical trialdesign. The course is conducted online and utilizes interactive learning modules, required readings, discussion boards, tutorials andhand-in assignments (weekly and end of course final project).

***773 / Systematic Review Methods (Online) / J. Boyko**

This online course is about research synthesis and focuses on comparisons between alternative interventions. Interactive learningmodules, required readings, discussion boards, tutorials, and assignments will be used to highlight steps in the systematic reviewprocess including: searching for potentially relevant articles; selecting primary studies using explicit, reproducible criteria; appraisal ofstudy architecture; quantitative data synthesis; and interpretation. Students in this course must first identify a suitable research questionand find a partner for their review. The course is structured around the steps of executing a systematic review and students areexpected to apply the knowledge they gain on an ongoing basis to complete their own systematic review by the end of the course.

***774 / Introduction to Biostatistics (Online) / S. Hanna**

This fully online course utilizes problems, published presentations, discussion boards, quizzes and tutorials to explore basic statisticalconcepts and techniques as they apply to analysis and presentation of data encountered in biostatistical and epidemiology practice.The course covers: graphical presentation of data, elementary probability, descriptive statistics, probability distributions, and introduceshypothesis testing using parametric and non-parametric methods.

***787 / Principles of Health Economics / S. Birch**

Problem-oriented course with an introduction to economic concepts and evidence related to health and health care. Current health policy issues and controversies are analyzed using an economic framework and basic economic theory. Special emphasis on population health issues, the role of the health care system in affecting health, and the influence of various participants (health care providers, patients, government) on health care utilization and population health status. No prior economics background is necessary.

788 / Health Economics / J. Hurley (cross-listed as Economics *788)

This is a basic graduate survey course on the economics of health and health care. Topics include the organization, financing and utilization of health care services. Both theory and evidence relating to patterns of consumer and provider behaviour are examined, as are the functioning and regulation of "markets" for health services. Major public policy issues in the provision of health care in Canada are identified and the economic aspects of such issues are considered in detail.

***789 / Health Economics for Health Care Managers**

Part I (sessions 1-6) introduces basic concepts of economics and health economics by reviewing how markets for health care and health care insurance operate, and examines techniques for economic evaluation of health care programs, such as cost-effectiveness analysis and cost-benefit analysis, and discusses how these evaluative principles are used to assess "value for money" in health care. Part II (sessions 7-12) introduces concepts regarding the economics of prevention, screening, diagnosis, and the economics of the pharmaceutical industry.

790 / Advanced Analysis of Survey Data / M. Boyle, K. Georgiades (cross-listed as Economics *770, Geography *770, Psychology *770, Sociology *770)

The course is divided into two parts. The objective of part 1 is to have student identify a suitable data set (research study) and develop a proposal describing their secondary analysis project. Students will be helped to develop their 1-2 page proposals which will include: the research question, a brief outline of its relevance and importance; identification of the appropriate data set(s); a brief statement about analytical approach to be used; and the identification of 3-4 iey references. The instructors have access to several data sets that can be used for this course. This part will occur between October and December. There will be two class sessions—one in October and the other in November and the opportunity for two individual sessions. The objective of Part 2 is to complete the research paper (review of the literature, analysis of data, write-up and revision of the report) with the purpose of submitting the paper for review to a peer-reviewed journal. This part will occur between January-May and include 10 class sessions.

791 / Topics in Advanced Health Economics / P. Contoyannis, J. Hurley, E. Tompa, J. Tarride (cross-listed as Economics *791)

*This course focuses on contemporary issues relating to the economics of health and health care. It is intended to provide a more detailed examination of selected issues from Economics/HRM *788 as well as expose students to more advanced topics and aspects of recent research in health economics. Topics may include economic evaluation, the economics of occupational health and safety, evaluation of health-care related interventions, advances in the empirical analysis of income and health inequalities, and the evolution of health from childhood to adulthood.*

Clinical Health Sciences Courses

***707 / Post Modern Family Therapy / T. O'Connor**

The course presents the concepts from post modern family therapy and examines their implications for working with families. The course includes solution focused and narrative therapy especially the works of Steven de Shazer, Michael White and Charles Gerkin and compares them to the concepts of modern family therapy. The post modern family therapy concepts are used in understanding and explaining the practice of therapy and ministry within various contexts. The course is interdisciplinary.

***719 / Foundations of Education in the Health Sciences/ B. Brown, Staff**
(Formerly NUR *719)

This course will explore the education literature through discussion and application to health sciences issues, including health professional education. Examination of early education literature and changes over time in the philosophy and practice of education will provide the framework of approaches to teaching and learning. Topics
include: recurrent issues in health professional education; teacher and learner-centred educational approaches; psychomotor learning; cognitive psychology and learning; instructional and evaluational methods.

Other courses that may be of interest are the following:

Health, Aging and Society Courses

***711 / The Health Care System and the Older Person**

This course provides an interdisciplinary analysis of priority issues relating to the health care system and the older person in the field of critical and social gerontology.

***713 / Critical Perspectives on Aging**

This course draws on perspectives in critical gerontology to explore issues related to the political, social, and cultural aspects of aging.

HEALTH SCIENCE EDUCATION

The Master of Science in Health Science Education (MSc HS Education) is an interprofessional program designed to develop skills in both research and scholarship in health professions education. The program is targeted to health care practitioners and clinical educators (physicians, nurses, occupational therapists, physiotherapists, midwives, physician assistants, social workers, etc.), and others who teach or would like to conduct research in health professions education. Non-Health practitioners will only be considered for the full-time, thesis stream. The MSc in Health Science Education program provides students with opportunities to develop a comprehensive understanding of current professional practice in health science pedagogy and research principles in health science education. This program strives to synthesize core competencies in the research scholarship of health professions education with practical application. Students will gain the research skills, pedagogical knowledge and professional experience necessary to succeed in a variety of areas of health science education and practice.

The MScHS Education program offers online courses in cognition and curriculum, simulation/technical and non-technical skills, online learning, educational leadership, assessment and evaluation, and research methods. In addition, two mandatory in-person residency periods must be completed. The program offers students two completion pathways: a course-based option which is offered in online format through part-time studies (full time may be considered with special permission), or a thesis-based option offered in either part-time or full-time studies. The program will be highly accessible through blended delivery of online and in-class formats.

The objectives of the program are to:

- Integrate graduate level training in research scholarship, evidence-based education pedagogy, educational leadership, interprofessionalism, and McMaster's FHS signature health science curriculum
- Enable knowledge, academic skill and attitude pertaining to health science education at the graduate level
- Enhance preparedness for advanced professional and inter-professional academic roles including leadership and research in health science education
- Engage learners with interactive learning strategies in both classroom and online learning formats
- Enable learners to utilize theory and education pedagogy for classroom and online learning, communication and assessment

Enquiries: Katie Zazulak
Master of Science in Health Science Education
Faculty of Health Sciences, McMaster University
1280 Main Street West
MDCL 3510
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Tel: 905-525-9140 x22114
Fax: 905-572-7099
Email: hsed@mcmaster.ca
Website: http:// fhs.mcmaster.ca/hsed/

Faculty / Fall 2012

PROFESSORS
Baptiste, Susan, MHSc, (McMaster) / Rehabilitation Science
Law, Mary, PhD, (Waterloo) / Rehabilitation Science
Neville, Alan, MD, (Aberdeen), MEd, (Toronto) / Oncology
Norman, Geoff, PhD, (McMaster) / Clinical Epidemiology and Biostatistics
Risdon, Cathy, MD (McMaster), DMan (Hertfordshire) / Family Medicine
Reiter, Harold, MD, (Toronto) / Radiation Oncology
Solomon, Patty, PhD (Waterloo) / Rehabilitation Science
Walsh, Allyn, MD, (Western) / Family Medicine

ASSOCIATE PROFESSORS
Cairney, John, PhD (Western) / Family Medicine
Marshall, Denise, MD (McMaster) / Family Medicine
McKey, Colleen, PhD (Capella) / Nursing
McNiven, Patricia, PhD (Toronto) / Midwifery
Noesgaard, Charlotte, MSc (Western) / Nursing
Wainman, Bruce, PhD (York) / Pathology and Molecular Medicine

ASSOCIATE CLINICAL PROFESSOR
Miller, Pat, PhD (McMaster) / Rehabilitation Science

ASSISTANT PROFESSORS
Bayer, Ilana, PhD (Toronto) / Pathology and Molecular Medicine
Carusone, Soo Chan, PhD (McMaster) / Clinical Epidemiology and Biostatistics
Chen, Ruth, MSN (Yale) / Nursing
Dore, Kelly, PhD (McMaster) / Clinical Epidemiology and Biostatistics
Grierson, Lawrence, PhD (McMaster) / Family Medicine
Jung, Bonny, PhD (Western) / Rehabilitation Science
Kulatunga-Moruzi, Chan, PhD (McMaster) / Family Medicine
Martin, Lynn, PhD (Toronto) / Nursing

Musson, David, MD (Austin), PhD (Western)/Anesthesia
Salfi, Jennine, PhD (McMaster)/ Nursing
Sherbino, Jonathan, MD (Ottawa), MEd (Toronto)/Medicine

ASSISTANT CLINICAL PROFESSOR
Whyte, Rob, MD (McMaster) / Anesthesia

Admission Requirements

In addition to the School of Graduate Studies requirements, candidates for admission to this health science education program will have an honours-equivalent, four-year bachelor's degree or related health professional degree (e.g., Bachelor of Health Sciences from the Nursing, Physician Assistant or Midwifery Programs, or Bachelor of Social Work), an MD, or a Master of Science in Physiotherapy or Occupational Therapy, etc. Additional requirements include:

- A four-year undergraduate degree with at least a B+ from an AUCC Member School (equivalent to a McMaster 8.5 GPA out of 12.0) in the final year in all courses in the [health science related] discipline.
- An official transcript of academic work completed to date at all post-secondary institutions attended, sent directly from the issuing institution(s). If the final degree does not show that a completed degree has been conferred, an official copy of the diploma is also required.
- Two confidential letters of recommendation from recent mentors (either those in an academic position or health practitioners) most familiar with the applicant's academic work.
- Curriculum Vitae to include work experience and list of educational experiences.
- Written personal Statement of Intent that explains why the applicant is seeking graduate education in this program (2 pages, 12 pt font, 1" margins):
    - Explanation of what is desired from this degree, and if they are applying for the course-based or thesis-based stream, full or part time.
    - Explanation of their area of interest.
- Preference will be given to those with teaching experience in a health-related discipline. However, applicants without teaching experience will be considered.
- Full time thesis students can find information on funding at http://sfas.mcmaster.ca/, and item 5.2.1 (Financial Support for Full-time Students) in the Graduate Calendar.

Admission is competitive. Meeting the minimum standards does not guarantee admission to the program.

To apply and pay the application fee online, consult the Graduate Studies website at http://graduate.mcmaster.ca/prospective-students/application-procedure

Program Requirements

The general regulations for Master's degrees may be found at the beginning of this Calendar. Minimum requirements for candidates of the MSc in Health Science Education program are outlined below.

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Course-based option students must:

- Complete, with at least a B- standing:
    - The program's four required courses (two quarter courses and two half courses)
    - Three graduate approved electives (half courses)
    - A scholarly paper

Thesis-based option students must:

- Complete, with at least a B- standing
    - The program's four required courses (two quarter courses and two half courses)
    - One graduate approved elective (half course)
    - A thesis

Courses

All courses are half courses (*) with the exception of the two-quarter courses (#) (HS 700 & HS 707). Additional information on program courses can be viewed at the Health Science Education website, http://fhs.mcmaster.ca/hsed/

#700 / Health Science Education I: Fundamentals of Health Science Education
An overview of the program and courses including the over-arching goals, learning outcomes, instructional methods, content, resources, assessment methods, and faculty. This course is designed for graduate students from a wide range of health science disciplines and is offered in an intensive summer on-campus format.

***701 / Cognition & Curriculum in Health Science Education**
This course explores the science of memory, thinking, learning and its application to teaching and curriculum design in health science education. Students will relate and apply epistemologies and theoretical frameworks from cognitive and educational psychology, teaching strategies and methods, such as PBL, concept-based learning, simulation-based learning, etc. to their teaching practice area. This course is offered online.

***702 / Educational Research Methods in Health Science Education**
In this course students are introduced to a range of research methods used to assess learning in health science programs. Major topics include psychometrics, epidemiology, experiments, quantitative, and qualitative methods.

***703 / Assessment and Evaluation**
In this course students explore theories and concepts underlying assessment, assessment strategies, and evaluation planning for health science education at the course and program level. Assessment topics include theory of measurement, reliability, validity, and generalizability theory and its application to assessment and evaluation instruments appropriate for health science academic and clinical settings, written examination formats, such as multiple choice and performance measures. Students will develop a basic knowledge of program evaluation including conceptual frameworks for program evaluation, instrumentation, data collection and data sources, and reporting results.

***704 / Simulation and Technical and Non-Technical Skills**
In this course students will explore, characteristics of high fidelity and low fidelity simulations for teaching and clinical performance assessment. In addition, both technical and non-technical skills will be reviewed from the perspective of evidence based teaching and assessment.

***705/ E-Learning**
In this course students explore the theory and application of the pedagogies, knowledge and teaching skills relevant to current and emerging learning technologies. Topics include the benefits and challenges of online learning, managing faculty and student transformation from classroom to online teaching and learning, facilitation of online discussions, and the design of learning activities and selection of technological resources for online learning.

***706 / Leadership**
The goal of this course is to enable students to relate the theoretical and conceptual fundamentals of educational leadership in academic health sciences and community health care context, such as change management, mentorship and power relations to their own practice as a result of sustained inquiry into their own work. An Interprofessional team facilitates this course.

#707/ Health Science Education II
This course explores scholarship and the process of writing and preparing a manuscript for journal submission, and development of programmatic research. Students present works in progress and provide feedback to their peers. This course is offered in an intensive summer on-campus format.

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708 / Scholarly Paper
The Scholarly Paper is the final degree requirement for the course-based MSc. The paper should reflect the student's ability to integrate ideas that reflect their analysis and use of knowledge in areas of health science teaching and learning, research and leadership in a scholarly way as well as the ability to independently apply and discuss these concepts in a concise, critical, and coherent manner. The paper will demonstrate integrative thinking and focus on a topic selected by the student in consultation with their Scholarly Paper Supervisor, Reader 1 and Reader 2 and submitted to the MSc HS Ed Administrative Assistant prior to

commencement. Students will develop a proposal individualized to the student's area of interest that addresses the MSc Health Science Education's Guidelines for Scholarly Papers. The scholarly paper is distinctive from a thesis, as it does not require the collection or analysis of primary data or the conduct of research with subjects, although this may be an option in some circumstances. The scholarly paper will be graded by the scholarly paper Supervisor and two additional Readers. The student may start some components of the paper in a preliminary form during their program. Students will be encouraged to present part of their paper during the Health Science Education II course. Depending on the specific topic, some students may need to conduct fieldwork to collect necessary data and in such cases appropriate ethics approval may be required. Supervisory feedback will be provided on an on-going basis online, by telephone videoconference, or in person should a face-to-face meeting at McMaster University be required. The Scholarly Paper Topic Approval form is available on the HS Ed website at http://fhs.mcmaster.ca/healthscienceeducation/

709 / Thesis

For the thesis option, students will complete a formal written research proposal that outlines their project plan prior to commencing research and submit it for approval to their Supervisory Committee within six months of entry into the program for full-time students and within one year of entry for part-time students. The thesis will demonstrate integrative thinking, understanding and reviewing the relevant literature and involve conducting original research, and will focus on a health science education topic that is selected by the student in consultation with their thesis Supervisor.

The proposal will be individualized to the student's area of interest that addresses the Thesis Guidelines established by the MSc Health Science Education program. Some components of the paper maybe started in a preliminary form by the student during their program. Students will be encouraged to present part of their thesis research (e.g. literature review) during the Health Science Education II Scholarly paper presentations course. Students who plan to conduct fieldwork to collect necessary data will seek appropriate ethics approval. Supervision feedback will be provided on an on-going basis by email online, telephone, videoconference, or in person should a face-to-face meeting at McMaster University be required.

Thesis students must submit a written thesis and oral defense (in person) before a committee comprised of the Graduate Program Director, the student's Supervisory Committee and an external examiner.

Anticipated completion time

The anticipated completion time of all program requirements for students enrolled in the FHS Health Science Education program is 2 years for a full-time student and 4 years for a part-time student from initial enrollment.

HISTORY

The Department of History offers programs leading to the M.A. and Ph.D. degrees. Part-time M.A. and Ph.D. studies are possible.

Enquiries should be directed to the Chair of Graduate Studies in History, 905 525-9140
Ext. 24416
Fax: 905 777-0158
Website: http://www.humanities.mcmaster.ca/~history/

Faculty / Fall 2012

DISTINGUISHED UNIVERSITY PROFESSOR
John C. Weaver, B.A. (Queen's), M.A., Ph.D. (Duke)

PROFESSORS
Virginia Aksan, B.A. (Allegheny), M.L.S. (Berkeley), M.A., Ph.D.(Toronto)
Michael Gauvreau, B.A. (Laurentian), M.A., Ph.D. (Toronto)
Stephen Heathorn, B.A. (Toronto), M.A. (McMaster), Ph.D. (Toronto)/ Graduate Studies Chair
Bernice M. Kaczynski, B.A. (Pittsburgh), M.Phil., Ph.D. (Yale)
Henry V. Nelles, B.A., M.A., Ph.D. (Toronto) / L.R. Wilson Professorof Canadian History

ASSOCIATE PROFESSORS
Megan Armstrong, B.A. (Toronto), M.A. (Queen's), Ph.D. (Toronto)
Karen Balcom, B.A. (Carleton), M.A. (Dalhousie), Ph.D. (Rutgers)
Nancy Bouchier, B.A., M.A., Ph.D. (Western)
Kenneth Cruikshank, B.A. (Carleton), M.A., Ph.D. (York)
Juanita DeBarros, B.A. (Toronto), M.A., Ph.D. (York)
Michael Egan, B.A., M.A. (Simon Fraser), Ph.D. (Washington State)
Ruth Frager, B.A. (Rochester), M.A., Ph.D. (York)
Evan Haley, B.A. (Dartmouth), M.A., Ph.D. (Columbia) / Jointappointment in Classics
Martin Horn, B.A. (Western), M.A. (McMaster), Ph.D. (Toronto)
Bonny Ibhawoh, B.A. (Bendel State), M.A. (Ibaden), Ph.D. (Dalhousie)
Tracy McDonald, B.A., M.A., Ph.D. (Toronto)
Alison McQueen, B.A. (McGill), M.A., Ph.D. (Pittsburgh)
Stephen Streeter, B.S. (Bates), M.A. (Stonybrook), M.A. (Riverside),Ph.D. (Connecticut)
Pamela Swett, A.B. (Bryn Mawr College), M.A., Ph.D. (Brown) / Chair

ASSISTANT PROFESSOR
Jaeyoon Song, B.A., M.A. (Korea), Ph.D. (Harvard)

ASSOCIATE MEMBERS
Andrew Bone (Bertrand Russell Project)
Richard Harris (Geography)

PROFESSORS EMERITI
James D. Alsop, B.A. (Winnipeg), M.A. (Western), Ph.D.(Cambridge)
Alan Cassels, M.A. (Oxford), Ph.D. (Michigan), F.R.H.S.
Paul S. Fritz, B.A. (Queen's), M.A. (Wisconsin), Ph.D. (Cambridge)
Daniel J. Geagan, B.A. (Boston College), Ph.D. (Johns Hopkins)
Charles M. Johnston, B.A. (McMaster), M.A., Ph.D. (Pennsylvania)
Harvey A. Levenstein, B.A. (Toronto), M.S., Ph.D. (Wisconsin)
Richard A. Rempel, B.A. (Saskatchewan), M.A., D.Phil. (Oxford)
David J. Russo, B.A. (Massachusetts), M.A., Ph.D. (Yale)
Wayne Thorpe, B.A.(Phil.) (Washington), M.A.(Phil.) (Colorado), B.A.(Portland State), Ph.D. (British Columbia)
John H. Trueman, M.A. (Toronto), Ph.D. (Cornell)

M.A. Degree

The History Department offers work leading to the M.A. degree in the fields represented by the courses listed below. Admission to the program requires, subject to the general regulations of the School of Graduate Studies, an Honours B.A. in history or in history and another subject, with at least a B+ standing. Potential applicants with a B.A. Honours degree in a closely related discipline should consult with the graduate advisor or the Chair of the Department.

Candidates for the M.A. degree normally complete degree requirements in one calendar year of continuous work. Candidates must obtain at least B- standing in all seminars. Only graduate seminars (courses numbered 700) may be counted for graduate credit. Failure on any course in the M.A. program will entail immediate withdrawal from the M.A. program.

A. Requirements for M.A. by Course Work

Students will complete six half courses, plus the M.A. Project course (History *797). Detailed requirements are as follows:

1. Five seminar courses from those offered by the Department in any given year. Master's candidates may choose one half course seminar from those offered by another Department, subject to approval of the History Department.

2. History *741 (Historiography).

3. M.A. Project Course (Master's Research Paper): History *797.

B. Requirements for M.A. by Thesis:

1. Three half-course seminars from those offered by the Department in any given year. Master's candidates may choose one-half course seminar from those offered by another department, subject to approval of the History Department.

2. History *741 (Historiography)

3. A thesis of 25,000-30,000 words of text, under the supervision of a member of the department.

Acceptance in the M.A. by thesis stream is not automatic with admission to the M.A. program. Students will require approval in writing from their prospective supervisor, submission of a formal thesis proposal and approval by the Departmental Graduate Studies Committee.

Ph.D. Degree

The Department supervises doctoral research in a variety of areas of specialization. Prospective applicants are directed to consult the Department's website which details research specializations. Candidates must contact individual faculty for guidance on appropriate thesis topics.

When admission to Ph.D. work has been granted a candidate will, in consultation with his or her prospective supervisor and the Graduate Studies Chair of the Department, select two Minor Fields and one Major Specialization. Minor Fields and Major Specialization will cover the principal literature in the areas of concentration.

Minor fields normally consist of two half-year 700-level graduate reading seminars (offered in the first term) in each of which a major historiographical essay and a written courseexamination are required. The grade for a minor field will consist of the grades for the in-course requirements, the examination, and the historiographical essay, in combination as indicated by the minor field supervisor.

While some overlap may be deemed beneficial, the Minor Fields should not duplicate Major Specialization reading. All doctoral candidates must have a minimum of three, and usually four, instructors supervising the combination of their Minor Fields and Major Specialization.

Major Specialization preparation begins in January and takes the form of a reading course. The reading for the course will be determined by the course instructors with oversight from the department's Graduate Studies Committee to ensure appropriate breadth and depth of the reading list. As part of the reading course candidates will complete a significant historiographical paper or papers. The Comprehensive Examination, comprised of written and oral components, will be held in the month preceding September 15 of the second year of the program. It will test the candidate's knowledge of the area of concentration and ability to deal with broad historiographic questions.

Successful completion of 6 units of Minor-Field coursework and 6 units of Major Specialization coursework, and the Comprehensive Examination, fulfill the course requirements of the School of Graduate Studies for doctoral candidates. Satisfactory performance in doctoral Minor Field and Major Specialization courses is a minimum grade of B-. A single grade of F on any course in the Ph.D. program, or two B- grades, entails automatic withdrawal from the program. The Comprehensive Examination in History requires a minimum grade of P (Pass) for successful completion.

Following successful completion of their Comprehensive Exam, doctoral candidates will present the supervisory committee with their thesis proposal. This should be about 10 pages in length, and should indicate the scope and structure of the thesis, the theoretical and research perspectives involved, and the principal archival sources to be used (along with brief mention of major secondary sources). The thesis proposal must be approved by the supervisory committee by early October, so that the candidate has a completed proposal ready for the OGS application deadline (normally mid-October). Length of thesis: 300 pages (75,000 words), exclusive of footnotes and bibliography.

Language requirement for doctoral candidates: competence in English and one other language is the minimum requirement of the Department of History. For candidates working in Canadian, British, or thematic areas, the other language will normally be French, although utility in the candidate's proposed field of research will be the governing consideration. Candidates researching in European History must demonstrate competence in two appropriate languages. Competence in a modern non-English language is deemed to mean the ability to translate standard historical prose with the aid of a dictionary. Specific expectations for translation competency are explained in the Ph.D. regulations which are available on the department website. Written tests are administered by the Department for Ph.D. candidates at intervals throughout the academic year. In particular cases the Supervisory Committee may recommend that a candidate demonstrate proficiency in an additional language or in special methodological skills, such as statistics or advanced cartography, in preparation for her or his research. All such recommendations must be approved by the Graduate Studies Committee. One language requirement for the Ph.D. must be cleared by the time the Comprehensive Examination is completed. Candidates requiring two or more languages should complete the language requirement most relevant to their dissertation topic before completion of their Comprehensive Examination; the other language requirements may be completed while working on the dissertation but must be cleared prior to the dissertation defense.

In certain cases, applicants with a B.A. (Honours) or the equivalent may be admitted directly to Ph.D. studies if their previous academic record shows sufficient promise, including at least an A average. Within one calendar year, the progress of students admitted to Ph.D. studies directly from a bachelor's degree will be reviewed by their supervisory committee and the GraduateStudies Committee. The Graduate Studies Committee will then recommend to the School ofGraduate Studies one of the following:

(a) proceed with Ph.D. studies
(b) not proceed with Ph.D. studies but re-register as a Master's candidate
(c) withdraw from the University

The Ph.D. coursework required for candidates admitted directly with a B.A. (Honours) or the equivalent will be 15 units, comprising successful completion of two Minor Fields; completion of the Major Field; and successful completion of History *741 (Historiography).

Courses

All courses are half courses. Not all courses are offered every year. A list of those offered is made available annually in the spring for the following fall/winter and summer sessions. In addition, credit for courses not offered in a given year may be obtained in certain cases by independent study with the appropriate faculty member. Students may take no more than one course by independent study.

***705 / Political Culture in Europe, 1900-1956 / Staff**
This course addresses selected topics in European political culture in the first half of the 20th century. It focuses on the genesis of political culture; the nature of competing ideologies such as socialism, nationalism, and fascism; the role of ideology in political mobilization; and the relationship between political culture and its socio-economic context.

***706 / Culture and Politics in Nineteenth-Century France / A. McQueen**
An intensive examination of a particular aspect of French History from the Revolution of 1789 to the First World War. The precise focus of the course will change from year to year, and may include a focus on a particular regime, e.g. Second Empire France (1852-1870).Relationships between politics, propaganda and visual and material culture will be emphasized.

***707 / European International Relations, 1890-1956 / M. Horn**
Directed readings on the history of international relations in Europe from 1890 to 1956. Among the topics that will be covered are the origins of the First World War, the post-war peace settlements, the coming of the Second World War, and the origins of the Cold War.

***708 / Research in European International Relations, 1890-1956 / M. Horn**
A major research paper in the field of European international relations, 1890-1956.

713 / Islam, Diaspora, and Identities in Central Asia 1880 to present / T. McDonald (cross-listed as Globalization *713)

This course focuses on Soviet Central Asia but begins with background from the late Tsarist period and ends in the post-Soviet present. Central Asia is the focus for broader discussions on issues of colonialism, identity, gender, nationalism, the Soviet legacy, Islam, diaspora, and the challenges of post-Soviet transition.

714 / The United States and Globalization since the Late Nineteenth Century / S. Streeter (cross-listed as Globalization *714)

This course explores the history of globalization in the modern era emphasizing the role of the United States both internationally and domestically. We begin with the War of 1898, track the rise of the American empire through the so-called Golden Age of capitalism, and conclude with the neoliberal era following the end of the Cold War. The focus is on how and why the United States came to play such a powerful role in shaping globalization; and, it also covers the impact of globalization on the United States itself.

***716 / Social and Cultural History of Victorian Canada, 1840-1914 / M. Gauvreau**

This seminar course provides an intensive introduction to the major themes and historiographic currents in nineteenth-century Canadian history. It will focus on the emergence of a more activist state in the wake of the Rebellions of 1837, the transformation of rural society, changing patterns of Victorian religious life and experience, gender ideologies and practices in the Victorian family, the growing segmentation of society into classes, and movements of social reform.

***717 / Topics in Early Modern European History / M. Armstrong**

This course will examine a particular facet of European history but this topic will change from year to year. Students taking this course will be introduced to the most recent scholarship on that topic. Potential topics include the reformation, persecution, and European cultural interactions in the Mediterranean and the Atlantic world. Particular attention will be given to religion though students will also study early modern political and social structures, economic practices and intellectual life.

***718 / Interpretations of Early Modern Britain / Staff**

The time period covered, at the broadest extent, is 1485-1815. Some themes will necessitate a shorter time-frame. The period and the precise theme will be specified in the course description well in advance of each year in which the course is offered. The themes constitute the major historiographical foci of scholarship: politics and governance, religion, social and cultural history, war and society. There is some overlap, but each theme is a sub-field with an extensive historiography. The works chosen will provide a representative and influential cross-section of historiographical developments, from circa 1880 to 2003.

***720 / Canadian Social History / R. Frager**
This course focuses on key aspects of Canadian social history, particularly in the period from the late 1800's to the 1960's, with emphasis on gender history, working class history, and the history of immigrant groups.

***721 / Modern British History / S. Heathorn**
An intensive investigation of the creation and reproduction of social, political and cultural identities and relationships in Britain between c. 1860 and c. 1970. The course considers the expression of imperial, national, class, gender, ethnic and sexual identities and their role in forging modern British politics and culture. In addition to weekly reading on these themes, students will have the opportunity to research in both secondary and primary sources.

***722 / Research in Modern British History / S. Heathorn**
Major research paper on a topic concerning 19th or 20th Century Britain.

****723 / Global Environmental History / M. Egan (cross-listed as Globalization *723)***
This course examines how the natural environment intersects with major themes in world history, including colonialism, industrialization, and war. It investigates the environmental context and consequences of these and other subjects, with the understanding that the environment is an agent and a presence in human history.

***724 / Modern Caribbean History / J. DeBarros**
This course examines social, intellectual, and political developments in the 19th and 20th century Caribbean. It will pay particular to theimpact of emancipation on Caribbean societies and the significance of gender, race and class in struggles to create new social andnational identities.

***725 / Environmental History: Canada in InternationalPerspective / K. Cruikshank**
In this reading seminar, we focus on an emerging literature in environmental history in Canada, in the context of the development of the field elsewhere. In doing so, we will explore the complicated ways in which the peoples of Canada have interacted with the dynamic biological world, from micro-organisms to mountains. We will consider how the natural world in which Canadians lived, worked and played changed, how ideas about nature changed, and how different social groups sought to shape and manage the natural world, and with what results.

***726 / Religion, Culture and Society in Canada, 1780-1970/ M. Gauvreau**
This course seeks to view religion as neither a form of "limited identity" nor as a reactionary anti-modern ideology; it treats religious institutions, practices and ideas as perspectives or lenses, through which can be viewed the transformations in the society and culture of Canada. Religious institutions and values infused popular culture in both private and public domains, and significantly shaped, throughout the period extending from the American Revolution to the "cultural revolution" of the 1960s the identities and social practices through which Canadians have lived: nationality, gender, class, ethnicity, and liberal capitalism. Because for much of its

history Canada was a colonial society, the point of reference is ‘transatlantic,’ to the experiences of European, British, and American societies.

***727 / Culture, Politics, and Society in Canada, 1939-1989/ M. Gauvreau**
This course examines the encounter of Canadians with political, social, and cultural modernity in the five decades between the onset of World War II and the failure of the Meech Lake Accord. It explores themes such as development in the wartime and postwar Canadian welfare states, the culture of the postwar family; the redefinition of youth identities in the 1950s and 1960s; the nature of postwar immigration; the origins and nature of Quebec’s Quiet Revolution; transformations within the ideology of liberalism; federalism and constitutional change; and the contested nature of Canada’s integration into a North American political and economic system.

***728/ American Foreign Relations / S. Streeter**
This seminar explores major topics in the history of the U.S. foreign relations since the late nineteenth century. Areas covered include the traditional ones, such as the War of 1898, U.S. hegemony in Latin America, U.S. intervention in the First and Second World Wars, the origins of the Cold War, the Korean and Vietnam Wars, and diplomacy in the Middle East. These subjects will be explored using conceptual approaches and analytical methods that include dependency theory, world systems, bureaucratic politics, as well as modernization theory, gender, race, cultural transfer, and critical theory.

***729 / Twentieth Century Germany / P. Swett**
This course focuses thematically on key historical debates concerning Germany in the Twentieth Century. Topics may include responses to modernity in the Kaiserreich and the crisis of modernity in the Weimar Republic. The ‘German catastrophe’ that was National Socialism will also be examined in detail as well as the struggle to come to terms with the Nazi past in the East and West.

***730 / Reseach in War and Society / Staff**
A research seminar for those wishing to continue the in-depth study of war and society.

***731/ Violence in the Early Modern World / V. Aksan**
An examination of the sources of violence in the early modern period, largely 1500-1800 with particular attention to a comparative analysis of eastern and western societies. Themes would certainly include state generated violence as in slavery, conscription, and the socio-impact of war, but also ideological, cultural and gendered sources of riots, rebellions and individual abuse.

***732 / Twentieth Century China / J. Song**
China from the end of the imperial system, through the Republic (1912-1949), the Maoist phase of the People’s Republic of China (1949-1976), to the present Post-Mao era, with emphasis on political history and revolutionary ideology.

***733 / Self and Society in the Early Middle Ages / B. Kaczynski**
The seminar will explore some key aspects of the complex and problematic transition from late Antiquity to the early Middle Ages. Topics will include the movement from paganism to Christianity, the practice of asceticism, shifting notions of the body and its place in society, changing definitions of gender, the social constructions of sanctity and sinfulness. The class will consider current debates about these issues and will give particular attention to what one historian describes as the "strategies involved in the recovery of a distant age."

****734 / Latin Epigraphy / E. Haley (cross-listed as Classics *734)***

****735 / Ancient Historiography / Staff (cross-listed as Classics *759)***

***737 / Research in Medieval History / B. Kaczynski**
The seminar follows either History 733, Self and Society in the Early Middle Ages, or History 740, Medieval Discourses of the Self, 1000-1200 *(same as English*740)*. It provides students in both seminars with an opportunity for research on a related subject.

****739 / Topics in Late Roman Republican and Early ImperialHistory / E. Haley (cross-listed as Classics *739)***

****740 / Medieval Discourses of the Self, 1000-1200 / B. Kaczynski, A. Savage (cross-listed as English*740)***
An interdisciplinary seminar, designed for students interested in a range of theoretical approaches to the past. We will examine a series of problematic medieval texts as contested sites of medieval selfhood: the Memoirs of Guibert of Nogent, the correspondence of Héloise and Abelard, the writings of Hildegard of Bingen, and Geoffrey of Monmouth's History of the Kings of Britain.

***741 / Historiography / Staff**
Designed to provide students with an intensive introduction to the major schools, approaches and sub-disciplines within the historical profession since the beginning of the century. Students will read a variety of excerpts from such historians as Bloch, Erikson, Braudel, Foucault and Vansina, in addition to older but seminal historians such as Ranke, Marx, Becher and Bury. Other issues considered include types of historical controversy; and the potential for clash between moral and intellectual responsibility where sensitive issues are involved.

742 / Early Modern England, France and Germany / M. Armstrong, B. Kaczynski
This intensive reading course introduces the graduate student to influential scholarship on Early Modern England, France and Germany between 1450 and 1700.

***743 / Topics in Soviet History / T. McDonald**
This course covers major themes in Soviet History. It will engage with the newest turns in the historiography and will cover themes such asrevolution, violence, gender, nationalism, ideology, identity, childhood, collectivization, the purges, Stalinism, and the great patriotic war.

***744 / Research in Soviet History / T. McDonald**

This course is a focused research course on an area of Soviet history chosen by the student. Students will work closely with the instructor in designing a research project. The course is designed so that each student receives maximum feedback from the instructor and from other students at each stage of his or her research and writing.

***745 / Research in Nature, Knowledge and Machines / M. Egan**

This research-oriented course engages with themes at the intersection of the histories of science, technology, and the environment.

746/ Science, Technology and Nature / M. Egan *(cross-listed as Globalization *746)

This readings course explores the historical relationships between science, technology, and the physical environment. Emphasis will be put on how knowledge and machines mediate historical understandings of nature, and how nature influences the production of science and technology.

***747 / Comparative Settlement Frontiers / J. Weaver**

This course looks at settlement policies, conflicts and accommodations with indigenous peoples, land allocation schemes, and introduced biota, and the environmental consequences of settlement. The new societies considered include the United States, Canada, Australia, New Zealand, and South Africa.

***748 / Research in Canadian History / Staff**

This course is designed to introduce students to the techniques and methods of primary research in Canadian history. Topics will vary from year to year, and the emphasis will be on encouraging students, under the supervision of the instructor, to research and write a 20-25 page (5000-6000 word) research paper.

***749 / Research in United States' History / Staff**

Students will formulate and execute a research project, producing a major, investigative paper on a topic in United States history based on extensive primary and secondary source research. The topic normally will be related to the theme of the United States reading seminar that the student completed in the first term. The course will stress the development of sound historical research and analysis practices, along with writing development and presentation skills.

***750 / Research in European History / M. Horn**

This seminar provides students with an opportunity for independent research on a topic in European history.

****751 / European/Muslim Encounters in the Pre-Modern World/ V. Aksan***
(cross-listed as Globalization *751)

This seminar will explore the historical origins and evolution of East/West (Europe/Islam) relations, concentrating on a number of themes. These may include 1) perceptions of religious difference (Christianity and Islam); 2) the narratives of warfare (crusades and jihads); 3) The

Orient and the "Turk" in European thought 17th – 19th centuries; 4) The politics and culture of eastern and western empires; and 5) Muslim encounters with the West, medieval and modern.

***752 / United States Women's and Gender History / K. Balcom**

Exploration of the best practices and current historiographical debates in the history of women and gender in the United States. The course will include historical work on the construction of masculinity and femininity, the relationship between gender roles, race relations and class identity, the growth of the American state, the evolution of American political theory and the changing status of women in American society, among other topics. The class will address the influence of postmodernism, feminist theory, and theories of narrative structure on the writing of history.

***753 / Revolutionary China, 1949-76: Maoist Utopianism, Stalinist Reality / Staff**

Chinese communist state and society during the Maoist period of the People's Republic of China, with the tension between Maoist visionary aspirations and Stalinist political and economic realities as the guiding theme.

***754 / Social and Environmental History of Modern America / K. Cruikshank**

This seminar is an introduction to some of the most interesting recent literature on the social and environmental history of the United States in the nineteenth and twentieth centuries. Topics address our understanding of industrial and urban development, nature, environmentalism, class, race, ethnicity and gender.

***755 / History, Heritage and Memory: How the Past is Used in Modern Western Culture / S. Heathorn, H.V. Nelles**

This course will explore how the past is represented and used within western societies. The focus is on the divergence between academic views and uses of the past and the role of the market, politics and popular culture in shaping and creating understandings of the past.

***756 / The World Wars / M. Horn**

Directed readings on the history of the two World Wars of the twentieth century. Among the topics that may be covered are strategy and command, war aims, intelligence, domestic politics, economic mobilization, the soldier's experience, literature on the wars, and the home front.

****757 / The British Empire and Global Integration, 1815-1960 / J. Weaver (cross-listed as Globalization *757)***

This course considers how assorted types of colonizers working within a loosely-managed empire co-opted, dispersed, and displaced subject populations and cultures, attempted to restructure established civilizations, pursued economic and strategic opportunities, moved and managed people in conjunction with plans for "improvement", diffused a language and array of ideas about law, justice and government, and distributed flora and fauna around the world.

***758 / Research on the British Empire and Anglo-American Settlement Frontiers, 1750-1900 / J. Weaver**

A seminar designed to advance skills in research and writing by requiring an original research paper and by practicing editorial and peer evaluation of these papers. Topics selected may be drawn from the history of any British colony or the United States from 1750 to 1900.

***759 / Public Health and Medicine in Nineteenth Century Canada and the United States / Staff**

This seminar explores topics in the history of public health and medicine in Canada and the United States. Topics will include: Historiography of Health and Medicine; Colonial Orthodox and Alternative Medical Practice, c. 1800; The Rise of the Hospital, 1800-1850; Health Care Professionalization, 1815-67; Urban Epidemics, 1832-1866; Public Health and the Decline of Mortality, 1850-1914; 'Scientific Medicine' and the Germ Theory of Disease, 1850-1872; Childbirth and Maternal Mortality, 1850-1900; Child Health and Welfare, 1880-1914; The Eugenics Movement, 1880-1914; the transformation of the hospital, 1880-1914.

***760 / History of Psychiatry, 1760-1960 / Staff**

This reading seminar explores topics in the history of psychiatry and mental health in Canada, United States, and Britain.

****761 / Themes in the History of the Post-Slavery African Diaspora / J. De Barros (cross-listed as Globalization *761)***

This seminar examines the social, political, and cultural changes following the end of slavery in the post-slavery African Diaspora. Particular attention will be paid to the significance of gender, race, and class in the creation of new social and national identities.

***762 / Research in Topics in Atlantic History / J. De Barros**

This course examines various topics in the history of the Atlantic World, from the sixteenth to the early twentieth centuries.

***763 / Research in the History of Modern Africa / B. Ibhawoh**

A study of historical research methodology and historiography relating to African History.

****764 / Global Power, Local Cultures: Comparative Colonialisms in Africa / B. Ibhawoh (cross-listed as Globalization *764)***

A comparative study of the processes by which imperial global power and local responses shaped the political, economic and cultural history of Africa in the late 19th and 20th centuries.

***765 / Canadian Sport History / N. Bouchier**

This seminar explores sport in Canada, focusing on its importance in the lives of Canadians and its complex role in larger processes of cultural and economic production. It investigates the connection of sport to broader themes in Canadian history, such as social class, ethnic, civic, and gendered identity formation, the capitalist economy, popular culture, discourses about respectability, ideas of social capital, and nation building.

766 / Imperialism and Medicine / Staff (cross-listed as Globalization *768)
Empire and modern medicine are both independently acknowledged as having played an important part in shaping our contemporary world. Indeed, in many ways, they continue to do so. Instead of studying them separately, this course explores how these two important institutions of modern world history were related to each other and the legacies that their relationship left behind.

***767 / War and Society in East Asian History / J. Song**
An in-depth topically arranged inquiry into various forms of armed conflict in East Asian history.

***768 / Canadian Gender History / R. A. Frager, N. Bouchier**
Focusing mainly on the nineteenth and twentieth centuries, this course examines the historical development of gender roles within a wide range of Canadian groups, while investigating the significance of changes and continuities in these roles. Canadian gender history will be examined in the context of key works in the development of gender history more broadly.

***797 / M.A. Project Course (Master's Research Paper) / Staff**
A research paper of approximately 30 pages of text (8,000 – 10,000 words), exclusive of footnotes and bibliography, under the supervision of a History faculty member. The paper is due the first week of August.

798 / Ph.D. Specialized Reading course / Staff
A compulsory course for Ph.D. students. This reading course covers the major themes and contextual background for each Ph.D. candidate's dissertation research. Each Ph.D. candidate will work out the precise content of the course with their supervisor. A second instructor will be assigned to assist in guiding and evaluating the course and the candidate. The course also prepares the candidate for their comprehensive examination.

KINESIOLOGY

The M.Sc. and Ph.D. programs in Kinesiology are offered in the Department of Kinesiology.

Enquiries: 905 525-9140 Ext. 23582
Fax: 905 523-6011
Website: http://www.mcmaster.ca/kinesiology

Faculty / Fall 2012

PROFESSORS
Martin Gibala, B.H.K. (Windsor), M.Sc. (McMaster), Ph.D. (Guelph)/ Chair
Audrey Hicks, B.P.E., M.Sc., Ph.D. (McMaster)
Timothy D. Lee, B.H.K.., M.A. (Windsor), Ph.D. (Louisiana State)
Maureen J. MacDonald, B.Sc. (Acadia), M.Sc., Ph.D. (Waterloo)
Kathleen Martin Ginis, B.Sc. (Toronto), M.A. (Western), Ph.D. (Waterloo)
Stuart Phillips, B.Sc., M.Sc. (McMaster), Ph.D. (Waterloo)/ Director, Graduate Program

ASSOCIATE PROFESSORS
Steven Bray, B.A., M.A. (Western), Ph.D. (Waterloo)
Peter J. Keir, B.Sc., Ph.D. (Waterloo)
Jim Lyons, B.A., M.Sc. (McMaster), Ph.D. (Simon Fraser)
Gianni Parise, B.Kin., M.Sc., Ph.D. (McMaster) / joint appointment with Medical Physics and Radiation Sciences
James R. Potvin, B.H.K. (Windsor), M.Sc., Ph.D. (Waterloo)

ASSOCIATE MEMBERS
N. Bouchier (History)
John Cairney (Family Medicine)
V. Galea (Rehabilitation Science)
L. Grierson (Family Medicine)
D. Kumbhare (Medicine)
M. Maly (Rehabilitation Science)
N. MacIntyre (Rehabilitation Science)
R. McKelvie (Medicine)
M. Pierrynowski (Rehabilitation Science)
M. Tarnopolsky (Medicine)
B. Timmons (Pediatrics)
L. Wishart (Rehabilitation Science)

ADJUNCT MEMBERS
Andrea Buchholz, B.A.A. (Ryerson), M.Sc. (Guelph), Ph.D. (Toronto)
David Ditor, B.A. (Western), M.Sc., Ph.D. (McMaster)
Lora Giangregorio, B.Sc. (Waterloo), Ph.D. (McMaster)
Marina Mourtzakis, B.Sc., B. Kin. (McMaster), Ph.D. (Guelph)
Philip Wilson, B.Sc. (UNC-Greensboro), M.Sc. (North Dakota),Ph.D. (Alberta)

PROFESSORS EMERITI
Digby Elliott, B.Sc., M.Sc., Ph.D. (Waterloo)
Neil McCartney, B.Ed. (Exeter), Ph.D. (McMaster)

M.Sc. Degree

The Department of Kinesiology offers a program leading to an M.Sc. degree. The program is primarily research oriented and offers opportunities for study in human performance physiology, exercise rehabilitation, exercise psychology, psychomotor behaviour, biomechanics, and motor control. One emphasis of the program is research related to the problems encountered by a variety of populations during physical activity and to the adaptation of human movement to meet the special requirements of these populations. There is close collaboration with faculty members in Health Sciences, Engineering, Physiotherapy, and Psychology.

A candidate for the M.Sc. degree must fulfill the general regulations of the School of Graduate Studies. An honours baccalaureate degree in kinesiology, physical education, or some related field of study in science, social sciences, or allied health profession program with at least B+ standing (equivalent to a McMaster GPA of 8.5) is generally required for consideration of admission.

Graduate Academic Requirements

M.Sc. Degree

A candidate for Master’s studies is required to complete, with at least a B minus standing, the following half courses:

- KIN *701, one unit of KIN *702

- plus two courses from the following selection:
    - *704, *705, *707, *708, *709, *711, *712, *715, *717, *718, *719, *720, *721

In consultation with their advisor, and with the approval of the Department of Kinesiology, the candidate may substitute one of his/her two KIN electives with an elective offered outside the Department of Kinesiology. Additional electives in departments other than the Department of Kinesiology will be determined in consultation with the advisor. It may also be necessary for certain candidates to take additional courses should their advisor and/or thesis supervisory committee members deem it necessary. A thesis is required. KIN *702 cannot be taken more than once.

Ph.D. Degree

Candidates for doctoral studies:

- must have a Master's degree (thesis) in Kinesiology or a related field of study with, at least, the minimum course experience of our M.Sc. graduates (i.e., 4 courses)
    - at entry to the program, or
    - by the completion of their first 9 months of doctoral study

- are required to complete successfully, 2 additional half courses, one being KIN *714

- in addition, other courses may be recommended by the candidate's advisor and/or supervisory committee

All graduate students are expected to maintain an attendance record of 75% for Kinesiology's Departmental Seminar Series while in the program.

Ph.D. candidates must also complete:

i) Comprehensive Exams

Candidates for the Ph.D. degree are expected to complete their comprehensive examination within the first 18-24 months of the program. The examination will be on a topic that is independent of the student's thesis area. The specific topic of the comprehensive examination will be determined by the candidate and their supervisory committee. An examination committee consisting of 3 members, one of whom (other than the supervisor) may be on the student's supervisory committee will submit questions relating to 3 sub-topics of the main topic area, the sub-topics collectively addressing basic and applied aspects of the main topic and one relating to a special population. The comprehensive examination will consist of a written and oral component. The written component will consist of 3 questions, one from each examiner, covering the basic, applied and special population aspects of the main topic. The examination will cover material from a selected set of readings provided to the student 8 weeks in advance of the exam date. The written examination will be completed within a single working day in a closed-book format. The student will advance to the oral examination stage within one week of the written exam date, if two of the written answers are deemed acceptable by the examination committee. If this timeframe cannot be adhered to, petition must be made to the department's Associate Chair, Graduate Program for special allowances. Following the oral examination, examiners will provide a single grade of fail (F), pass (P) or pass with distinction (P+) for the student's combined written and oral answers to each question. The student will be deemed to have passed the comprehensive examination if he/she obtains a pass (P) on all three questions during the oral examination. A pass with distinction will require P+ grades on each of the three examination questions at both the written and oral examinations. Students who fail (fewer than two acceptable answers) at either the written or oral stages of the examination process will be given a second opportunity according to the Policy and Regulations set out by the School of Graduate Studies.

ii) Thesis

It is expected that the Ph.D. candidate will be actively involved in research throughout the program. Therefore, the thesis may not be characterized in the traditional sense where a committee approves a research proposal, the student conducts the research and prepares the written work for oral defense. Rather, the thesis may involve a collection of completed research efforts, some of which may have been presented at conferences and/or published prior to the oral defense. The thesis proposal meeting will be in the form of an open presentation by the candidate that summarizes the current state of research in the field, the candidate's research to date in this area, and a defense of the proposed research. Decisions regarding the quantity of research to comprise the thesis and the format of the written document will be made by the candidate's supervisory committee.

Courses

All courses are half courses. Courses marked with a plus sign (+) may differ in content from term to term.

***701 / Inquiry and Research in Physical Activity / Faculty**
Detailed review and appraisal of common research procedures; application of statistical techniques, evaluation procedures and experimental methods in current use in the investigation of human movement.

***702 / Individual Research Study in Selected Topics / Graduate Faculty**
Selected research projects in kinesiology assigned according to student research interests and needs. This course cannot be taken more than once.

***704 / Cardiovascular Regulation in Exercise / M. MacDonald**
This course will examine central and peripheral cardiovascular interactions during exercise. Focuses of the course will be the control of muscle blood flow, the role of the vascular endothelium and cardiovascular control reflexes in exercise.

***705 / Motor Behaviour / T. Lee, J. Lyons**
Selected topics in motor learning and control are investigated. Two or three different topics are usually studied in detail.

***707 / Cognitive Dysfunction and Perceptual-MotorPerformance / TBA**
An examination of developmental and acquired cognitive handicaps particularly as they relate to the learning and control of voluntary movement.An introduction to a neuropsychological approach to movement pathology.

***708 / Biomechanics / J. Dowling, J. Potvin**
Examination of issues involved in quantification and interpretation of effects and control of forces that act on and are produced by the human body. Topics include: whole body motion data collection and signal processing, biomechanical information content of electromyograms, human movement efficiency, modeling and muscle mechanics.

***709 / Neuromuscular Function in Aging and Disease / A. Hicks**
In-depth study of the neuromuscular system and the changes which occur during aging and in certain pathological conditions. The course will be divided into three sections. Part A: General overview of the human neuromuscular system; and laboratory techniques for assessment of neuromuscular function. Part B: The aging neuromuscular system; and the effects of physical activity (inactivity), and training. Part C: Neuro-muscular changes in various myopathies and neuropathies; and the role of exercise intervention.

***711 / Motor Control / R. Balasubramaniam**
This course is designed to give a comprehensive overview of human sensorimotor control research. The course will cover neurophysiological, computational and cognitive approaches to the study of problems in human motor control. The goal of this course is to prepare the student for conducting research in motor control neuroscience with a thorough overview of the literature, methodologies and debates in the field. Applications for motor learning and functional rehabilitation will also be discussed.

***712 / Skeletal Muscle Metabolism / M.J. Gibala**
This course will examine in detail the regulation of carbohydrate, lipid and amino acid metabolism in human skeletal muscle. Emphasis will be placed on the manner by which metabolic pathways operate to meet the energy demands of the muscle cell during rest and exercise (dynamic and resistive), and adaptations which occur in response to physical training. The role of the liver, adipose tissue, endocrine and circulatory systems will be considered when relevant, as well as the investigative techniques employed in human research studies.

***713 / Directed Readings in Kinesiology / Graduate Faculty**
This course is for Ph.D. candidates only and is designed as an advanced reading course in an area of kinesiology related to performance in healthy individuals. A course outline must be submitted to the Graduate Coordinator in the Department of Kinesiology.

***714 / Directed Readings in Kinesiology's Special Populations / Graduate Faculty**
This course is for Ph.D. candidates only and is designed as an advanced reading course in an area of kinesiology related to performance in individuals from special populations. A course outline must be submitted to the Graduate Coordinator in the Department of Kinesiology. Candidates will be required to prepare a research grant proposal as part of the evaluation in this course.

***715 / Foundations of Health and Exercise Psychology/ K. Martin Ginis, S. Bray**
An introduction to theories, measures, and methodologies typically used in health and exercise psychology research. Students will learn to critically evaluate and apply key principles.

***717 / Exercise Psychology: Applications to Chronic Diseaseand Disability / K. Martin Ginis, S. Bray**
A seminar course that examines exercise psychology principals as they apply to preventing disease and disability, and promoting well-being in chronically ill populations. Topics include quality of life, disease self-management, and exercise promotion.
Prerequisite: KIN *715

***718 / Human Factors / J. Lyons**
This course will provide an in-depth examination of the theoretical issues and practical applications surrounding research in Human Factors and Cognitive Ergonomics. Particular emphasis will be placed on current research that deals with understanding the relevance of human-information processing and human-machine interface models for ergonomic design, developing functional skills for the ergonomic assessment of products and human-machine systems, and developing an understanding of the fundamental requirements of conducting an ergonomic analysis of a work environment.

***719 / Topics in Molecular and Cellular Exercise Physiology / G. Parise**
This course will explore current and emerging topics in exercise physiology from a molecular and cellular perspective. Relevant molecular processes such as pre-transcriptional regulation of gene expression, molecular regulation of muscle satellite cells and adult muscle stem cells, inter and intra-cellular signaling for muscle adaptation, and necrosis and apoptosis in muscle will be examined. Relevant molecular events associated with muscle aging will also be explored.

***720 / Social and Psychobiological Factors in Health and Exercise Psychology / S. Bray, K. Martin Ginis**
Physical activity is linked to numerous physiological and psychological benefits, yet the populations of industrialized nations are becoming increasingly sedentary. This course will explore empirical findings and methods examining mental health issues linked to physical activity participation including affective disorders and cognitive functioning as well as underlying biological processes theorized to account for these effects. The role of interpersonal forces and their interaction with behavioural and psychophysiological pathways to health-related outcomes will also be examined. Prerequisite: KIN *715

***721 / Human Muscle Protein Metabolism / S. Phillips**
An in-depth analysis of how physical activity affects skeletal muscle protein metabolism in humans. Examination of genetic and protein metabolic changes that underpin phenotypic changes in skeletal muscle with physical activity and other conditions namely disease and dietary change.

***722 / Advances in Biomechanics and Electromyography / P. Keir**
This course will survey the biomechanics and electromyography literature from past to present to put recent advances in perspective and provide a solid grounding. Classic landmark studies in link segment modelling, muscle mechanics, and electromyography will provide the basis for developing technologies and current research areas. The myoelectric signal will be examined from its development (physiology) and techniques to monitor changes with force, muscle length, velocity and fatigue will be examined.

MANUFACTURING ENGINEERING

The Walter G. Booth School of Engineering Practice offers complete facilities to students seeking the Master of Engineering in Manufacturing Engineering (M.E.M.E.) degree.

Enquiries: 905-525-9140 Ext. 26566
E-mail: manufacturing@mcmaster.ca
Fax: 905-528-7901
Website: http://manufacturing.mcmaster.ca/

Faculty / Fall 2012

ASSOCIATE PROFESSOR
Michael R. Thompson, B.Sc., B.Eng., M.Eng., (McMaster), Ph.D. (Waterloo) P. Eng. / Director, M.Eng. in Manufacturing Engineering

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The Master of Engineering in Manufacturing Engineering is a one-year program aimed at highly motivated students seeking advanced training in the broad area of Manufacturing. Application for admission to the program may be made through the Walter G. Booth School of Engineering Practice.

Successful applicants will be placed in the appropriate department of the Faculty of Engineering depending on the student's area of technical interest. In addition to the general requirements for entry into a graduate program in Engineering, students must hold an Honours Bachelor's degree in Engineering with at least a B average (equivalent to a McMaster 8.0/12 GPA) in the penultimate and final years. An accelerated option for the program is available to McMaster engineering undergraduates.

Delivery of the program includes a strong emphasis on project-based experience within the Manufacturing Industry, which is obtained through a blend of industrial work experience and an industry-based project during the coursework portion of the program. Requirements for these are outlined below. Due to the strong practical orientation of the experiential and project components of the program, successful completion requires that students have strong interpersonal and communication skills. To this end, each applicant will be interviewed. A strong performance in the interview is a critical requirement for admission.

The program accepts full-time and part-time students. The program is normally expected to take one year of study for students able to enroll full-time and having completed the accelerated option during undergraduate enrollment at McMaster. This student would enroll in May and have minimal industrial experience. The program would normally comprise eight months of study for student enrolling in September with more extensive industrial experience.

Work Experience

Manufacturing-based employment experience is a critical component of the program. All candidates must successfully complete a minimum of eight months of industrial work experience, of which a minimum of four months must be obtained at the graduate (i.e. post baccalaureate) level. Any applicants with a minimum of four months of appropriate undergraduate work experience will be required to apply for admission to the program in May with the objective of obtaining the required graduate level employment experience prior to the start of classes in September. Obtaining employment in an appropriate setting will be facilitated by McMaster's Engineering Co-op and Career Services (ECCS). Applicants should note that suitable employment is not guaranteed and that the onus is on the student to find suitable employment. The suitability of non-ECCS derived employment should be discussed with the program Director. Applicants with a minimum of one year of post baccalaureate manufacturing-related industrial experience will normally apply for admission into the program in September. The appropriateness of this employment experience will be judged by information provided to the program Director during the application process. Students must write a suitable report on project work undertaken during the graduate work experience as part of the compulsory course MANUF 700.

Accelerated Option

This option is only available to students currently enrolled at McMaster as undergraduate engineering students in the Departments of Chemical Engineering, Materials Science and Engineering, and Mechanical Engineering. In exceptional circumstances, students from other Engineering departments may apply for entry into the accelerated option by contacting the program Director. Application for entry into the accelerated option occurs in the fall semester of the penultimate year of undergraduate studies. Applicants must have maintained a minimum CGPA of 8.0 for their undergraduate course work and successfully passed the interview with the program Director for admission into the accelerated option. The accelerated option allows students to gain specific industrial experience in the manufacturing industry through a minimum four month work experience (facilitated through ECCS) and to complete two 600 level manufacturing-related courses in their final undergraduate year which will be counted towards their M. Eng. degree requirements. Completion of the requirements for the accelerated option are embodied in completion of the course ENG 4F00. Completion of this course along with meeting all of the other admissions criteria will result in a favourable recommendation by the program Director to the School of Graduate Studies for admission into the M. Eng. in Manufacturing Engineering program.

Project

Students must complete a suitable industry-based project. Projects will normally be performed by groups of two to three students and will ideally be multi-disciplinary in nature. Projects should address a specific problem found in a manufacturing facility. It is expected that the majority of the projects will be developed from work undertaken during the graduate employment experience and students should look for opportunities to develop projects with their employers. Students are also encouraged to develop their own ideas and find industrial sponsors. Identification of this project is the responsibility of the student and must be provided to the program director at the time of applying to the program. Project groups will have an industry-based supervisor (stakeholder) with whom the student team can discuss progress, arrange trials etc.. Students will also have an academic supervisor who will normally have some expertise in the subject area. It is expected that the teams will meet with their supervisors on a regular basis to discuss their progress.

Projects will have three "tollgate" stages. Student groups must submit a project proposal by the end of September to their academic and industrial supervisors for approval of scope, deliverables and timeline. The interim project report, outlining progress-to-date, is due at the end of the fall semester for approval by the academic and industrial supervisors. The final written project report is normally due at the end of the winter semester. However, if the supervisors agree that the project group has not made sufficient progress by this point, they are free to request further work to meet the standards of the program. The project team will orally defend their final project report to an examination board comprised of their industrial supervisor, academic supervisor and program Director (Chair) or designate.

Courses

Students must complete two compulsory full-year courses, one compulsory one-term (half) course and five option half courses or the equivalent combination of half-term (quarter) and half courses.

Half courses are marked with an asterisk (*) and quarter courses are marked with a pound sign (#). Students should note that not all option courses are offered every year.

Compulsory Courses:

MANUF 700 / Work Term Report
MANUF 701 / Project
MECH ENG *729 / Manufacturing Systems (or equivalent as determined by the program director)

MANUF 700 / Work Term Report
Work term report for graduate work term experience or equivalent, to be approved by their industrial supervisor(s). Report to be submitted by the end of September. Attendance at Manufacturing-related guest seminars and organised industry tours.Seminar to be given on M.Eng. project at the end of the academic year. All elements assessed on a Pass/Fail basis.
Terms 1 and 2
Prerequisite: Enrolment in the M. Eng. Manufacturing Engineering program

MANUF 701 / Project
Industry-based multi-disciplinary project. Course elements are: project proposal (end of September), mid-year report (mid-December) and final report which will be examined orally. Evaluated on a Pass/Fail basis. Terms 1 and 2
Prerequisite: Enrolment in the M.Eng. Manufacturing Engineering program

Option Courses

Students who did not complete the Accelerated Option will select any combination from the list below totaling two and a half courses, of which a maximum of two half courses can be taken at the 600 level. Students who completed the Accelerated Option must select any combination of courses totaling one and a half courses, all of which must be at the 700 level. Other manufacturing-related courses may be substituted with permission of the Director. Note that not all courses are offered every year.

Chemical Engineering
***6B03 /** Polymer Reaction Engineering
***6C03 /** Statistics for Engineers
***6E03 /** Digital Computer Process Control
***6X03 /** Polymer Processing
***6Z03/** Interfacial Engineering
***742 /** Membrane Based Bioseparations
***752 /** Optimization of Chemical Processes
***761 /** Multivariable, Stochastic and Adaptive Control of Chemical Processes
***764 /** Process Control Design
***765 /** Multivariate Statistical Methods for Process Analysis and Monitoring
***770 /** Selected Topics in Polymer Science and Engineering
***772 /** Polymer Rheology
***773 /** Advanced Concepts of Polymer Extrusion
***774 /** Advances in Polymeric Materials

Materials Science and Engineering
***6C03 /** Modern Iron and Steelmaking
***6D03 /** Materials and the Environment
***6H03 /** Thin Film Science and Engineering
***6I03 /** Sustainable Manufacturing Processes
***6P03 /** Properties of Polymeric Materials
***6R03 /** Ceramic Science
***6T03 /** Properties and Processing of Composites
#740 / Interfacial Phenomenon in Materials Science
#743 / Selected Topics in Oxidation and Corrosion
#754 / Fracture Mechanics
#755 / Deformation of Crystalline Solids
***760 /** Electronic Materials

#765 / Selected Topics in Polymer Science and Engineering
#771 / Principles of Heterogeneous Kinetics
#773 / Properties of Metallurgical Slags
#774 / Injection Metallurgy
#775 / Physical and Mathematical Modeling of Materials Processing

Mechanical Engineering
***6K03 /** Robotics
***6L03 /** Industrial Design
***6Q03 /** Mechanical Vibrations
***6T03 /** Finite Element Applications
***6Z03 /** CAD/CAM/CAE
***702 /** Advanced Dynamics of Machines
***705 /** Advanced Finite Element Analysis
***710 /** Machine Tool Analysis
***714 /** Solidification Processing
***724 /** Solid and Surface Modeling Techniques
***728 /** Manufacturing Processes I
***734 /** Theory of Plasticity
***738 /** Manufacturing Processes II
***743 /** Advanced Mechatronics
***751 /** Advanced Mechanical Engineering Control Systems
***752 /** Advanced MEMS Fabrication and Microfluidics

MATERIALS SCIENCE AND ENGINEERING

Candidates may be accepted for graduate work leading to the M.Sc. degree in Materials Science, and to the M.A.Sc. degree in Materials Engineering on a regular or part-time basis, or for the Ph.D. degree in Materials Science, or Materials Engineering.

Enquiries: 905 525-9140 Ext. 24295
Website: http://materials.mcmaster.ca

Faculty / Fall 2012

DISTINGUISHED UNIVERSITY PROFESSORS
J.D. Embury, B.Sc. (Manchester), Ph.D. (Cambridge), P.Eng., F.R.S.C., Member NAE / Emeritus
G.R. Purdy, M.Sc. (Alberta), Ph.D. (McMaster), D.H.C. (Grenoble), F.C.I.M., F.A.S.M., F.T.M.S., F.R.S.C., P.Eng. / Emeritus
D.S. Wilkinson, M.A.Sc. (Toronto), Ph.D. (Cambridge), F.C.I.M., F.A.Cer.S., P.Eng.

PROFESSORS
G. Botton, B.Eng., Ph.D. (École Polytechnique de Montreal)
K.S. Coley, B.Sc. (Strathclyde), Ph.D., D.I.C. (Imperial College, London)
J. J. Hoyt, B.Sc. (Cornell), M.Sc., Ph.D. (Berkeley)
G.A. Irons, B.A.Sc. (Toronto), M.Sc., Ph.D. (McGill), F.C.I.M., P.Eng. / Dofasco Chair in Ferrous Metallurgy
A. Kitai, B.Eng. (McMaster), Ph.D. (Cornell), P.Eng. / Joint appointment with Engineering Physics
D.V. Malakhov, B.Sc. (Moscow), Ph.D. (Novosibirsk, Russia)
M. Niewczas, M.Sci., M.Sc., Ph.D. (Krakow)
A. Petric, M.A.Sc. (Toronto), Ph.D. (ÉcolePolytechnique), P.Eng.
N. Provatas, M.Sc., Ph.D. (McGill)
G. Xu, M.Sc., Ph.D. (Pittsburgh), D.E.S. (Columbia)
I. Zhitomirsky, M.Sc. (Kalinin), Ph.D. (Moscow)

ASSOCIATE PROFESSORS
J. Kish, B.Eng., Ph.D. (McMaster)
H. Zurob, B.Eng., Ph.D. (McMaster)

ASSISTANT PROFESSOR
B. Gault, B.Sc. (Paris), M.Sc., Ph.D. (Roven, France)

ASSOCIATE MEMBERS
J. McDermid (Mechanical Engineering)
C. Swartz (Chemical Engineering)

The general requirements of the School of Graduate Studies must be met by all candidates. Additional departmental requirements are described in the following paragraphs.

All of the graduate degree programs in this Department involve course work, comprehensive examinations and research leading to a thesis.

All graduate students must attend seminars arranged by the Department, including the external seminar program, as well as the student seminar series organized as part of *701 and *702.

M.A.Sc. or M.Sc. Degree

All candidates for the M.Sc. in Materials Science and the M.A.Sc. in Materials Engineering must complete satisfactorily no fewer than two full courses of which no more than a half course may be at the 600-level. All students must complete *701, Graduate Seminar (Master's), as part of these course requirements. All candidates must present a thesis, which embodies the results of original research. It is anticipated that about seventy-five percent of the candidate's effort will be devoted to the research problem on which the thesis is based.

Students wishing to be transferred to the Ph.D. program prior to the completion of the Master's degree (see section 2.1.2 of the General Regulations of the Graduate School) must submit a Transfer Report, embodying a statement of progress and achievement in the research to date and a proposal for Ph.D. research. The Transfer Report must be submitted to the Department Chair not later than the completion of five terms after initial registration in the Master's program. Approval to transfer will be determined through an oral examination.

Ph.D. Degree

A candidate for the Ph.D. degree in Materials Science or Materials Engineering will be required to complete not fewer than four full courses beyond the bachelor's degree. This includes the course requirements listed for the M.A.Sc. or M.Sc. programs, plus two additional full courses at the 700-level. Students must complete the Graduate Seminar courses, *701 or equivalent and *702, as part of these course requirements.

Students entering the Ph.D. program with a Master's degree or promoted from the Master's program are required to complete not fewer than two full courses at the 700-level. These students must complete *702, Graduate Seminar (Ph.D.), as part of these course requirements.

Students are encouraged to select some of their courses from areas beyond the focus of their research, including courses offered by other departments. It is expected that the student may also be required to take courses in addition to the prescribed courses for graduate credit. These may be at either the undergraduate or graduate level. Students who enrol directly into the Department's Ph.D. program will submit a written proposal for their research program after one year, but less than 16 months. Their supervisory committee, augmented by two other members, at least one of which should be from the department, will give a critical review and examine the student on material contained in or related to the proposal.

The Ph.D. Comprehensive Examination will be in two parts. Part I will cover, at the undergraduate level, topics central to materials science and engineering. Credit for this part will be given to a candidate who has successfully completed the comprehensive examination previously required of M.Sc. and M.A.Sc. students. Part II will test the candidate's knowledge at an advanced level. Candidates will be expected to show the greatest depth of knowledge in their field of research but will also be expected to demonstrate knowledge of fields related to their areas of specialization. Part II must be completed within two years of entry into a Ph.D. program at McMaster.

Candidates are expected to begin their thesis research soon after registering for Ph.D. studies. Candidates will be required to submit a thesis which embodies the results of original research and to defend the thesis in the Final Oral Examination.

There are opportunities to take courses from visiting and adjunct professors and for part of the research to be conducted at other universities that collaborate with various faculty in the department.

Courses

Many of the 700-level courses offered by the Department are quarter course modules. These are identified by a pound (#) sign and are offered in 6 week slots. Half courses are identified by an asterisk (*) and last one term (approximately 12 weeks). The course structure is designed so that most courses are available on a two-year basis, subject to student demand and faculty resources. Some courses are offered every year. Students should select a program of study in consultation with their faculty supervisor and be aware of the prerequisite requirements of some courses.

The following courses, which are available to senior undergraduate students, are also offered for graduate credit at the M.Sc. and M.Eng. level only. Graduate students taking these courses are regularly required to do extra course work beyond that required of undergraduates in the 400-level course.

***6AA3 / Computational Thermodynamics / D. Malakhov**
Thermodynamic modelling.Principles of computational thermodynamics and its applications.Thermo-Calc. Fortran programming.

***6C03 / Modern Iron and Steelmaking / K.S. Coley, G.A. Irons**
Theory and practice of ironmaking. Heat and material balances, ironmaking reactors, raw materials, direct reduction and new processes. Thermodynamics and kinetics of steelmaking.Hot metal treatment; static and dynamic process control; deoxidation; casting; specialty steelmaking; inclusion engineering.

***6D03 / Materials and the Environment**
The oxidation of metals and alloys; electrochemical principles and methods applied to aqueous corrosion and its control.

****6E04 / Computational Modeling of Microstructure Formation / N. Provatas (cross-listed as Computational Science and Engineering *6E04)***
Introduction to explicit and implicit finite difference and finite element simulation techniques for PDE's used in materials science and engineering.Applications to microstructure formation, reaction-diffusion kinetics and interface dynamics.Introduction to parallel methods. Course evaluation will be based on a term project.

***6F03 / Synthesis and Applications of Nanomaterials / G. Botton**
Review of methods of synthesis of nanoscale materials approaches (bottom-up and top down), review of the fundamental properties of nanoscale materials (thermodynamic, mechanical, optical, electronic). Discussion and presentations on many of the applications of these materials in fields of mechanical properties, energy storage, electronic and magnetic, optical, etc.

***6G03 / Characterization of Nanomaterials**
Interaction of electrons and photons with matter. Imaging methods with electron microscopy, scanning probe techniques, x-ray photoelectron spectroscopy and x-ray absorption analysis with high spatial resolution.

***6H03 / Thin Film Science and Engineering / I. Zhitomirsky**
Deposition and fabrication techniques, surfaces, growth mechanisms, epitaxy, defects, kinetic effects in thin films, materials science aspects, applications and properties of thin films.

****6I03 / Sustainable Manufacturing Processes / G.A. Irons (cross-listed as SEP *6I03)***
Sustainable development, materials cycles, methods for measuring environmental impact, life cycle analysis, waste treatment and recycling technologies.

***6NN3 / Computational Modeling in Materials Engineering / N. Provatas**
Numerical methods are introduced and used to model selected problems in materials science involving mass transfer, molecular dynamics and electronic properties.

***6P03 / Properties of Polymeric Materials / G. Xu**
Structure of amorphous and crystalline polymeric materials; mechanical, electrical and optical properties and their modification through processing.

***6R03 / Ceramic Science / Staff**
Microstructural development and properties of traditional ceramics.Acidic, basic, neutral and nonoxidizing refractories; ferro-electric, piezo-electric and ferromagnetic ceramics; super-ionic and structural ceramics.

***6T03 / Properties and Processing of Composites**

This course is intended to provide students with the knowledge related to the structure and properties of a range of composite materials systems. Topics include micromechanics of composites, intrinsic properties of matrix materials and reinforcements; elements of the mechanics and thermodynamics of interfaces; fabrication of composites materials, modelling of physical properties of composites with the emphasis on mechanical properties, thermal properties and electrical conductivities using Eshelby method. Recent developments in composite materials systems will also be covered.

ENG *6T04 / Materials Selection in Design and Manufacturing / J. McDermid

Materials selection charts, materials selection with mechanical constraints, coupled materials selection and processing/fabrication routes, effect of microscopic and macroscopic shape of materials selection, design of hybrid materials, eco-selection.

The following courses are offered for graduate credit only:

***701 / Graduate Seminar (Master's)**

Each student is required to prepare and present a major seminar, based upon extensive research work and literature surveys, on any topic of current research interest in Materials Science and Engineering. A grade will be assessed based on overall performance in the course.

***702 / Graduate Seminar (Ph.D.)**

Each student is required to prepare and present major seminars, based upon extensive research work and literature surveys, in areas related to their current research. A grade will be assessed based on overall performance in the course.

<u>Thermodynamics and Kinetics</u>

***711 / Advanced Thermodynamics / Staff**

Solution thermodynamics including gas, liquid and solid equilibria. A background in basic thermodynamics of solid state systems is required.

***712 / Phase Transformations / J.J. Hoyt**

Diffusion in binary and ternary systems. Selected topics in phase transformations including: nucleation and growth phenomena; diffusionless transformations; morphological development, control and instability; influence of defects on transformations.

***713 / Computational Thermodynamics / D.V. Malakhov**

Scientific heritage of J.W. Gibbs.Lattice stabilities.Reference states. Thermodynamic models of phases including sublattice model, quasi-chemical model, associated solutions, partially ionic liquids, etc. and their application to metallic systems, oxides, salts and aqueous solutions. Usage of structural information for choosing a proper phase model.Calculation of equilibrium in gaseous systems.Magnetic contribution to the Gibbs energy.Order-disorder transformations and their modeling.Thermodynamic principles hidden behind phase diagrams.Driving forces for the onset of precipitation.Isonucleation diagrams. Thermo-Calc and TQ interface. Simultaneous treatment of heterogeneous experimental information (CALPHAD method).Fortran 90/95 programming.

#714 / Phase Field Methods in Microstructure Modeling /N. Provatas
The course examines microstructure formation in pure materials and alloys. We begin with an examination of sharp interface kinetics used to describe Diffusion controlled free-boundary evolution in phase transformations. We will then use statistical thermodynamics to motivate the development of basic phase field models relevant to solidification and solid-state microstructure evolution. Finally, we study numerical algorithms for simulating basic phase field equations.

Defects in Solids

***720 / Point Defects and Materials Behaviour / Staff**
An analysis of the point defects equilibria including vacancies, interstitials and substitutional atoms. Experimental techniques for their determination, Krüger-Vink diagrams, ionic conductivity/defect concentration relations.Their role in the deformation of metals, radiation damage, embrittlement, cold-working and hardening; concepts and practice.

Materials Characterization

#731 / Introduction to Electron Microscopy / G. Botton
(cross-listed as Biomedical Engineering #731)
Electron sources, optics, development of scanning, transmission and scanning-transmission electron microscopes. Electron-solid interactions, production of secondary electrons, x-rays. Diffraction theory, energy loss processes.

#732 / Analytical Electron Microscopy / G. Botton
(cross-listed as Biomedical Engineering #732)
Comparison of analytical techniques, low voltage and environmental SEM. Convergent beam diffraction methods, microanalysis in the TEM with EDS and EELS. High resolution TEM, high angle dark-field methods, EELS near-edge structure analysis.

#733 / Materials Characterization by Electron Microscopy / G. De Silveira
Materials Characterization by Electron Microscopy is intended as an introduction to the theory, physical and operating principles of scanning electron miscroscopy, focused ion beam microscopy and spectroscopy techniques. It provides students with competence in the characterization of a wide variety of conductive and non-conductive nano-scale materials, which is further developed with hands-on assistance during the graduate research project.

Surfaces and Interfaces

#740 / Interfacial Phenomenon in Materials Science / J. McDermid
Introduction to interfaces including free surfaces, grain boundaries and coherent and incoherent precipitate interfaces.Introduction to surface analysis techniques such as scanning Auger microscopy, X-ray photoelectron spectroscopy and secondary ion mass spectroscopy. Interfacial chemistry including adsorption isotherms, wetting of solid interfaces by liquids and solid/vapour interfaces. Interfacial phenomenon including segregation, formation of secondary phases and interfacial reaction phases, role of interfaces in creep, corrosion phenomenon, interfacial cohesion and the role of crystallographic anisotropy. Course evaluation will be based on assignments and a term project.

***743 / Advanced Topics in corrosion Science and Engineering / J.R. Kish**
A fundamental discussion on the structure of electrified interfaces, dynamic electrochemistry, mixed potential theory, mass transport,passivity, and corrosion measurement techniques. A selection of problems (with worked solutions) and research topics will be provided to clarify the electrochemical theories of corrosion and methods for corrosion control and protection.

#780 / Metallic and Non-metallic Coatings / J. McDermid
Electrochemical basis of metallic coating protection systems, governing phase equilibria in metallic coating systems, gas/metal reactions, reactive wetting at interfaces, microstructural development of metallic coating systems on ferrous substrates, non-metallic and composite coatings, engineering properties and practical applications of coating systems.

Mechanical Behaviour of Solids

#751 / Effect of Length Scale on Mechanical Behaviour/ D.S. Wilkinson, M. Niewczas
Effect of microstructure — from the nano- to the macroscopic level — on the strength, ductility and toughness of materials, in both single phase and multiphase materials; modeling approaches, including continuum approaches, dislocation mechanics and atomistic modeling.

#753 / Fracture Mechanisms in Solids / D.S. Wilkinson, J.D. Embury
Mechanisms leading to fracture in solid materials. Ductile fracture by the nucleation, growth, and coalescence of voids; damage accumulation concepts; brittle fracture in metals and ceramics; crack propagation; crazing in the polymers.

#754 / Fracture Mechanics / J.D. Embury, D.S. Wilkinson
Elastic and plastic behaviour of bodies containing defects including: linear elastic fracture mechanics; description of crack tip plasticity; use of LEFM in design; ductile-brittle transition; crack propagation under conditions of creep or fatigue. Offered from time to time, depending on interest and demand.

#755 / Deformation of Crystalline Solids / J.D. Embury, D.S. Wilkinson, M. Niewczas
A quantitative treatment of the mechanical behaviour of crystalline materials, with emphasis on elasticity and plasticity. Topics include: ideal strength, isotropic and anisotropic elasticity, dislocations, continuum models, work hardening, strengthening mechanisms, time dependents effects. This course is offered in alternate years.

Physical Properties of Solids

***760 / Electronic Materials / I. Zhitomirsky**
Basic magnetic properties of materials, magnetic structure, domains, critical behavior at the ordering temperature, soft and hard magnetic materials.Ferroelectric, piezoelectric, pyroelectric and optical properties of materials.Capacitor materials.Semiconductors.Materials for energy storage and generation.Materials selection and design.Nanocomposites.

***764 / Solid State Polymer Analysis / G. Xu**
Analytical solid state methods are employed to determine the influence of polymer structure on physical and chemical properties.

#765 / Selected Topics in Polymer Science & Engineering/ S. Zhu, G. Xu
Discussions on topics of current interest in polymer science and engineering, such as structural characterization, diffusion in bulk solution, network formation, colloid stabilization, and flocculation. (Note: This course may also be taken for half course credit as Chemical Engineering *770. Such students will be required to complete the mid-term exam and a project as well. Students taking this course for quarter course credit as Materials Science #765 will be required to complete the mid-term exam.)

Materials Processing

#771 / Principles of Heterogeneous Kinetics / K.S. Coley
Basic principles of chemical kinetics; transport processes by interfacial chemical reactions; empirical rate expressions based on experimental data, and theoretical rate equations based on proposed mechanisms; rate limiting steps and process control.

#773 / Properties of Metallurgical Slags / K.S. Coley
This course will present a theoretical picture of slags and their properties and will demonstrate how these properties can be controlled to help optimise metallurgical processes. The following aspects of slag properties will be covered: Slag structure and its relationship with basicity; Basicity concepts from V-ratio to optical basicity; the relationship between structural chemistry and physical property of slags; Basicity and slag capacities. Industrial examples will be taken from Oxygen steelmaking, ladle metallurgy and continuous casting.

***774 / Injection Metallurgy / G.A. Irons**
The transport phenomena associated with the injection of gas or gas and particles into liquid metals are examined. Specific topics include: pneumatic conveying, particle injection, flow regimes, mixing, plume modeling and refining reactions.

***775 / Physical and Mathematical Modeling in MaterialsProcessing / G.A. Irons**
Criteria for similarity; analysis of tracer mixing; mathematical models of combined fluid flow, heat transfer and mass transfer. Critical review of case studies in the literature.

Special Topics

#791 / Special Topics in Materials Science and Engineering/ Staff
From time to time, modules will be offered on subjects of interest to the Department faculty.

***792 / Special Topics in Materials Science and Engineering/ Staff**
From time to time, courses will be offered on subjects of interest to the Department faculty.

In addition to these courses, there are many courses offered by other departments, which may be considered. The selection of such courses should be done in consultation with the student's supervisor and will be authorized by the Chair of the Department. Students should consider courses offered by the Departments of Engineering Physics, Chemistry, Chemical Engineering, Mechanical Engineering, Physics and Astronomy, and Mathematics and Statistics.

Research in Materials Science and Engineering

The Department of Materials Science and Engineering provides opportunities for research in a broad range of fundamental and applied topics including materials processing and recycling, nano-technology and nanoscale materials science, electronic materials and structural materials. Detailed descriptions of research activities can be found in the web pages for each faculty member and are briefly listed below: microstructure and interfaces in nanoscale functional materials, electronic structure and spectroscopy of complex oxides and alloys, electron microscopy and electron energy loss spectroscopy techniques (G. Botton); kinetics and thermodynamics of high-temperature reactions in materials processing and service, physical chemistry of iron and steel making (K. Coley); microscopy and microanalysis, atom probe microscopy, precipitation in A1-alloys (B. Gault);phase transformations, molecular dynamics and Monte Carlo simulations (J.J. Hoyt); transport phenomena in process metallurgy, computational fluid mechanics, steel making (G. Irons); corrosion and environmental degradation of materials (J. Kish); materials for solid-state devices (A. Kitai); thermodynamics, ceramics, phase diagrams, fuel cells, solid electrolytes, energy conversion (A. Petric); crystallographic and kinetic aspects of phase transformations (G. Purdy); computational thermodynamics, measurement, analysis and modeling of texture, thermo-mechanical treatment of aluminum alloys, experimental and numerical simulation of solidification processes (D. Malakhov); crystallographic and kinetic aspects of phase transformations and electron miscroscopy in materials, magnetic and electrical properties of materials and nanomaterials, molecular dynamic and finite element modeling of the molecular structure of metals (M. Niewczas); solidification microstructure formation in alloys using phase-field and other continuum methods combined with high performance computing, deformation in cellular solids using continuum and quasi-atomistic methods, paper microstructure and its effects on electrophotography (N. Provatas); casting, physical metallurgy of steels and cast iron (S. Subramanian); microanalysis and mechanical property measurements applied to studies of mechanisms of strengthening, creep and fracture in metals and ceramics (D. Wilkinson); organic electronics, polymer fuel cells, nanostructures (G. Xu); electrodeposition of ceramics, metals, polymers and composites, nanostructured materials, nanofibres, photonic crystals, quantum dots, ferroelectric and magnetic materials, biomaterials, fuel cells (I. Zhitomirsky); microstructure evolution and its effect on mechanical properties of metals (H. Zurob).

The Department is involved with several institutes that provide opportunities of interaction with industry and interdisciplinary research, including the Brockhouse Institute for Materials Research, the Steel Research Centre, the Centre for Automotive Materials and the McMaster Institute for Materials Research.

Facilities for Research

In addition to the special types of equipment required in the above fields of study, the research facilities available to the Department include state of the art transmission and scanning electron microscopes as part of the National Centre for Electron Microscopy, a main shop employing several full-time instrument-makers, a student shop, a plasma melting facility, consumable and non-consumable electrode arc-melting furnaces, X-ray diffraction facilities, a supply of liquid helium, X-ray fluorescence and neutron activation analysis equipment, optical emission spectrometer, dielectric and mechanical relaxation, a wet-chemical analysis laboratory, levitation melting apparatus, laboratory rolling mill, computer-controlled mechanical testing machines, creep test facilities for metals and ceramics, hot isostatic press, vacuum hot press, interference microscope, hot-stage microscope, high frequency ultrasonic non-destructive evaluation system for ceramic specimens, and ion accelerator, 50 kg vacuum and a 100 kg air induction melting and casting facility, physical property measurement system for measurements of magnetic and electrical properties of materials. Additional information is located on the department website.

MATHEMATICS

The Department of Mathematics and Statistics offers programs leading to the M.Sc. and Ph.D. degrees in Mathematics. Part-time doctoral studies in Mathematics are permissible.

Enquiries: 905 525-9140, Ext. 24336
Fax: 905 522-0935
E-mail: graduate@math.mcmaster.ca
Website: http://www.math.mcmaster.ca/graduate

Faculty / Fall 2012

PROFESSORS
S. Alama, B.S. (Columbia), M.S., Ph.D. (Courant, N.Y.U.)
N. Balakrishnan, B.Sc., M.Sc. (Madras), Ph.D. (I.I.T., Kanpur)
H.U. Boden, B.S. (New Hampshire), Ph.D. (Brandeis) / Chair
B. Bolker, B.S. (Yale), Ph.D. (Cambridge)
L. Bronsard, B.A. (Montreal), M.S., Ph.D. (Courant, N.Y.U.)
W. Craig, A.B. (Berkeley), M.S., Ph.D. (Courant, N.Y.U.) / SeniorCanada Research Chair
D. Earn, B.Sc., M.Sc. (Toronto), Ph.D. (Cambridge)
S. Feng, B.Sc., M.Sc. (Beijing Normal), Ph.D. (Carleton)
J-P.Gabardo, B.Sc. (Université de l'Etat à Mons), Ph.D. (Maryland)
I. Hambleton, B.Sc., M.Sc. (Toronto), Ph.D. (Yale) / Britton Professorof Mathematics
B. Hart, B.Math. (Waterloo), Ph.D. (McGill) / Chair
D. Haskell, B.A. (Oxford), M.S., Ph.D. (Stanford) / Associate Chairand Undergraduate Advisor
F.M. Hoppe, B.Sc. (Toronto), M.Sc. (Weizmann Institute of Science),M.A., Ph.D. (Princeton)
T.R. Hurd, B.Sc. (Queen's), D.Phil. (Oxford)
N. Kevlahan, B.Sc. (British Columbia), Ph.D. (Cambridge) / AssociateChair and Graduate Advisor
M. Kolster, Dipl. (Hamburg), Dr.rer.nat. (Saarbrücken), Habil. (Münster)
M. Lovric, B.S. (Zagreb), M.S., Ph.D. (Ohio State)
M. Min-Oo, B.Sc. (Rangoon), Dip. Math., Dr.rer.nat.Habil. (Bonn)
G.H. Moore, B.A. (Berkeley), M.A., M.Sc., Ph.D. (Toronto)
A.J. Nicas, B.Sc. (McGill), M.A., Ph.D. (Princeton)
D.E. Pelinovsky, M.S. (Nizhny Novgorod State, Russia), Ph.D.(Monash, Australia)
E.T. Sawyer, B.Sc., Ph.D. (McGill) / McKay Professor of Mathematics
P. Speissegger, Diploma (Switzerland), Ph.D. (Illinois) / CanadaResearch Chair
M.A. Valeriote, B.Math. (Waterloo), Ph.D. (Berkeley)
R. Viveros-Aguilera, B.A. (Veracruzana, Mexico), M.A. (NationalPolitechnic Inst., Mexico), Ph.D. (Waterloo)
M.Y-K. Wang, A.B. (Princeton), Ph.D. (Stanford)
G.S.K. Wolkowicz, B.Sc., M.Sc. (McGill), Ph.D. (Alberta)

ASSOCIATE PROFESSORS
A. Canty, B.Sc. (College Cork, Ireland), M.Sc., Ph.D. (Toronto)
A. Childs, B.Sc., M.Sc., Ph.D. (McMaster)
M. Grasselli, B.Sc. (Sáo Paulo), Ph.D. (King's College)
M. Harada, A.B. (Harvard), Ph.D. (Berkeley)
B. Protas, M.Sc. (Warsaw Univ. Technology), Ph.D. (Warsaw Univ.Technology and Université de Paris VI [Pierre et Marie Curie])

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B. Chen, M.Sc., Ph.D. (Waterloo)
D. Lozinski, B. Math. (Waterloo), M.Sc., Ph.D. (Northwestern)
C.P. Mok, B.Sc. (Chinese University of Hong Kong), A.M., Ph.D. (Harvard)
T. Pirvu, B.Sc. (Craivo), M.Sc., Ph.D. (Carnegie Mellon)

ASSOCIATE MEMBERS
Joseph Beyene (Clinical Epidemiology and Biostatistics), B.Sc. (Addis Ababa), Ph.D. (Toronto)
A. Deza (Computing & Software), M.Sc., (Ecole Nationale des Pontset Chaussées), Ph.D. (Tokyo Institute of Technology)
J. Dushoff (Biology), B.A. (Pennsylvania), Ph.D. (Princeton)
Timothy Field (Electrical and Computer Engineering), B.A. (Cambridge), D. Phil (Oxford)
S.D. Walter, B.Sc. (London), Ph.D. (Edinburgh) / Clinical Epidemiology & Biostatistics
Changchun Xie (Clinical Epidemiological and Biostatistics), B.Sc. (Hunan), M.Sc. (Zhejiang), M.Sc. (Dalhousie), Ph.D. (Guelph)

ADJUNCT MEMBER
A.H. El-Shaarawi (National Water Research Institute), B.S., M.Sc.(Cairo), Ph.D. (Waterloo)

PROFESSORS EMERITI
P.D.M. Macdonald, B.Sc., M.Sc. (Toronto), D.Phil. (Oxford)
A. Rosa, M.S. (Kiev State), Ph.D. (Slovak Acad. Sciences)

Admission requirements can be found under the School of Graduate Studies general regulations for the M.Sc. and Ph.D. programs at the front of this Calendar.

M.Sc. Degree

Applicants will be considered for admission to the M.Sc. program if they have a B+ average in the final year of an honours Bachelor's degree in Mathematics, or in a related area. They may apply to follow one of four options:

A. Thesis Option

The candidate must complete a minimum of six one-term graduate courses and submit a thesis written under thesupervision of a faculty member and based on original research. The thesis is defended in an oral examination. The duration of this option is normally20 months.

B.Project Option

The candidate must complete a minimum of seven one-term graduate courses, one of which is required to be Mathematics *790 (Major ResearchProject). The duration of this option is normally 12 months.

C. Financial Mathematics Option (M-Phimac)

The candidate must complete the following graduate courses: Mathematics *771, Mathematics *772, Mathematics #778, Mathematics #779, Mathematics *774, Mathematics *775, Mathematics *776, Mathematics 790 and Statistics *721 (or an alternate statistics course approved by thedepartment). The duration of this option is normally 12 months.

D. Transfer Option

A candidate may transfer directly to the PhD program without completing an M.Sc. by first registering for the thesis option and then submitting anapplication for transfer after 12 to 20 months. This option requires completion of six one-term graduate courses, onewritten comprehensive exam, submission of a research proposal, and a statement from the supervisor. Successful applicants may apply allaccumulated credits to the PhD degree, but are still required to complete two one-term courses beyond the M.Sc. once registered in the PhD program. Unsuccessful applicants must choose one of the other options.

Each candidate for the M.Sc. is required to choose no fewer than four 700-level courses in Mathematics, and the remaining courses may include up totwo one-term courses at the graduate level from a cognate subject, with the entire program of coursework subject to departmental approval. In alloptions, at most two one-term 600-level courses may be used to fulfill the course requirement. Students intending to do doctoral work are advised tocomplete two of the two-term course sequences from Algebra *701/*702, Analysis *721/*722, and Applied Math *741/*742.

Ph.D. Degree

The Department of Mathematics and Statistics offers a program of study and research towards the Ph.D. degree in Mathematics, including appropriate topics in Applied Mathematics, Financial Mathematics, Probability, and Statistics. Applicants will be considered for admission to the Ph.D. program if they have completed an M.Sc. in Mathematics (or in a related area) with a B+ average.

The minimum course requirement for the Ph.D. is two one-term courses beyond the M.Sc. and acceptable to the department. All candidates are required to pass the comprehensive exam consisting of two exams testing breadth of knowledge (the first written and the second written or oral, at the department's discretion), and one additional oral exam testing depth of knowledge in the proposed field of study. Candidates must also present and defend, in an oral examination, a thesis written under the supervision of a faculty member containing original research.

All graduate students must attend the weekly Department Colloquium, and students in the Ph.D. program are expected to participate in the seminar relevant to their field of study.

Courses

Courses marked with an asterisk (*) are one-term courses. Courses marked with a plus sign (+) may differ in content from year to year and may be taken a second time for credit. Note that only a selection of these courses will be offered each year.

Courses in cognate subjects may also be taken for graduate credit in Mathematics. Students interested in Mathematical Statistics should consult the Statistics course listing elsewhere in this calendar. Students interested in Computational Mathematics should consult the Computational Engineering and Science course listing elsewhere in this calendar. Students interested in Computer Science should consult the Computing and Software course listing elsewhere in this calendar.

The following courses, which are available to senior undergraduate students as 400-level, are offered for graduate credit. Graduate students in 600-level courses will be required to do extra work in addition to that required of undergraduate students in the corresponding 400-level course (such as extra reading, problems, written or oral presentations) as prescribed by the instructor.

***6A03 / Real Analysis II**

Metric spaces, compactness.Spaces of continuous functions, functions of several variables, Inverse and Implicit Function Theorems. Lebesgue integration.

***6AT3 / Topics in Analysis**

Precise topics will vary; consult the department for current information. Possible topics include: functional anaysis, measure theory, harmonic analysis, calculus of variations

6B03 / Calculus on Manifolds *(cross-listed as Computational Science and Engineering *6B03)

Review of multivariate calculus, basic properties of manifolds, differential forms, Stokes' theorem, de Rham cohomology, and applications.

***6BT3 / Topics in Geometry**

Precise topics will vary; consult the department for current information. Possible topics include: differential geometry, riemannian metrics, connections, curvature, geodescis, topological and analytic properties of Riemannian manifolds.

***6E03 / Galois Theory**

Field extensions, splitting fields, normality and separability, Galois extensions, finite fields, solvability by radicals, cyclic extensions, cyclotomic extensions, algebraic closure, classical constructions, computations of Galois groups.

***6ET3 / Topics in Algebra**

Precise topics will vary; consult the department for current information. Possible topics include: algebraic geometry, algebraic number theory.

***6FM3 / Financial Markets and Derivatives**

Modelling of options, futures, interest rate securities and other financial derivatives in continuous time using Brownian motion and stochastic calculus. Topics include risk-neutral pricing, the Black-Scholes framework, dynamic hedging, volatility and risk.

***6FT3 / Topics in Differential Equations**

Topics to be selected from the theory of ordinary differential equations, bifurcation and stability, and partial differential equations.

***6L03 / Introduction to Mathematical Logic**

First order logic, deduction systems, completeness and compactness theorems, model theory.

***6LT3 / Topics in Logic**

Precise topics will vary; consult the department for current information. Possible topics include: axiomatic set theory, computability theory, model theory or proof theory.

***6MB3 / Mathematic Biology**

Population dynamics: models of discrete and continuous growth; competition and predation; epidemic models. Other topics selected by instructor.

****6Q03 / Numerical Methods for Differential Equations***
(cross-listed as Computational Science and Engineering *6Q03)

Approximation error; methods for ODEs, stiffness; iterative methods for BVP; weighted residuals; spectral methods; methods PDEs, accuracy, consistency, convergence; stability analysis.

***6TT3 / Topics in Topology**

Precise topics will vary; consult the department for current information. Possible topics include: fundamental group and covering spaces, cell complexes and homology theory, theory of knots, links and braids.

***6V03 / Applied Analysis**
Theory of Distributions, Fourier Transform, fundamental solutions and Green's functions for partial differential operators, uncertainty principle, Poisson summation formula, applications.

***6X03 / Complex Analysis II**
Conformal maps, analytic continuation, harmonic functions, the Riemann mapping theorem, Riemann surfaces.

The following 700-level courses are offered for graduate credit. Among these, the core sequences in Algebra *701/*702, Analysis *721/*722, Applied Mathematics *741/*742, and Geometry/Topology *761/*762 will normally be offered every year. The remaining courses may be offered less frequently, depending on student demand.

***701 / Algebra I**
Group theory, field theory and Galois theory with applications.

***702 / Algebra II**
Rings and modules, representation theory of finite groups, homological algebra.

+*703 / Topics in Algebra
Selected topics from: commutative algebra, representation theory, homological algebra, K-theory.

***704 / Algebraic K-Theory**
Etalecohomology, Chern characters, motivic cohomology, connections to algebraic number theory and algebraic geometry.

***705 / Algebraic Number Theory**
Number fields, theory of ideals and valuations, local fields, Dirichlet unit theorem, finiteness of class number, ramification theory, quadratic and cyclotomic fields, ideles, introduction to class field theory.

***706 / Algebraic Geometry**
Affine varieties, regular functions, projective varieties, Riemann surfaces, complex surfaces, computational algebraic geometry, sheaves, schemes.

***711 / Model Theory**
Structures, theories, quantifier elimination and model completeness, types and saturation, algebraic closure and pregeometries, strong minimality andMorley's theorem, o-minimality. Examples discussed include algebraically closed and real closed fields.

+*712 / Topics in Foundations
Selected topics, such as model theory, both pure and applied, general algebraic systems, set theory, proof theory, and the theory of computability.

***721 / Analysis I**

This course covers measures, integration, L^p-spaces, convergence theorems, and Fubini's theorem, differentiation, Baire category theorem.

***722 / Analysis II**

Complex analysis, properties of holomorphic and harmonic functions, approximation and factorization theorems, conformal mapping, analytic continuation.Introduction to functional analysis.

***723 / Functional Analysis**

Hahn-Banach, uniform boundedness principle, convex compact sets and Krein-Milman Theorem. Selected topics from: theory of locally convex spaces, orthogonal bases in topological algebras, topological groups.

***724 / Fourier Analysis**

Introductory Fourier analysis on Euclidean spaces and selected topics from: harmonic and subharmonic functions, weighted norm inequalities, Paley-Littlewood theory, analysis on compact and locally compact groups.

***727 / Partial Differential Operators**

Properties of distributions, fundamental solutions, the Cauchy problem, elliptic operators, maximum principles, applications and further topics.

***731 / Algebraic Topology I**

Fundamental groups, covering spaces.Homotopy theory and fibrations.Simplicial and CW complexes, homology groups.

***732 / Algebraic Topology II**

Manifolds, cohomology, cup products.Poincaré duality, characteristic classes, and other topics chosen by instructor.

***741 / Methods of Applied Mathematics I**

Ordinary differential equations: well-posed initial value problems (i.e. existence, uniqueness, continuation and continuous dependence), general non-autonomous linear systems, special linear systems (autonomous, periodic), classical stability theory, bifurcation and asymptotic methods.

***742 / Methods of Applied Mathematics II**

Partial differential equations: elliptic, parabolic, and hyperbolic equations using distributional, integral equation, and variational methods, and nonlinear problems.

+*743 / Advanced Topics in Differential Equations
Further study in Ordinary and/or Partial Differential Equations.Theory and Application. Selected topics from: dynamical systems theory, optimal control, nonlinear equations, with applications to shock waves, incompressible fluid flow, free boundary problems and porous media.

***744 / Asymptotic Analysis**
Asymptotic expansions, regular and singular perturbation theory, multiple scale analysis, boundary layer theory, WKB theory, applications.

+*745 / Topics in Numerical Analysis
Selected topics from numerical linear algebra, approximation theory, optimization, numerical solution of differential equations: finite differences, finite elements, boundary elements, spectral methods.

***746 / Bifurcations and Stability Theory**
Local and global theory, averaging techniques, Hopf bifurcations, group-theoretic aspects, strange attractors and chaos, applications and related topics.

+*747 / Topics in Mathematical Biology
Development of mathematical models using differential equations, difference equations, stochastic processes and/or game theory.Analytical and numerical exploration of the models. Topics selected from ecology, epidemiology, immunology, physiology and/or other areas of biological and medical science.

+*748 / Topics in Mathematical Physics
Linear operators in Hilbert spaces, spectral representations.Mathematical foundations of classical mechanics, general relativity, quantum mechanics, and quantum field theory.

****749 / Mathematical and Computational Fluid Dynamics***
(cross-listed as Computational Science and Engineering *749)
Mathematical properties of the Euler and Navier-Stokes equations for fluid flow, boundary layers, non-Newtonian fluids and turbulence. Numerical methods for the solution of the equations of fluid dynamics, focusing on finite volume, finite difference and spectral methods. Advanced topics include non-uniform grids, multigrid methods and adaptive methods.

***761 / Geometric Topology**
Differentiable manifolds and their basic properties, fibre bundles, de Rham cohomology and applications.

***762 / Differential Geometry**
Connections of fibre bundles, curvature, topological and analytic properties of Riemannian manifolds.

+*764 / Topics in Differential Geometry and Global Analysis
Selected topics, such as differential operators on manifolds, complex differential geometry, submanifolds, harmonic maps, gauge theory, moduli spaces.

+*765 / Advanced Topics in Geometric Topology
Selected topics, such as Morse theory, cobordism, surgery theory, algebraic K-theory, group actions on manifolds, geometric group theory.

***766 / Lie Groups**
Subgroups and subalgebras, maximal tori, structure theory, representations of compact Lie groups, semi-simple Lie groups and symmetric spaces, Lie algebra cohomology, Clifford algebras and spinors, Kac-Moody algebras.

***771 / Mathematics of Finance**
Binomial model of stocks, stochastic calculus, martingales and arbitrage, Black-Scholes equation and pricing derivative securities, fundamental theorems of asset pricing, models of equity and fixed income markets.

+*772 / Topics in Financial Mathematics
Selected topics in financial mathematics, such as stochastic models in finance, pricing and hedging financial derivatives, analysis of financial time series/model calibration, portfolio optimization, interest rate theory, credit risk, Monte-Carlo methods, finite difference methods.

***774 / The Mathematics of Credit Risk**
Default events and stopping times; bonds and rates; credit spreads and corporate bond prices; intensity based models; credit rating models, firm value models; default correlation; credit derivatives; calibration; basket credit products; collateralized debt obligations.

***775 / Portfolio Theory and Incomplete Markets**
Semimartingale market models; trading strategies; wealth processes and stochastic integration; risk aversion; utility theory of consumption and wealth; solution of Merton's problem; pricing and hedging in incomplete markets; markets with stochastic volatility; transaction costs; Levy markets; risk measures and capital requirements.

***776 / Financial Markets**
Overview of equity, fixed income and FX markets; pricing of vanilla and exotic derivatives; financial time series, GARCH models; discussion of volatility; market risk, VaR, CAPM models; introduction to credit risk; capital models.

***778 / Applied Computational Finance I**
Introduction to scientific computing: floating-point arithmetic, error analysis. Lattice methods: binomial trees; numerical methods for parabolic PDEs;applications to option pricing.

***779 / Applied Computational Finance II**
Monte Carlo methods, simulation of stochastic processes, variance reduction techniques; applications to option pricing and portfolio riskmanagement.

***782 / Probability Theory**
Probability measures, conditional expectations, martingales, convergence of probability measures, stochastic processes.

***790 / Major Research Project**
Students conduct independent research and write a substantial essay on a topic proposed by, or approved by, a faculty member, who acts as their advisor for the essay. The topic may be in an area of research of one of the Departmental members or may be related to the teaching of Mathematics. The essay should be from 5000-10000 words, and may be an expository work on a recent advance in the field. Students are expected to deliver an oral presentation of their essay during Symposium Day. This course is required for fulfillment of the M.Sc. project option.

***795 / Math Graduate Seminar**
This seminar meets weekly in Fall and Winter terms, and students are expected to attend the seminar regularly, as well as to prepare and present several seminar talks on topics, which they are to choose with the supervision of the instructor.

+*798 / Directed Reading
Topics chosen by the student and instructor.

+*799 / Directed Reading
Topics chosen by the student and instructor.

MECHANICAL ENGINEERING

The Department of Mechanical Engineering provides facilities for students intending to proceed to the M.A.Sc., M.Eng. and Ph.D. degrees.

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Faculty / Fall 2012

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Saeid Habibi, B.Sc. (Dundee), Ph.D. (Cambridge), P.Eng. / Chair
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Samir Ziada, B.Sc. (Cairo), M.Eng. (McMaster), Ph.D. (Lehigh), P.Eng. / Associate Chair (Graduate Studies)

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Stephen Tullis, B.Sc., M.Sc., (Queen's), Ph.D. (Cambridge), P.Eng.
Stephen C. Veldhuis, B.Eng.Mgt., Ph.D. (McMaster), M.Eng.(Carnegie Mellon), P.Eng.

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David W. Capson (Electrical and Computer Engineering)
Justin DeBeer (Surgery)
Robert Fleisig (Walter G. Booth School of Engineering Practice)
Nicholas Kevlahan (Mathematics and Statistics)
GhaniRazaqpur (Civil Engineering)
Philip Wood (Chemical Engineering)

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Ross L. Judd, B.E.Sc. (Western), M.Eng. (McMaster), Ph.D. (Michigan), P.Eng.
Mamdouh Shoukri, B.Sc. (Cairo), M. Eng., Ph.D. (McMaster), P. Eng. / York University
David S. Weaver, B.A.Sc.,M.A.Sc. (Toronto), Ph.D. (Waterloo), P.Eng.

M.A.Sc. Degree

The requirements for the M.A.Sc. degree in Mechanical Engineering can be satisfied through full- or part-time study. The minimum course requirement is four half courses, at least three of which should be at the 700-level. Students are required to present a thesis which embodies the results of independent work that the candidate has completed and which demonstrates competence in Mechanical Engineering. An oral defense of the thesis is required.

ADMI M.Eng. Degree in Design and Manufacturing

The requirement for the M.Eng. in Design and Manufacturing is to complete ten module graduate courses (5 graduate half courses).

Ph.D. Degree

Four half courses, at the 700-level, are the minimum required beyond the Master's degree. The supervisory committee will approve the selection of courses in consultation with the student.

Ph.D. candidates are required to pass a Comprehensive Examination designed to test their breadth of knowledge and ability to integrate ideas. A candidate must complete a thesis which embodies the results of original research and mature scholarship. The general University requirements for the thesis and oral defense will apply.

Courses

Courses marked with an asterisk (*) are half courses. The following 600-level courses are offered for both graduate credit and senior undergraduate credit.

***6B03 / Topics in Product Development / A. Spence**
Case studies using modern product development methods, value engineering, product specification, rapid product development, lean design and continuous improvement. Product liability and robust design.

***6BB3 / Biomechanics / G. Wohl**
Application of mechanical engineering principals to biomechanics problems including cellular biomechanics, hemodynamics, the circulatory system, the respiratory system, muscles and movement and skeletal biomechanics.

***6CC3 / Experimental and Computational Biomechanics/ C. Quenneville**
This course will provide basic background in experimental and computational biomechanics including biomechanical testing concepts and application of finite element method in simulations of biomechanical structures/systems.

***6K03 / Robotics / G.M. Bone**
Fundamental theory and practical applications of robotic manipulators and mobile robots. Equations of motion, robot dynamics and statics, motion planning, introduction to machine vision, basics of robot programming.

***6L03 / Industrial Design / Staff**
Introduction to the techniques of industrial design, case studies and introduction to illustration techniques.

***6Q03 / Mechanical Vibrations / S.C. Veldhuis**
This course is designed to provide students with an introduction to the fundamental concepts of vibration engineering. Students will learn an appreciation for harmonic motion as well as the modeling of mechanical systems. This course will draw on the math skills established in previous courses with a special emphasis on understanding the physical phenomena involved as well as interpret and apply the results to real problems. A project will also be undertaken involving the simulation and validation of a model capturing critical aspects of a dynamic mechanical system.

***6T03 / Finite Element Applications / P. Wu**
Theory of the finite element derivation, solution procedures.Applications to static and dynamic mechanical systems using a finite element package.

***6U03 / Compressible Flow and Turbomachinery / S. Tullis**
Compressible flows: Fanno and Rayleight flows, normal and oblique shocks. Turbomachines: axial and radial flow gas and steam turbines, axial and radial flow compressors and fans.

***6V03 / Thermo-Fluids Systems Design and Analysis / C.Y. Ching**
Design, operation and application characteristics of equipment commonly used in thermal systems.Modeling performance characteristics of piping systems, pumps, compressors, fans, heat exchangers, boilers and cooling towers.System simulation and optimization.Selection criteria of thermal equipment. Design optimization and system performance evaluation.

***6Z03 / CAD/CAM/CAE / A. Spence**
Solid modeling theory, part creation, assemblies and rigid bodies, mechanism simulation, B-Splines, data exchange, CNC machining and inspection. Major project using computer laboratory facilities.

The following 700-level courses are offered for graduate credit only:

***702 / Advanced Dynamics of Machines I / M.A. Dokainish**
The study of structural damping; shock loading response spectra; random vibration; self-induced vibration; nonlinear systems; introduction to elastic wave theory; dynamic criteria of failure; and Hamilton's principle and Lagrange's equations.

***705 / Advanced Finite Element Analysis / P. Wu**
Solve nonlinear quasi-static and dynamic problems in solid mechanics with finite element method. Introduce the kinematics of large deformations and metal plasticity theories. Describe explicit and implicit implementations of constitutive models into finite element software. Cover a range of engineering applications, including assessment of damage and failure, prediction of deformation localization and necking.

****706 / Advanced Heat Transfer / R.L. Judd (cross-listed as Chemical Engineering *706)***
Steady and transient conduction stressing formulation and approximate solution techniques. Convection heat transfer including compressible and incompressible flow. Radiation heat transfer including gray body radiation and radiation from gases and vapours.

****707 / Analytical Solutions in Transport Phenomena / S. Shankar (cross-listed as Chemical Engineering *707)***
Analytical solution techniques for heat and mass transfer problems, analysis of boundary conditions, solutions to solidification problems, evaluation of inter and intrinsic diffusivities, analysis of various coordination systems and transformation of coordinates and moving heat source problems.

***708 / Two-Phase Flow and Heat Transfer / J. Cotton**
Development of conservation laws for two-phase flow systems, two-phase flow modeling, pressure drop and void fraction in piping systems, pool and convective boiling transfer, critical heat flux in pool and flow boiling, post-dryout heat transfer, critical two-phase flow and flow instabilities.

***709 / Introduction to Turbulent Flows / C.Y. Ching**
The course introduces the phenomenological features in turbulent flows and the methods used to analyze these flows. This will include developing the Reynolds average equations, investigating the vortex dynamics in these flows, applying the governing equations to different flows and other topics. The course will cover material related to both wall-bounded and free-shear flows.

***710 / Machine Tool Analysis / S.C. Veldhuis**
Definitions and test of accuracy.Metrology using laser interferometer.Thermal deformations. Automation, numerical control: command generation, digital positional servos. Dynamics of machine tool structures, stability against chatter. Selection, specification, utilization, maintenance.

***711 / Advanced Dynamics of Machines II / M.A. Dokainish**
Extension of Mech. Eng. *702 which includes a study of random vibration, self-induced vibration, and nonlinear systems.

***713 / Combustion Theory and Modeling / S. Tullis**
Introduction to combustion and reacting flows. Topics include reaction mechanisms and kinetics, laminar and turbulent flames with both premixed and non-premixed reactants. The course will emphasize the main theoretical difficulties involved in describing turbulent flows with chemical reactions and will be discussed with reference to practical applications. Numerical methods and models for the simulation of reacting flows.

***714 / Solidification Processing / S. Shankar**
Fundamentals of Solidification, Review of Solidification processes, near net shape solidification, molten metal handling and treatment, cast part quality.

****715 / Biomechanics of Injury and Prevention / G. Wohl***
(cross-listed as Biomedical Engineering *715)
Topics include mechanics of biological tissues, injury/failure mechanisms (particularly musculoskeletal tissues and brain injury), and theory behind methods and devices for prevention of injuries with particular focus on motor vehicle collisions and sport-related injuries.

****717 / Current Topics in Orthopaedic Biomechanics / C. Quenneville***
(cross-listed as Biomedical Engineering *717)
Current techniques and technologies used in orthopaedic biomechanics and their applications and limitations, including joint replacement design and failure, analysis of human locomotion, numerical methods in biomechanics, computer assisted surgery, and design of assistive devices.

****719 / MEMS Devices: Design, Fabrication, and Applications / R.N. Kleiman***
(cross-listed as Engineering Physics *719)
An introductory course that will provide the fundamentals from many disciplines relevant to the understanding and application of MicroElectroMechanical Systems (MEMS) technology. Design topics will include mechanical and biofluidic principles with an emphasis on analytical techniques. Equivalent circuits for MEMS devices, noise analysis, and nonlinear phenomena will be discussed. Fabrication methods will cover bulk and surface micromachining techniques that rely heavily on VLSI processing. Process integration with existing device platforms and materials properties related to MEMS design and fabrication will be discussed. Numerous applications of MEMS technology to problems in science, engineering, and medicine will be presented and analysed.

***722 / Theory of Elasticity / D.S. Weaver**
Theoretical foundations of the mechanics of deformable solids with engineering applications. Topics will include: the introduction to rectangular cartesian tensors, development of equations of classical linear elasticity, applications to plane and torsion problems, exact and approximate analytical methods.

***723 / Flow Induced Vibrations / D.S. Weaver**

Classification of problems in flow-induced vibrations, physical modeling and mathematical modeling of problems involving fluid-structure interaction. Examples of applications to hydraulic gates and valves, cylindrical structures such as: smoke stacks, marine risers, nuclear reactor internals, bridge decks.

****724 / Solid and Surface Modeling Techniques / A. Spence***
(cross-listed as Computational Science and Engineering *724)

Fundamental issues in both solid and surface modeling.B-Rep, CSG, octree representations.Computational geometry searching and sorting techniques, surface representations, B-Splines, NURBS.Curve and surface intersection methods.

***728 / Manufacturing Processes I / P. Koshy**

Fundamentals of metal cutting: cutting process, cutting forces and temperatures, tool wear, machinability of materials, machined surface quality and integrity, optimization of cutting conditions. Applications to single edge and multiple edge operations and grinding.

***729 / Manufacturing Systems / T. Nye**

This course studies the organization and control of manufacturing systems. Types of production systems, the role of inventory, capacity and production control planning, scheduling, push-, CONWIP- and JIT-systems.Use of analytic, heuristic and numerical analysis and design methods.

***734 / Theory of Plasticity / M.K. Jain**

Yield Criteria for ductile isotropic metals. Invariants of a second order tensor.Representative stress and strain. Flow Rule (plastic stress/strain relationships). Fundamental plasticity theory leading to the establishment of the extremum principles. Application of these principles to a rigid, incompressible, non-hardening, rate-insensitive solid in a state of plane strain (upper and lower bound theorems). Slip line field analysis (a more advanced upper bound method). Theory of finite strain.Introduction to some macroscopic theories of anisotropy.Introduction to crystallographic theory of metal deformation and determination of crystallographic yield loci.

***736 / Special Topics in Mechanics / Staff**

***737 / Special Topics in Thermo-Fluid Sciences / Staff**

***738 / Manufacturing Processes II / M.P. Sklad**

Yield behaviour, yield criterion and flow roles. Review of bulk and sheet metal forming operations. Approximate methods of solution to some of these processes.

***739 / Special Topics in Production / Staff**

***742 / Fundamentals of Acoustics / S. Ziada**

Complex exponential method to solve partial differential equations, acoustic wave equation and simple solutions, sound transmission, sound absorption in fluids, radiation and reception of sound waves, acoustics of pipes and cavities, resonators, ducts, acoustic filters, instability of shear flows and its coupling with sound waves.

***743 / Advanced Mechatronics / S. Habibi**

This is a graduate course in mechatronics with an emphasis on actuation systems and control. The course begins by considering the industrial process that is followed for the design of large integrated systems. It then considers the necessity for a mutidisciplinary approach to design and discusses the rational for mechatronics. Electrical and hydraulic actuation systems are considered, modeled and simulated. Electronic circuits, microcontrollers, real-time digital control, filtering, estimation and system identification are considered in the context of the control of actuation systems. The course heavily relies on experiential learning and includes a project.

***745 / Analytical Fracture and Damage Mechanics / M.K. Jain**

Modeling of linear elastic, elastic-plastic crack and damage problems, including mathematical foundations, experimental determination of fracture toughness and multi-axial damage in engineering materials, and application of fracture mechanics concepts to suitable engineering problems.

***748 / Experimental Mechanics / D.S. Weaver**

A hands-on experimental mechanics course emphasizing theory, critical evaluation, and engineering applications. Topics include: electrical resistance strain gauges, brittle coating methods and photoelasticity using transmission and reflective polariscopes.

***750 / Computer Integrated Manufacturing / Staff**

Computer integrated manufacturing. Flexible manufacture.Retrieval and generative process planning. Design for manufacturability, assembly and inspection. Simulation of manufacturing systems.Manual, automated and robotic assembly.Integrating sensors in manufacturing.

****751 / Advanced Mechanical Engineering Control Systems/ G.M. Bone***
(cross-listed as Computational Science and Engineering *751)

Design of digital control systems with emphasis on mechanical engineering applications, sampling characteristics, z transforms and z transfer functions. Root Locus in the z plane, frequency response, transient response. State space analysis, Eigen values, Eigen vectors, controllability, observability (SISO). State space design, pole assignment, state feedback, output feedback, modal control.Introduction to adaptive control, self-tuning regulations, model reference adaptive systems.

752 / Advanced MEMS Fabrication and Microfluidics /R. Selvaganapathy (cross-listed as Chemical Engineering *750 and EngineeringPhysics *752)

Introduction, Microfabrication and micromachining, Surface and bulk micromachining, non-conventional machining, Microfluidics, Microchannels, Microvalves, Micromixers, Micropumps, Droplet actuation, Integrated Systems.

***753 / Advanced Fluid Mechanics / M. Hamed**

Review of vectors, tensors, tensor notation, hydrostatics and stressed in fluid, and Eularian and Lagrangian coordinate systems. Develop conservation of mass, momentum, and energy equations and examine their properties. Analyze boundary layer flows, potential flows, and introduce transition to turbulence and turbulence flows.

756 / Computational Fluid Dynamics / M. Lightstone (cross-listed as Computational Science and Engineering *756)

This course provides an introduction to finite-volume methods for solving fluid flow and heat transfer problems. Course content includes multi-grid solvers and pressure-velocity coupling techniques. The course emphasizes an understanding of the physics and the fundamentals of fluid flow and heat transfer. A working knowledge of FORTRAN is required.

***758 / Graduate Seminars in Mechanical Engineering /R.L. Judd, Coordinator**

Seminar series presented by graduate students and guest speakers. All full time graduate students are required to register for this “zero credit” course in the fall and winter semesters. Course grades are either Pass or Fail (P/F). To pass the course the student must attend at least 60% of the seminars. Full time Master’s students are required to present one seminar in the series before graduation, and Ph.D. students must present two seminars.

Facilities for Research

One entire wing of the John Hodgins Engineering building is devoted to Mechanical Engineering and contains a number of laboratories specifically allocated to research. Current equipment includes various vibration measurement instruments, experimental stress analysis equipment, high-speed camera, electrical instrumentation, metrology facilities, gas turbine, gas analysis instrumentation, heat transfer apparatus, variable slope water flume, wind tunnel, cascade tunnel, hot-wire anemometry, plasma generator, computer-aided design equipment, metal forming and cutting facilities, and noise measuring instrumentation.

ADVANCED DESIGN AND MANUFACTURING INSTITUTE (ADMI)

The Advanced Design and Manufacturing Institute, ADMI, a partnership of four leading Ontario universities, namely, Queen’s University, University of Toronto, University of Western Ontario, and McMaster University, presents a unique, innovative learning experience through a Master’s Degree Program in Design and Manufacturing with emphasis on business and management. The program is designed to provide practicing engineers the enhanced knowledge, tools, technology as well as business and management skills, necessary to keep them at the forefront of their profession. The ADMI Master's Degree program has the enthusiastic endorsement of Materials and Manufacturing Ontario and Ontario Industry.

McMaster University Faculty members within the Faculty of Engineering and the School of Business contribute to the extensive selection of ADMI course offerings.

Individuals who choose to apply for admission to McMaster University will, once their application is approved, be registered within the Department of Mechanical Engineering on a part-time basis. The Master's Degree awarded by McMaster will be aM.Eng. with a *Design and Manufacturing* designation.

Enquiries: 905 525-9140 ext. 23097
Fax: 905 572-7944
Email: mech@mcmaster.ca
Websites: http://mech.mcmaster.ca
http://admicanada.com

Courses

Presenting universities are specified by their specific numeric codes:

06	University of Western Ontario
08	McMaster University
09	Queen's University
10	University of Toronto

DM 0610 / Intelligent Manufacturing
In this course, the participants will develop an understanding of how machine intelligence, knowledge-based systems (KBSs) and smart sensors can effectively improve the performance of machine tools, work cells, and overall manufacturing enterprises. The aim is to introduce and explore the fundamental issues and modern tools in designing intelligent manufacturing systems.

DM 0611 / Design for Manufacturability
In this course, the participants will develop an understanding of how the physical design of a product interacts with the components of the manufacturing system. The aim is to introduce, familiarize, explain and demonstrate, and use some of the most common tools and techniques developed in the field.

DM 0612 / Finite Element Analysis for Design Engineers
The course is intended for engineers who wish to use the Finite Element Analysis (FEA) as on their design tools, and for engineering managers in charge of FEA related projects.

DM 0663 / Financial and Managerial Accounting

The purpose of this course is to provide a sound understanding of accounting - the "language of business" - and to develop skills in the interpretation and use of accounting information. The course will provide a thorough understanding of how accounting information is used in organizations.

DM 0664 / Principles of Technical and ProfessionalCommunication

The focus of this course is mastery of the fundamental elements of all effective professional communication: assessing the communicative situation, understanding the needs and expectations of the audience, creating an effective and suitable message, and projecting confidence and competence through an appropriate communication style. The course combines theoretical understanding with practical application in four areas of communicative competence: reading, writing, listening, and speaking. Students will prepare and present a variety of messages and will be involved in the critical appraisal of the messages of others.

DM 0665 / Business-to-Business (B2B) Marketing

The objectives of the course are to provide an introduction to the basic theories and concepts in marketing, with an emphasis on businesses marketing to other businesses (B2B marketing); to develop an effective decision-making framework to address practical problems and issues in marketing; to illustrate the need to integrate marketing decision-making with the other functional areas within an organization; and to offer specific insights into selected marketing contexts, e.g. services, new/high technology, developing and managing relationships, and marketing in the global environment. Emphasis will be placed on e-business and how the Internet and the World Wide Web have greatly changed the role, efficiency and effectiveness of the marketing function, especially in the business-to-business marketplace.

DM 0681 / Technological Entrepreneurship & Innovation

Technological entrepreneurship involves much more than having a good business idea and writing a solid business plan. This course will introduce new venture creation as a process intimately connected to new product innovation and design. The successful introduction of a new product or service within an existing or new business requires several important steps: identification, evaluation, and selection of opportunities; planning and financing the new venture or project; and executing the new venture or project plan. A combination of lectures, assignments, and experienced guest speakers will be used to explore each of these steps in a practical manner that will be interesting and useful to any professional engineer, entrepreneur, or manager.

DM 0803 / Advanced Machining Systems / M. Elbestawi

This course will deal with the major component of *intelligent* machining. Predictive modeling of machining processes.Computer simulation of various processes such as milling, turning, and drilling. Prediction of process variables such as forces, torques, power and tool wear. Simulation of machining dynamics for chatter prediction.Sensors.Review of sensing techniques, and signal processing methodologies for monitoring cutting processes.Examples including tool breakage, tool wear and chatter monitoring. Process Controls. Various approaches for process control in machining applications, interface with position control, and state-of-the-art open architecture control.

DM 0820 / Geometric Dimensioning &Tolerancing/A.D. Spence

Drafting Standards, Conventional vs. Geometric Dimensioning &Tolerancing, Form Controls, Datums, Orientation Controls, Position Tolerances, Concentricity and Symmetry Controls, Runout Controls, Profile Controls, Tolerance Stacks, Preferred Hole/Shaft Sizes, Go/No-Go Gauges, Inspection Fixture Design, Coordinate Measuring Machine Technology, touch trigger and analog probes, non-contact laser digitizer probes, FARO arms and laser trackers, software error compensation, Computer Aided Design software tools for inspection planning and analysis.

DM0824 / Optimization of Energy Efficiencies in Industrial Processes / M. S. Hamed

The course covers the fundamentals of industrial energy management and the technical procedures required for assessing energy saving opportunities (ESOs) in equipment and systems found in almost every industrial facility. These procedures can be applied on existing equipment or systems. It can also be used for sizing and selecting new equipment. The required background in heat transfer, fluid mechanics, and thermodynamics to support the analysis and the assessment of the various ESOs is also covered.

DM 0825 / Computer Aided Design - Part, Assembly, andMechanism Modeling / A.D. Spence

Part Modeling, Assembly Modeling, Solid Modeling Theory, Kinematic and Dynamic Mechanism Modeling, Sculptured Surface Design, Reverse Engineering and Visualization. A major project will require students to create individual designs for each major topic using Computer Aided Design software.

DM 0827 / Renewable Energy Systems / M.S. Hamed

The course provides an overview and fundamentals of different renewable energy systems (RES) including biomass, hydropower, geothermal, wind, solar thermal and photovoltaics. It covers the basics of performance and economic analysis of RES. It also covers the use of RES in achieving sustainability in high performance green buildings and details of the LEED rating system for new construction and existing buildings. The course also introduces the use of computer programs for simulating and analyzing RES.

DM 0828 / Lean Manufacturing - Principles, Applications andImplementation / S. C. Veldhuis

This course provides an introduction to Lean Manufacturing and covers the basic principles on which Lean is built. The main focus is on Lean from an industrial engineering or management scientist perspective. The course will cover an extensive set of Lean tools and outline their application in a manufacturing environment with the goal of achieving measurable objectives related to operational effectiveness. Once the basic tools are put in place they will be applied in a major course project that targets an area for improvement in a participant’s place of work or in a Lean project developed through discussion with the instructor. To complement the course, some advanced topics not normally covered in an introductory Lean course will also be reviewed.

DM 0871 / Manufacturing Management: OrganizationalBehaviour/ V. Baba

The course addresses the topics of organization structure and organization design in relation to manufacturing strategy. Specific content in this module will include: the strategy-structure relationship; differentiation and integration; centralization and decentralization; function and product and matrix and network forms of organizations; strategic alliances; principles of organization design; characteristics of high performing work organizations; technology and organization design. A feature of the module will be a group project based on a team of students examining an ongoing organizational unit from the point of view of four different frames of reference: human resources, structural, cultural/symbolic, political. The project will sensitize students to the multiple ways of analyzing and understanding organizations and to some of the realities associated with the actors and politics of manufacturing entities. The module will also examine some new trends in manufacturing such as outsourcing, consideration of the entire value chain and the use of contract or temporary employees.

DM 0872 / Management Skills Development / V. Baba

Within the context of organizational behaviour, the course will emphasize the acquisition of personal, interpersonal, and group skills that are required to lead and manage people effectively in modern organizations. The orientation of the course will be targeted toward managing superiors, peers, and subordinates through a process of change. The course is delivered in a workshop format with the emphasis on the acquisition and development of people skills ready to be implemented in an engineering context. This is a course dealing primarily with the acquisition of skills and the student is expected to have a basic grasp of issues, concepts, and applications of general management and organizational behaviour in order to fully benefit from what is offered here.

DM 0880 / International Business / J. Tiessen

This course (1) analyzes the international business environment and (2) surveys managerial issues associated with international operations. Part one focuses on the institutions of globalization—the WTO, IMF, European Union etc.—and their implications for national economies. The second part examines how firms operate in this global environment. Specifically we will study how marketing, accounting, finance, operations, human resources and strategy are affected by geography and culture. Both sections will require research projects aimed at developing familiarity with international economic information and news sources—in print and on the internet.

DM 0886 / Tools for Technology Transfer / M. Mongeon

In a knowledge-based economy, successful organizations develop technologies and intellectual capital that may give rise to competitive advantage. The purpose of this course is to provide students with basic tools that will allow them to identify such technologies and intellectual capital in organizations, protect that capital by applying the necessary types of legal protection such as patents and copyright registrations and to then profit by transferring it to others or otherwise creating new entrepreneurial activities within the organization.

DM 0917 / Ergonomic Design

This course provides an overview of ergonomic problems that are addressed in engineering design: including biomechanical, physical and physiological issues. Case studies will range from the design of vehicle cockpits to process control rooms, from industrial manual materials handling tasks to human direct robots, and from domestic tools to biomechanical devices. Specific topics include: anthropometry, work space design, environmental conditions (light, noise, humidity, temperature, motion), physiology, materials handling capacity, gender issues, tool design, product design and structured ergonomic design evaluation techniques.

DM 0919 / Dynamics and Vibration in Engineering Design

The course is intended to provide students with the ability to understand and incorporate dynamics and vibration into their designs as predictors throughout the stages of the design process and as analysis tools during prototype testing. Techniques of dynamic model development ranging from Newton-Euler Equations to Lagrange's Equations to modern Multi-Body Dynamics (MBD) techniques are presented and compared. The design utility of the derived models, from simple linear to complex non-linear and 3D, and what they bring to the design process is presented.

DM 0920 / Design: Materials Selection

The theme of this course is how to integrate materials selection into the design process at an early stage. The objectives are: i) to upgrade students' knowledge of mechanical design, engineering materials, failure mechanisms and materials selection methodologies and the use of sources of information on materials properties.

DM 0922 / Mechatronics Engineering

Mechatronics is the integration of mechanical, electrical, computer and control engineering. This course deals with the analytical tools and hands-on experience required to design, model, analyze and control mechatronic systems. This course will develop the underlying science of mechatronic systems and show its application to the computer control of machines and manufacturing processes.

DM 0967 / Manufacturing Business Strategy

This course introduces students to the current theories used for business strategy in a manufacturing environment including product streams, theory of constraints, lean/agile manufacturing, supply chain management, and reliability/maintenance programs. The fundamentals, tools advantages and disadvantages for each strategy are examined. First hand interaction with various analytical tools will be a major feature of the course. Case studies featuring automotive related industries and their suppliers will be used to highlight the potential uses and value of the product stream approach. Participants will have the opportunity to use the analytical tools to conduct additional analyses and construct their own business strategy models.

DM 1013 / System Maintenance

The course will cover tools and methodologies necessary to achieve a program of maintenance excellence such that assets within an organization are cared for through sound and timely decision-making. The methodology of Reliability Centered Maintenance will be used to describe a process that can be used to establish maintenance plans. The main thrust of the course will be to focus on techniques, such as Weibull analysis and life cycle costing, that can be used to optimize a range of decisions associated with systems maintenance.

DM 1014 / Rapid Mechanical Design

Rapid Mechanical Design addresses all aspects of mechanical design, including consideration for end-of-life issues, with the focus and emphasis of the course being on rapid product development. Participants will have an introductory section on a limited set of classical design topics in order to prepare the students for the in-depth discussion of the advanced topics on rapid prototyping. The introductory topics include: Manufacturing Management Strategies, Concurrent Engineering, Conceptual Design, and Design for X. The advanced rapid-design topics are categorized into virtual and physical prototyping.

DM 1015 / System Simulation

System Simulation is a methodology for developing computer models of a company's overall or partial production system. These models can incorporate all the relevant complexities and random factors. They can provide a 3-D graphic representation of the system and a test bed for suggested improvements. The model is first run under the "as is" assumption, and then modified to incorporate potential improvements. The change in model behaviour, such as cost or throughput, provides management with the necessary decisive information. The System Simulation course will provide the basic concepts required for the development of such models. This includes coverage of specialized techniques for modeling the system random factors and analyzing the model results, and an introduction to the AutoMod programming language.

DM 1016 / Design Methodologies

Assessment of design methodologies and the practical implications of formalizing approaches to design. Functional requirements and design parameter analyses; design axioms of independence and minimization of information. Hierarchical design philosophy. Design for manufacturability within the tolerancing and information content. Contribution of industrial design approaches. Case study illustrations with particular reference to the tool, die and mold industries. Group projects.

DM 1018 / Product Design & Development

The course is intended to provide graduate engineering students with a broad sense of the issues and methodologies involved in Product Design. Emphasis is placed on creativity in the design and development of readily useable products and systems intended for manufacture in quantity for consumer and commercial markets. The course covers a broad range of product development issues aside from those that are strictly technical, including appeal, appropriate functional aspects, viability and durability.

DM 1021 / Forensic Engineering and Failure Analysis

The course provides participants with the fundamentals necessary to understand and appreciate investigation methods into engineering failures. Topics to be considered include definition of potential sources of failure in engineered materials; understanding of failures due to natural causes, fire, high and low speed impacts, design, manufacture and service conditions; procedures for investigation of structural, materials, environmental, service and design-related failures; introduction to principles of materials selection for prevention of mechanical failures; characterization techniques used to assess materials structure and chemistry; demonstration of fundamental principles through real case studies to understand liabilities and legal issues.

DM 1085 / Advanced Project Management

This course builds from the basic tools of project management to introduce participants to the reality of managing projects within the context of engineering organizations that can be complex, where multiple projects may be in place, where membership is drawn from a variety of specializations and individual differences abound and where team-based functioning is the norm. The course will address issues such as management of multiple projects, individual differences, project leadership, working in teams, and change management. Case studies of managed projects will be used in the course.

MEDICAL PHYSICS AND APPLIED RADIATION SCIENCES

The M.Sc. and Ph.D. programs in Radiation Sciences and the M.Sc. program in Health and Radiation Physics are administered by the Department of Medical Physics and Applied Radiation Sciences. Staff from several University departments and from health care institutions contribute to the programs.

Enquiries: 905 525-9140 Ext. 27650
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Faculty / Fall 2012

PROFESSORS
Douglas R. Boreham, B.Sc. (Laurentian), Ph.D. (Ottawa)
David R. Chettle, B.Sc., M.Sc., Ph.D. (Birmingham)
Thomas J. Farrell, B.Sc., B.Ed. (Toronto), M.Sc. (Western), Ph.D. (McMaster) / Joint appointment with Radiology / Associate Chair (Graduate)
Michael J. Farquharson, B.Sc. (Sussex), M.Sc. (Surrey), Ph.D.(University College London) / Chair
Fiona E. McNeill, B.Sc. (Edinburgh), Ph.D. (Birmingham)
Carmel E. Mothersill, B.Sc., Ph.D. (University College Dublin)
Michael S. Patterson, B.Sc. (Queen's), Ph.D. (Toronto) / Jointappointment with Radiology
Colin B. Seymour, DCT(RT) (Guy's Hospital), B.L. (King's Inn),M.Sc., Ph.D. (Trinity College Dublin)

ASSOCIATE PROFESSORS
Soo Hyun Byun, B.Sc., M.Sc., Ph.D. (Seoul National University)
Joseph E. Hayward, B.Eng., M.Eng., Ph.D. (McMaster) / Jointappointment with Radiology
Gianni Parise, B.Kin., M.Sc., Ph.D. (McMaster) / Joint appointment with Kinesiology

Douglas R. Wyman, B.Sc. (Waterloo), Ph.D. (McMaster) / Jointappointment with Radiology

ASSISTANT PROFESSORS
Nicholas A. Bock, B.Sc. (Western), Ph.D. (Toronto) / Associate Chair (Undergraduate)
Kevin Diamond, B.Sc. (Waterloo), Ph.D. (McMaster)
Orest Z. Ostapiak, B.Sc., M.Sc., Ph.D. (Toronto)
Hao Peng, B.Sc., M.Sc. (Wuhan), Ph.D. (Western)
Marcin Wierzbicki, B.Sc. (McMaster), Ph.D. (Western)

LECTURER
David M. Tucker, B.Sc. (McMaster), C.H.P. (American Board of Health Physics)

ASSOCIATE MEMBERS
Ian S. Dayes (Radiology)
Qiyin Fang (Engineering Physics)
Troy Farncombe (Radiology)
Christopher L. Gordon (Radiology)
Michael D. Noseworthy (Radiology)
Andrew J. Rainbow (Biology)
N. Renee (Crowther) Labiris (Radiology)
John F. Valliant (Chemistry)
Colin Webber (Radiology)

ADJUNCT MEMBERS
Charles H. Cunningham, B.A.Sc., Ph.D. (Toronto)
Joanne M. O'Meara, B.Sc., Ph.D. (McMaster)
Ana Pejovic-Milic, B.Sc., M.Sc. (Belgrade), M.Sc., Ph.D. (McMaster)
Anthony J. Waker, B.Sc., Ph.D. [Poly S. Bank (CNAA), London,U.K.]

PROFESSOR EMERITUS
William V. Prestwich, B.Sc., Ph.D. (McMaster)

M.Sc. Degree

A.Health and Radiation Physics

The M.Sc. in Health and Radiation Physics is relatively course intensive and is designed to provide the education, training and professional development required for a career in Health Physics.

Normal admission requirements are a B.Sc. honours degree, at least B+ standing (or equivalent) in Physics, Biophysics, Engineering Physics, or Chemistry, or some course of study approved by the Department of Medical Physics and Applied Radiation Sciences.

A candidate for the M.Sc. degree must:

1. Complete satisfactorily the courses: Medical Physics *772, Medical Physics *773, Medical Physics *773 and Medical Physics *776. Students must complete satisfactorily one additional 700-level course from the following list: Medical Physics *770, Medical Physics *771 or Medical Physics *778. Students who have not satisfactorily completed Medical Physics *6R03 must also complete this course satisfactorily.

2. Pass a final comprehensive examination.

3. Complete and defend a research report based on a project approved by the Department.

A student with a strong background in Health and Radiation Physics may be permitted to replace one or more of the core courses with relevant courses approved by the Department. A student may not take more than one 600-level full graduate course to satisfy the minimum course requirements.

B. Radiation Sciences (Medical Physics/Radiation Biology)

The M.Sc. in Radiation Sciences (Medical Physics) requires that a candidate complete satisfactorily the courses Medical Physics *775, Medical Physics *773 and one other half course. Students who have not completed satisfactorily Medical Physics *6R03 must also complete this course satisfactorily. Candidates for this M.Sc. are also required to present and defend a thesis, which shall embody the results of original research.

The M.Sc. in Radiation Sciences (Radiation Biology) requires that a candidate complete satisfactorily the course Medical Physics *773, and one other half course at the 700 level which can be either Medical Physics *779 or Medical Physics *780. Students who have not completed satisfactorily Medical Physics *6B03 must also complete this course satisfactorily. Candidates for this M.Sc. are also required to present and defend a thesis, which shall embody the results of original research.

Ph.D. Degree

Radiation Sciences (Medical Physics/Radiation Biology)

The minimum course requirement for the Ph.D. degree in Radiation Sciences in both fields of Medical Physics and Radiation Biology is the completion of at least one full course at the 700-level beyond the courses required for the M.Sc. degree. Candidates in the Medical Physics field who have not already completed Medical Physics *773, Medical Physics *6R03 and Medical Physics *775 shall take these courses plus at least one other half course at the 700-level. Candidates in the Radiation Biology field who have not already completed Medical Physics *6B03 and Medical Physics *773 shall take these courses plus two half courses at the 700 level.

Every candidate for the Ph.D. must pass a Comprehensive Examination concerned with Radiation Sciences, but outside their own immediate area of research.

A thesis must be presented embodying the results of original research, and this thesis will be defended in a final oral examination.

Courses

Courses marked with an asterisk (*) are half courses.

***6B03 / Radioactivity and Radiation Interactions / Staff**

Radioactivity and radiation phenomenology: interaction of radiations with matter, dosimetry, radiation in medicine, biological effects, radiation levels and regulations, radiation protection.

****6I03 / Introduction to Biophotonics / J. Hayward***
(cross-listed as Engineering Physics *6I03)

This is a survey course on basic principles of light interaction with biological systems and specific biomedical applications of photonics. In the first quarter of the course, basic principles in optics and biology will be briefly covered while emphasis will be on more advanced topics such as lasers and photo detectors, light-tissue interaction, and photobiology. The remaining part of the course will be focused on specific biomedical applications using photonics technology.

***6R03 / Radiation and Radioisotope Methodology / H. Peng, S.H. Byun**

Lectures and laboratory work in the techniques and theory of the measurement of radiation. Topics include radioactivity and radioactive decay, solid state dosimetry, principles of active detectors, counting statistics and data reduction, advanced multidetector systems.

***6T03 / Clinical Applications of Physics in Medicine/ M. Patterson**

Basic physical concepts underlying medical imaging, nuclear medicine, physiological measurement, radiation therapy and biomedical laser applications with an overview of their technical implementation.

***6XX3 / Human Biology for Physical Scientists / Staff**

An overview of the structure and the function of the major organ systems of the body with some reference to radiation interactions.

****702 / Medical Imaging Systems II / M. Noseworthy, N. Bock***
(cross-listed as Biomedical Engineering *702)

This course will compliment Medical Imaging Systems I. In this course imaging methods that rely on non-ionizing radiation will be discussed. The course content focuses on magnetic resonance imaging (MRI), in vivo nuclear magnetic resonance (NMR), ultrasound (US), and optical imaging methods. Advanced concepts such as multi-modality imaging appraches, image fusion, and functional medical image processing will be discussed.

****770 / Medical Imaging Systems I / H. Peng***
(cross-listed as Biomedical Engineering *770 and Electrical and Computer Engineering *780)

Medical imaging is important for both clinical medicine, and medical research. This course will provide an introduction to several of the major imaging modalities, focusing on the aspects of imaging physics, signal processing and system design. The topics to be covered include *projection-imaging systems (projection X-Ray), backprojection based systems (CT, PET, and SPECT). Ultrasound, optical imaging and MRI will be covered in the second part of this course Medical Imaging System II.*

***771 / Isotopes In-Vivo / Staff**
Discussion of how various practical aspects of the production and in-vivo use of radioactive isotopes impact upon radiation doses of people who work with radioisotopes and people to whom radioactivity is administered either by design or by accident. Discussion of the regulatory processes involved in the production and in-vivo use of radio chemicals.

***772 / Medical Health Physics / K. Diamond**
Health Physics aspects of ionizing and non-ionizing forms of radiation commonly used in medicine. Includes ultraviolet, visible, infrared, radio frequency/microwave, ultrasound, diagnostic x-rays, radiation therapy.

***773 / Basic Clinical Radiobiology / D. Boreham**
This course is intended to introduce graduate students to the clinical applications of radiation biology in cancer therapy. The course will focus on the general aspects of DNA repair, cancer biology and clinical radiation therapy.

***775 / Advanced Radiation Physics / S.H. Byun**
Mathematical analysis of the radiation field; interaction coefficients, survey of interactions, radiation transport, electromagnetic and hadronic cascades, exposure, dose, kerma, dose equivalent, micro-dosimetry, interface dosimetry, cavity theory, shielding theory.

****776 / Introduction to Operational Health Physics / D.M. Tucker (cross-listed as UN 0805)***
An introduction to a number of topics that will be encountered in the practice of health physics. The following topics will be discussed: Dose limitation; dosimetric quantities for individuals and populations; ionizing radiation risks and hazards; ICRP-60; internal doses and the compartment model; derived air concentrations and annual limit on intake; metabolic models for respiratory system and GI tract, radiation safety at nuclear reactors, particle accelerators, irradiators, X-Ray installations and laboratories; pathway analysis; derived release limits; environmental monitoring, sample collection and preparation, and sources of radiation; atmospheric transport; cost benefit analysis; derivation of limits for surface contamination. Also listed as UN0805.

***777 / Special Topics in Medical Physics / Staff**
Directed reading course on advanced topics in Medical Physics to be designated by the staff instructing the course. Normally at least two topics will be allocated. Examples of such topics are: radiation induced chromosome aberrations and biological dosimetry; therapeutic applications of nuclear medicine; the role of stochastic geometry in microdosimetry; photobiological mechanisms and cancer therapy; digital radiographic techniques; statistics for medical imaging; iterative reconstructions in tomographic imaging; atomic and nuclear techniques in body composition. Topics will be designated so that they lie outside a student's

own research area. A student may register only once in this course and must have the permission of the Department.

***778 / Radiation Oncology Physics / T. Farrell, W. McMillan**
Theoretical aspects of clinical radiation oncology physics including dosimetry, radiation delivery, treatment optimization and dose calculation algorithms are presented in a series of lectures. These are complemented with clinical observation in which the practical implementation of radiation oncology is investigated.

***779 / Radiation Health Risks and Benefits / D. Boreham**
This course is designed to introduce graduate students to recent advances in radiation biology that have direct impact on our understanding of the health risks associated with ionizing radiation. The course will focus on mechanisms of radiation damage and repair and applications in medicine and industry.

***780 / Radiation Effects in Plants and Animals / C. Mothersill**
This course will consider past and newly developing approaches to protection of non-human species from the effects of radiation in the environment. The emphasis will be on practical problems of assessing radiation effects in ecosystems and on the ethical and legal dilemmas created by new research in this area.

Research in Medical and Health Physics

Research groups and research facilities exist in the Department of Medical Physics and Applied Radiation Sciences, Hamilton Health Sciences, the Juravinski Cancer Centre, St. Joseph's Hospital, and in different departments within the University. There are strong research links with the McMaster Institute of Applied Radiation Sciences (McIARS).

Current research activity includes dosimetry of diagnostic and brachytherapy radioisotopes, β interface dosimetry, imaging dose distributions (Prestwich), neutron micro-dosimetry (Byun), nuclear and atomic techniques used for analysis of both trace toxic elements and major components of human body composition (Chettle, McNeill, O'Meara, Pejovic-Milic, Bock), development of novel radiopharmaceuticals and medical use of radioisotopes in diagnosis and therapy (Valliant, Peng, Farncombe), novel methods of imaging bone architecture and joint structure non-invasively (Gordon, Webber), magnetic resonance imaging (Bock, Noseworthy), the role of DNA damage and DNA repair processes in carcinogenesis and in the response of tumour cells to radiotherapy and chemotherapy (Rainbow), the role of adaptive response, genomic instability and bystander effect in radiation risk assessment of human and non-human biota (Boreham, Mothersill, Seymour), laser and light propagation in tissue for photodynamic therapy and tissue characterization (Patterson, Farrell, Hayward), skeletal muscle function and the mechanisms of repair/regeneration (Parise), novel radiotherapy planning, delivery and verification techniques (Diamond, Ostapiak, Wierzbicki).

Facilities for Research

The swimming pool reactor (operated at 2MW) is available for projects involving medical radioisotope and radiopharmaceutical development, neutron activation, dosimetry and neutron radiography. The accelerator laboratory houses a KN Van de Graaff (usually operated at up to 2.5MV and currents up to 200 μA) and a polarized x-ray fluorescence facility, which are used for the development of in-vivo elemental analyses. Two new accelerators are being installed; one will be a microbeam facility for radiobiology research.

Within Nuclear Medicine there is an 11MeV proton cyclotron, primarily used for production of positron emitting isotopes, together with positron tomographs. Equipment used for body composition studies includes dual energy x-ray absorption scanners, a whole body counter and a peripheral quantitative computed tomograph.

At the Juravinski Cancer Centre there is a suite of laser and other light sources and detectors used in conjunction with studies on photodynamic therapy and other applications involving light propagation in tissue. It also hosts a full complement of high energy radiotherapy units including a robot-mounted linear accelerator (Cyberknife), various treatment planning systems, a well-equipped dosimetry lab and machine shop.

MEDICAL SCIENCES

The Graduate Program in Medical Sciences is designed to provide the opportunity for advanced education and research in the Biomedical and Health Sciences. Ph.D. level programs are available in: Metabolism and Nutrition (MN); Blood and Vasculature (BV); Cancer and Genetics (CG); Infection and Immunity (II); and Physiology/Pharmacology (PP).

The goal of the program is to provide students with the opportunity to become competent investigators in health-related research problems. This is accomplished in an environment in which multiple disciplines are represented and in a setting appropriate for acquiring a broad appreciation of problems in health and disease. Students are expected to acquire in-depth understanding and expertise in a specific area.

Enquiries: 905 525-9140 Ext. 22983
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Website: http://www.fhs.mcmaster.ca/medsci

Faculty / Fall 2012

METABOLISM AND NUTRITION

PROFESSORS
Stephanie Atkinson, B.A. (Western), Ph.D. (Toronto)
Christoph Fusch, M.D. (Tübingen), Ph.D. (Berne)
Mark Tarnopolsky, M.D., Ph.D. (McMaster)
Colin E. Webber, B.Sc. (Birmingham), M.Phil., Ph.D. (Surrey)

ASSOCIATE PROFESSORS
Thomas Hawke, B.Sc., M.Sc., Ph.D. (Guelph)
David Meyre, B.Sc., M.Sc. (USTL Lille University), D.E.A., Ph.D. (Paris-Grignon National Agronomic Institute), H.D.R. (USTL Lille University)
Greg Steinberg, M.Sc., Ph.D. (Guelph), PDF (Melbourne)

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Katherine Morrison, B.Sc. (McMaster), M.D. (Calgary)
Sandeep Raha, B.Sc.H., M.Sc., Ph.D. (Toronto) / Coordinator
Zainab Samaan, MBChB, MScPSych, MRCPsych, DMMD (Zena)

ASSOCIATE MEMBERS
Radhey S. Gupta (Biochemistry)
Colin A. Nurse (Biology)
Stuart Phillips (Kinesiology)

PROFESSORS EMERITI
Richard G. Butler, B.Sc., M.Sc. (Toronto), Ph.D. (A.N.U. Canberra)M.B.A. (McMaster)
Gerard T. Simon, M.D. (Geneva), F.R.C.P.(C)
Eva S. Werstiuk, B.Sc., Ph.D. (London, U.K.)

BLOOD AND VASCULATURE

PROFESSORS
Richard C. Austin, B.Sc. (Brock), M.Sc., Ph.D. (McMaster)
Anthony K.C. Chan, (Queen's), M.B.B.S. (Hong Kong), F.R.C.P.(C)
Robert Hart, B.S. (Antioch College, OH), MD (Columbia)
Catherine Hayward, B.Sc., M.D. (Western), F.R.C.P.(C), Ph.D.(McMaster)
John G. Kelton, M.D. (Western), F.R.C.P.(C)
Matthew McQueen, MBChB, Ph.D. (Glasgow), FCACB, FRCPC
Fred A. Ofosu, B.Sc. (McMaster), Ph.D. (Toronto)
Sam Schulman, M.D., Ph.D. (Stockholm)
William P. Sheffield, B.Sc., Ph.D. (McGill)
Jeffrey I. Weitz, M.D. (Ottawa), F.R.C.P.(C), F.A.C.P.

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Peter Gross, B.Sc., M.Sc., M.D., C.I.M.R.P. (Toronto), L.M.C.C.,A.B.I.M., U.S.M.L., F.R.C.P.C.
Peter Horsewood, B.Sc., Ph.D. (Loughborough, U.K.) / Part-time
Gonzalo Hortelano, B.Sc. (Basque), M.Sc. (Witwatersand),Ph.D. (Wollongong)
Joan Krepinsky, B.Sc., M.Sc. (Toronto), M.D. (McMaster)
Patricia Liaw, B.Sc. (McMaster), M.Sc. (Western), Ph.D. (McMaster) - Coordinator
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Janusz Rak, M.D., Ph.D. (Wroclaw, Poland)
Geoff Werstuck, B.Sc., Ph.D. (McMaster)

ASSISTANT PROFESSOR
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ASSOCIATE MEMBERS
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Bernardo Trigatti (Biochemistry)

PROFESSORS EMERITI
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Mark W.C. Hatton, B.Sc., M.Sc., Ph.D. (London)
Jack Hirsh, M.B., B.Sc., M.D. (Melbourne), M.R.C.P., F.R.C.P.(C),F.A.C.P., F.A.C.C.P.

CANCER AND GENETICS

PROFESSORS
Mickie Bhatia, B.Sc. (McMaster), Ph.D. (Guelph)
Ronald Carter, B.Sc., M.Sc. (Toronto), D.V.M., Ph.D., F.C.C.M.G.(Guelph)
John A. Hassell, B.Sc. (New York), Ph.D. (Connecticut)
Matthew McQueen, MBChB, Ph.D. (Glasgow), FCACB, FRCPC
John Waye, B.Sc. (Guelph), M.Sc. (McMaster), Ph.D. (Toronto)
Judith West-Mays, H.B.Sc. (Wilfrid Laurier), M.Sc., Ph.D. (Waterloo)/ Coordinator

ASSOCIATE PROFESSORS
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Holger (Hal) W. Hirte, M.D., F.R.C.P.(C) (Toronto)
Brian Leber, B.Sc., M.D., C.M., F.R.C.P. (McGill), F.R.C.P.(C) (McMaster)
Jehonathan Pinthus, B.Sc. (Ben-Gurion), M.D. (Hebrew University),Ph.D. (Weizmann Institute ofScience)
Murray Potter, B.Sc., B.Sc. Med., M.D. (Manitoba), F.R.C.P.,F.C.C.M.G.
Damu Tang, B.Sc. (Harbin, China), M.Sc., Ph.D. (Calgary)
Peter F.M. Whyte, B.Sc., M.Sc. (British Columbia), Ph.D. (SUNY atStony Brook)

ASSISTANT PROFESSORS
Kjetil Ask, PCEM, License, Maitrise (Burgundy), D.E.A. (Henri Poincaré), Ph.D. (Burgundy)
Anita Bane, M.B., BAO, B.Ch. (National University of Ireland, Galway),M.R.C.P. (U.K.), Ph.D. (Toronto)
Darren Bridgewater, B.Sc., Ph.D. (Western)
John Draper, B.Sc., Ph.D. (Sheffield)
Helga Duivenvoorden, M.Sc. (A.U.W. Netherlands), Ph.D.(S.F.I.T. Switzerland)
Michelle Ghert, B.A. (Stanford), M.D. (Vanderbilt)
Jefferson Terry, B.Sc. (Alberta), M.Sc. (Victoria), Ph.D. (B.C.), M.D. (Calgary), F.R.C.P.C.
Guillaume Pare, D.E.C. (Jean-de-Brebeuf), M.Sc., (McGill), M.D.
Theodoras Tsakiridis, B.Sc. (A.U. Greece), M.Sc., (London, U.K.),Ph.D., M.D. (Toronto), F.R.C.P.C. (McMaster)

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Suleiman Igdoura (Biology)

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Silvia Bacchetti, Sc.D. (Rome)
Patricia L. Chang, B.Sc. (Hong Kong), Ph.D. (Western)
Frank L. Graham, B.Sc. (Manitoba), M.A., Ph.D. (Toronto)

INFECTION AND IMMUNITY

DISTINGUISHED UNIVERSITY PROFESSORS
John B. Bienenstock, M.B., B.S. (U.K.), M.R.C.P., F.R.C.P.(C), F.R.C.P. / Emeritus
Stephen M. Collins, M.B., B.S. (London), L.M.C.C.(C), F.R.C.P.(C),E.C.F.M.G., V.Q.E.(U.S.A.), M.R.C.P.(U.K.)
Jack Gauldie, B.Sc. (McMaster), Ph.D. (London)

PROFESSORS
Jonathan Bramson, B.Sc., Ph.D. (McGill)
Gerard P. Cox, M.B., B.A.O., B.Ch. (Ireland), F.R.C.P.(C), F.R.C.P.(I)
Judah A. Denburg, B.A. (Yeshiva), M.D. (McGill, Hebrew Univ.)
Delsworth G. Harnish, B.Sc., M.Sc. (Queen's), Ph.D. (McMaster)
Manel Jordana, M.D. (Barcelona), E.C.F.M.G.(U.S.A.), Ph.D. (McMaster)
Mark Larché, M.Sc., Ph.D. (London, UK)
James B. Mahony, B.Sc., Ph.D. (Toronto) / Assistant Dean
Mark R. McDermott, B.Sc., Ph.D. (McMaster) / Coordinator
Carl D. Richards, B.Sc. (Western), M.Sc., Ph.D. (McMaster)
Kenneth L. Rosenthal, B.Sc., M.Sc. (Illinois), Ph.D. (McMaster)
Denis P. Snider, B.Sc., Ph.D. (Toronto)
Brian J. Underdown, B.Sc., Ph.D. (McGill) / Part-time
Zhou Xing, M.D. (North Sichuan, P.R.C.), M.Sc. (Tongi, P.R.C.), Ph.D. (McMaster)

ASSOCIATE PROFESSORS
Ronan Foley, B.Sc., M.D. (McMaster), F.R.C.P.(C)
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Timothy Gilberger, M.Sc., Ph.D. (Hamburg)
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Waliul Khan, M.B.B.S. (Bangladesh), Ph.D. (Japan), PDF (Manchester, McMaster)
Martin Kolb, M.D., Ph.D. (Würzburg, Germany)
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Karen Mossman, B.Sc. (Guelph), Ph.D. (Alberta)
Fiona Smaill, M.Sc. (McMaster), M.B., Ch.B. (Otago, New Zealand) F.R.C.P.(C), F.R.A.C.P.
Martin Stampfli, Licentiate in Biochem, Ph.D. (Bern, Switzerland)
Michael Van Ameringen, B.Sc., M.D. (McMaster)
Yonghong Wan, M.D., M.Sc. (Hubei Medical University)

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Dawn Bowdish, B.Sc. (Guelph), Ph.D. (British Columbia)
Paul Forsythe, B.Sc., M.Sc., Ph.D. (Queen's University Belfast)
Helen Neighbour, B.Sc., M.Sc., M.D. (University College London), Ph.D. (Imperial College, London)
Maggie Larché, B.Sc., MBChB (Bristol), M.R.C.P. (Royal College ofPhysicians), Ph.D. (London)
Brian Lichty, B.Sc. (Guelph), Ph.D. (Toronto)
Kathy McCoy, B.Sc.H. (Victoria, NZ), Ph.D. (Otago, NZ)
Ping Chang Yang, Ph.D. (Hunan)
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Kenneth Croitoru, M.D. (McGill)

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James Henry, B.Sc. (Toronto), M.Sc., Ph.D. (Western)
Dharam P. Singal, B.Sc., M.Sc. (Delhi), Ph.D. (Washington)

PHYSIOLOGY/PHARMACOLOGY

PROFESSORS
Jonathon D. Adachi, B.Sc., M.D. (McMaster), F.R.C.P.(C)
Alexander Ball, B.Sc., Ph.D. (Dalhousie)
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Laurie Doering, B.Sc. (Queen's), M.Sc., Ph.D. (Saskatchewan)
Margaret Fahnestock, B.Sc. (Stanford), Ph.D. (California, Berkeley)
Warren Foster, B.Sc., M.Sc. (Guelph), Ph.D. (McMaster)
Ashok K. Grover, B.Sc., M.Sc. (Delhi), Ph.D. (Calgary)
Anne Holbrook, B.Sc. Pharm. (Toronto), Pharm. D. (Philadelphia),M.D., M.Sc. (McMaster), F.R.C.P.(C)
Jan D. Huizinga, B.Sc., M.Sc., Ph.D. (Groningen) / Coordinator
Mark Inman, M.Sc. (Waterloo), M.D., Ph.D. (McMaster)
Luke J. Janssen, B.Sc., M.Sc., Ph.D. (McMaster)
Kieran J. Killian, M.B., B.Ch.,B.A.O., M.R.C.P. (Ireland), F.R.C.P.(C)
Robert M.K.W. Lee, B.Sc. (Mandalay), M.Sc. (Rangoon), Ph.D. (Alberta)
Nicholas Leyland, B.A.Sc. (Guelph), M.D. (Toronto), M.H.C.M. (Harvard), F.R.C.S.C.
Michael Mazurek, B.A., M.D. (Toronto), F.R.C.P.
Robert S. McKelvie, B.Sc., M.Sc., M.D. (Western), Ph.D. (McMaster)F.R.C.P.(C)
Ram K. Mishra, B.S., M.Sc. (India), M.S. (New Orleans), Ph.D.(St. John's)

Carlos Morillo, B.Ac. (Colegio San Carlos, Colombia), M.D.(Pontificia Universidad Javeriana, Columbia)
Lennard Niles, B.A. (Western), M.Sc., Ph.D. (Toronto)
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Alexandra Papaioannou, B.Sc.N., M.D., M.Sc. (McMaster)
Mary H. Perdue, B.Sc. (Windsor), M.Sc. (Toronto), Ph.D. (Calgary)
Michael Rathbone, M.B., Ch.B. (Liverpool), Ph.D. (McMaster), F.R.C.P.(C)
Ian W. Rodger, B.Sc. Ph.D. (Strathclyde) / Part-time
Gurmit Singh, B.Sc., Ph.D. (Dalhousie)
John Wallace, B.Sc., M.Sc. (Queen’s), Ph.D. (Toronto), M.B.A.(Birmingham, U.K.), F.R.S.C.
Salim Yusuf, M.B.B.S. (Bangalore), Ph.D. (Oxford), M.R.C.P.(U.K.)

ASSOCIATE CLINICAL PROFESSOR
Myrna Dolovich, B.E. (McGill)

ASSOCIATE PROFESSORS
David Armstrong, M.A., M.B. BChir, F.R.C.P.(uk), F.R.C.P.(C)
Gail Gauvreau, B.Sc., M.Sc. (Guelph), Ph.D. (McMaster)
Alison Holloway, B.Sc. (Toronto), Ph.D. (Guelph)
Shucui Jiang, B.Sc., M.Sc., M.D. (Qingdao Medical University), Ph.D. (Fed. Instit.forNeurobiol)
Patricia Rosebush, B.Sc.N.,M.Sc.N. (Toronto), M.D. (McMaster)
Michael Van Ameringen, B.Sc., M.D. (McMaster)

ASSISTANT PROFESSORS
PremyslBercik, M.S. (Charles, Prague), Ph.D. equivalent(Lausanne, Switzerland)
Jeffrey Dickhout, Ph.D. (McMaster)
Peter Kavsak, B.Sc. (McGill), Ph.D. (Toronto)
Renee Labiris, B.Sc., M.Sc. (McMaster), Ph.D. (Toronto)
Louis W.C. Liu, B.Sc., M.Eng., Ph.D., M.D. (McMaster)
Helen Neighbour, B.Sc., M.B.B.S. (University College London), Ph.D. (Imperial College London)
Elyanne Ratcliffe, B.A., M.D. (McMaster), F.R.C.P.C.
Brian Timmons, H.B.K. (Lakehead), Ph.D. (McMaster)
Elena Verdu, M.D. (Buenos Aires), M.D. thesis (Lausanne), Ph.D.(Czech Academic of Science)

ASSOCIATE MEMBER
Cameron J. Blimkie (Kinesiology)

PROFESSORS EMERITI
Edwin E. Daniel, B.A., M.A. (Johns Hopkins), Ph.D. (Utah)
George Heigenhauser, B.A. (Western), M.S., Ph.D. (Michigan)
Norman Jones, M.B., B.S., M.R.C.S., M.R.C.P., M.D., F.R.C.P.(London)
David C.Y. Kwan, B.Sc. (Hong Kong), M.Sc. (Wilkes), Ph.D.(Pennsylvania)
Jacob (Jack) M. Rosenfeld, B.Sc. (McGill), Ph.D. (Carleton)
Edward V. YoungLai, B.Sc., Ph.D. (McGill)

M.Sc. Degree

The requirements for the M.Sc. degree appear under the Regulations for the Master's degree near the beginning of this Calendar. A candidate for the M.Sc. degree is required to spend at least one calendar year in full-time study at McMaster University.

McMaster's Postgraduate Medical Education Program allows Clinician Investigator Program trainees the opportunity to undertake a Master's or Ph.D. degree as a full-time student (please refer to the Handbook for CIP trainees and the HSGP Policy re CIP Applicants; separate applications are required for both).

The candidate must complete, with at least B- standing, not fewer than one full graduate course, which must include at least one 700-level half course in Medical Sciences but may include one 700-level half course normally in the Faculty of Science or Faculty of Engineering. When appropriate, a maximum of one Health Research Methodology or Nursing half course may be taken by M.Sc. students. The candidate is also required to present a thesis, which embodies the results of original research. In a final oral examination the candidate will be required to defend the thesis.

Students wishing to be transferred to the Ph.D. program prior to the completion of a master's degree (see Section 2.1.2 of the General Regulations of the Graduate School and the statement entitled "Policy and Procedure for Transfer from M.Sc. to Ph.D. - Medical Sciences") must have an overall course average of B+ or better in the M.Sc. curriculum and must submit a critical Transfer Report, embodying a statement of progress and achievement in the research work to date and a proposal for Ph.D. research. The Transfer Report must be submitted to the student's Transfer Committee within 21 months from entry at the M.Sc. level as a full-time student. Approval to transfer will be determined at a meeting of the Transfer Committee at which the student will present his/her work and ideas for Ph.D. study orally.

Ph.D. Degree

A candidate for the Ph.D. degree must comply with the School of Graduate Studies Regulations for the Degree Doctor of Philosophy, including the completion of one and one-half full graduate courses beyond the B.Sc. or one additional half course in Medical Sciences beyond those required for the Master's degree. The three half courses beyond the B.Sc. must include at least one full 700-level graduate course in Medical Sciences, but may include one 600-level half course in Medical Sciences or one 700-level half course <u>normally</u> in the Faculty of Science or Faculty of Engineering. When appropriate, a maximum of one Health Research Methodology or Nursing half course may be taken from the B.Sc. to the level of Ph.D.

Candidates must also:

1. Obtain at least B- standing in course work.

2. Pass a Comprehensive Examination before the end of the twenty- first month following the start of their doctoral studies at McMaster. The examination, which consists of a written and oral part, gives students an opportunity to demonstrate their ability to acquire information about major issues in biomedical sciences and to evaluate critically such information. The written component of the Comprehensive Examination is a Canadian Institutes of Health Research (CIHR)-style grant proposal. In the oral component of the Comprehensive Examination, the student is expected to provide reasoned arguments in support of his/her interpretation of the scientific area under study, to demonstrate his/her ability to use the information acquired to formulate a hypothesis, and develop an experimental plan that addresses the hypothesis, to rationalize weaknesses and strengths of the experimental approach. The student and supervisory committee will agree on a topic that is of interest and value to the student and merit independent study. Further information regarding the comprehensive examination is contained in the Medical Sciences GraduateProgram Comprehensive Examination, Purpose and Procedure booklet, which is available in the Office of the Associate Dean of Graduate Studies (Health Sciences).

3. Present a thesis on an approved topic and defend the thesis at a final oral examination.

All graduate students in Medical Sciences are expected to present at least ONE research seminar during their M.Sc. and their Ph.D. studentships at McMaster.

Combined MD/Ph.D. Program

Students in the MD/Ph.D. program will complete both the MD curriculum requirements (eligible for MD residency programs), and the Ph.D. curriculum requirements in order to be eligible for particular academic placements across institutions. The program will seek to train individuals who will pursue research as a major priority and to prepare graduates for leadership roles in integrated research initiatives, particularly those involving interdisciplinary and translational health research endeavors. The program expects that McMaster MD/Ph.D. graduates will contribute significantly to the need for clinician scientists in a variety of roles. The program will accept up to 3 students on a yearly basis, and reach 10-15 students in the program at steady state.

The MD/Ph.D. program is offered in an integrated format with specific blocks of time provided for activities either in full- or part-time studies in either program. There will be opportunity for flexibility in the arrangement of a student curriculum, if requested and/or deemed appropriate.These requests will be reviewed by the MD/PhD program committee and the student's doctoral program, before making a recommendation to the Associate Deans. The Program utilizes the established MD curriculum and the established graduate programs of

Medical Sciences, Biochemistry, Neuroscience, Health Research Methodology, or Biomedical Engineering.

MD program fulfillment (in the MD/Ph.D. program): The new MD curriculum, electives and clerkship periods. Horizontal electives (optional in current MD program, not optional in the MD/Ph.D. program) must be completed during graduate research block (3 years). A minimum of 80 hours in horizontal electives must be completed satisfactorily.

Ph.D. program fulfillment (in the MD/Ph.D. program): Time will be allowed for attendance at regular research group meetings while in theMD curriculum. Attendance at MD/Ph.D. program group meetings (faculty and students) will be held a minimum of 3 times annually. In addition, students must complete the requirements of their PhD program, as outlined in the relevant section of Graduate Calendar, including the comprehensive examination and the submission and defense of a research thesis(the researchproposal should be completed as early as possible in the program).

Medical Sciences
Candidates must successfully complete the equivalent of three 700- level graduate half courses (credit for satisfactory completion of MD horizontal electives are provided within the graduate program such that only three courses are required), in addition to the other program requirements, as outlined in the Medical Sciences Program section of the Graduate Calendar.

Biochemistry
There is no course requirementfor the Biochemistry Ph.D.program unless the student's supervisory committee makes specific recommendations. Candidates must also complete the other program requirements as outlined in the Biochemistry Program Section of Graduate Calendar.

Neuroscience
All students in the Neuroscience graduate program are required to complete the 700 level Neuroscience course – The Nervous System – and a minimum of 1 (3-unit) course from the list of Neuroscience courses at the 700 level. Candidates must also complete the other program requirements as outlined in the Neuroscience Program section of the Graduate Calendar.

Health Research Methodology
Students in the Health Research Methodology program must complete a minimum of three HRM courses, with specific requirements depending on the field of specialization. Candidates must also complete the other program requirements as outlined in the Health Research Methodology Program Section of Graduate Calendar.

Biomedical Engineering
Students in Biomedical Engineering program must complete a minimum of six half courses beyond the baccalaureate degree orthree half courses beyond the M.Sc. degree. Candidates must also complete the other program requirements as outlined in the Biomedical Engineering Program section of the Graduate Calendar.

Courses

Courses marked with an asterisk (*) are half courses. Courses marked with a plus sign (+) may differ in content from year to year. Not all courses will be offered every year. Before students can enroll and register their name in the Health Sciences Graduate Studies Office in MDCL-2235 for any course, they must have permission from the course instructor.

6J03 / Biochemical Immunology / M. McDermott, J. Bramson, Z. Xing (cross-listed as Biochemistry *6J03 and Molecular Biology *6J03)
This advanced course applies small group-based learning to immunological problems. Topics concern development of immunoassays, resistance to infection and immunity in health and disease.

***701 / Cell Biology I / R. Austin, Staff**
Different structural and molecular aspects of both cellular and extracellular components will be discussed. Topics will include cell structure, calcium regulation, cytoskeleton, exocytosis, wound healing, matrix sythesis, cell adhesion, and integrins.

***702 / Cell Biology II / P. Whyte, Staff**
Topics to be discussed will include nuclear structure, chromatin structure and function, chromosomal dynamics and DNA replication. In recent years, it has been determined that many nuclear processes are localized to different areas of the nucleus and that processes such as transcription and DNA replication may be dependent upon interactions with nuclear structures. The relationship between nuclear structure and nuclear process will be emphasized throughout the course.

***703 / Gene Therapy / G. Hortelano, Staff**
An analysis of the technology of gene therapy. The principles of gene delivery through the use of viral and non-viral approaches, the particular characteristics of different target tissues and their suitability to be genetically modified, and the application of various gene therapy strategies in selected individual diseases of big impact to the health care system will be covered.

***704 / Cell Physiology / J.D. Huizinga, W. Kunze**
Cell physiology, with a focus on membrane transport, excitable membranes and cell to cell communication. The course will be problem based with other faculty members as discussants.

705 / Neurochemistry / R.K. Mishra (cross-listed as Neuroscience *705)

A detailed analysis of the molecular mechanisms underlying the action of neurotransmitters and neuropeptides in the nervous system. Topics will include: synaptic transmission, biochemical pathways of neurotransmitters and neuropeptides, using selected examples. Basic concepts in the interactions of transmitters and peptides with their receptors, structural and pharmacological differences, receptor affinity vs. efficacy, and receptor-coupling to second messengers will be discussed. The role of neurotransmitter-peptide interactions and their relevance in selected diseases will also be addressed.

708 / Signal Transduction: Dynamic Mechanisms of Actionof Growth Factors and Nuclear Receptors / R. Truant (cross-listed as Biochemistry *709)

The topics covered will include: Ras and GTP binding protein families, MAP kinase cascades; T-cell and B-cell activation; nuclear receptors for steroid and thyroid hormones. The course will be based on recent review articles and important current papers.

709 / Clinical Neuroanatomy / A. Ball, L. Doering (cross-listed as Neuroscience *709)

This course deals with the basic organization of the central nervous system (CNS) with an emphasis on pathways and diseases affecting the CNS. A different topic is dealt with each week. Topics include: (a) blood supply, CSF, meninges; (b) CNS topography, CT scans; (c) spinal cord tracts and reflexes; (d) medulla, pons, mesencephalon; (e) cranial nerves, base of skull; (f) cerebellum; (g) forebrain, ventricles, thalamus, olfaction, audition, vision; (h) basal ganglia, hippocampus, hypothalamus; (i) cortex; (j) Autonomic Nervous System.

710 / Human Anatomy / Staff

The anatomy of the human will be studied regionally by dissection and supplemented with self-teaching modules in all areas of morphology. Relevant embryology, histology and applied anatomy will be introduced in order to understand certain structures more completely.

711 / Psychoneuroimmunology / B. Sakic (cross-listed as Neuroscience *711)

Psychoneuroimmunology (or science about mind-body interactions) examines bi-directional communication among the nervous, endocrine and immune systems. By critically reviewing contemporary topics, the students are expected to learn about the role of the "regulatory metasystem" in the maintenance of homeostasis. The etiology of common neuroimmunologic diseases and the immune theory of some classical mental disorders will also be topics of discussion. The learning method involves both didactic and problem-based approaches, accompanied by computerized and interactive video animations.

***712 / Reproductive Endocrinology / W.G. Foster**

Graduate students taking this course will be introduced to general principles of endocrinology with a special focus on reproductive endocrinology. Students will gain knowledge of the structure and function of the reproductive tract and all relevant endocrine glands. An understanding of classical and contemporary methods of investigating the function of the reproductive tract will be covered. In addition, students will gain experience in oral presentation of complex scientific materials and how to prepare a grant application. Emerging issues and techniques as they apply to research in reproductive endocrinology will be covered in this course.

***713 / Integrated Systems in Gastrointestinal Health and Disease I / J. Huizinga, W. Khan**

The course will provide an understanding of the gastrointestinal tract emphasizing the integration of basic science and pertinent clinical issues. Each topic will highlight advances in cell physiology and molecular biology including the clinical perspective. Emphasis will be given to development of the gastrointestinal tract, digestive processes, absorption and motility. It is a non-compulsory companion course with MS *769.

***714 / Industrial and Environmental Toxicology / W. Foster**

This course is designed to provide graduate students and others with basic and advanced knowledge to develop awareness and insight of the toxicologic aspects of life-science research, related professional activities, and environment and health issues. Topics that are emphasized include: (i) pathways to humans; (ii) human health effects; (iii) toxicologic mechanisms; and (iv) a consideration and application of accepted critical-appraisal guidelines and skills to assess the occurrence, in animal experiments or human experiences, of the following: acute toxicity, subchronic toxicity, reproductive and developmental toxicity, mutagenicity, carcinogenicity, respiratory and skin sensitization.

***715 / Advanced Immunobiology I / Z. Xing**

This 2-module course will examine important current research issues in immunology through the discussion of research papers around specific topics and problems in immunology with an emphasis on the critical analysis of immunological studies and the regulation of the immune response. Specifically, the students will examine the use and interpretation of immunological data and common themes in various types of cellular immune responses.

***716 / Advanced Immunobiology II / C. Richards, M. Stampfli**
(formerly part of Medical Sciences *715)

This 2-module course examines current research issues in immunology through discussion of research papers on specific topics and problems in immunology with emphasis on the immune response in disease including immune mediated disease and infection with different types of organisms. Issues of regional immunity and immune mediated pathology will be emphasized.

***717 / Vaccines and Vaccine Immunology / Y. Wan, Z. Xing, J. Bramson**

Vaccines and vaccine immunology have become an important sub-discipline of modern biomedical practice and research. It becomes increasingly important to both prevention and treatment of infectious diseases, cancer, autoimmune diseases and allergic diseases. This course is designed to provide graduate students with the basic concepts of current human vaccination programs, methods used to developing various forms of new vaccines, and vaccine immunology.

***718 / Molecular Cytogenetics and Techniques / J.C. Wang**
The goal of this course is to provide students with a detailed understanding of the principles and techniques of molecular cytogenetics and the application in research and clinical service. The topics include prenatal cytogenetics and pre-implantation cytogenetics, cytogenetics of infertility, paediatric cytogenetics, cancer cytogenetics, and chromosome instability syndromes. The course will take a seminar-based format with student participation.

***719 / Electrophysiology of Excitable and Non-Excitable Membranes / L. Janssen**
The goal of this course is to provide students with a detailed understanding of ionic mechanisms in excitable and non-excitable cells, in health and disease. After outlining general principles (currents; voltages; ions; membrane properties), we will examine various ion channels and pumps in detail, then consider ionic mechanisms in a variety of cell types in health and disease. Depending upon students' interests, the latter could include: electrical signalling in nerve and muscle; absorption/secretion in renal nephrons and the epithelium (respiratory or gastrointestinal); volume regulation, excitation-secretion coupling and the oxidative burst in inflammatory cells; sensory transduction in various cell types (retina, chromaffin cells, baroreceptors, chemoreceptors); bone sculpting by osteoclasts/osteoblasts; fertilization in oocytes. The course will take a seminar-based format with student participation.

***720 / Tobacco and Health: From Cells to Society / W. Foster**
This course will provide students with a comprehensive overview of tobacco and tobacco-related issues from a public health perspective. The course focuses on patterns, determinants and health effects of tobacco use, the causes, impacts and interventions regarding nicotine addiction, and the prevention of tobacco use. Topics will include epidemiology, nicotine addiction, genetic factors, health effects, treatment issues, prevention, and policy issues. Students will be exposed to experts in the field who bring hands-on experience in tobacco control in addition to academic expertise.

***721 / Pathophysiology of Lung Diseases - Asthma and COPD / R. Sehmi, G. Gauvreau**
This graduate course will be drawn on the contribution of several field experts within the Respiratory group at McMaster University, to cover topics on the immunology of airway inflammatory diseases, asthma and chronic obstructive lung disease. This course will include elements of inflammation/immunity, as well as basic lung cellular biology, developmental biology, pharmacology, ventilation-perfusion, epithelial function (ion transport and defense), drug metabolism, pathophysiology and disease in asthma and chronic obstructive lung disease. At the end of this course the students should have a good conceptual understanding of the cell biology of airway inflammatory diseases and the pathological features associated with asthma and chronic obstructive lung disease.

***725 / Current Topics in Mucosal Immunology / C. Kaushic, D. Snider**
This course will provide an in depth understanding of selected key areas of mucosal immunology. It is intended for students who have taken basic immunology courses already, and who have an interest in new evolving areas of research in immunology. Students study such topics as: the role of ephithelial cells in mucosal immune responses; dendritic cells in mucosal

tissues; mucosal microbial flora; innate responses in mucosa; the role of IgA at mucosal surfaces (among many topics). The course will emphasize understanding problems and controversies in the selected topics.

***732 / Vascular Diseases, Haemostasis and Thrombosis I/ P. Gross**

This two-module course presents current concepts and basic mechanisms involved in haemostasis and thrombosis. Module 1: blood coagulation and fibrinolysis. Module 2: platelet physiology and biochemistry.

***733 / Vascular Diseases, Haemostasis and Thrombosis II/ P. Liaw**
(formerly part of Medical Sciences *732)

MS733 is a graduate course which is directed largely to the needs of students in the "Blood and Vasculature" area of the Medical Sciences Graduate Program, although other graduate students in Medical Sciences, Biomedical Engineering, or Biochemistry are welcome to attend. The subject areas covered in this course include evolution of the hemostatic system, the endothelium as an organ system, venous thrombosis, the microcirculation, animal models, intravital microscopy, vasculogenesis, angiogenesis, and atherosclerosis.

****740 / Advanced Concepts of Drug-Receptor Interaction / R. Mishra, L. Niles***
(cross-listed as Neuroscience *740)

Detailed analysis of drug-receptor data. The course includes theory of ligand binding and analysis of graphical plots applicable to drug receptor studies. Selected topics include discussion of binding sites for the major neurotransmitters and hormone classes, the functional aspects of the binding in normal and disease state, and application of biotechnology to study cell surface receptors and signal transduction mechanisms.

***742 / Topics in Respiratory Physiology / M. Inman**

A seminar-based approach to understanding the principles of respiratory physiology. Initial focus will be on functional anatomy, ventilatory mechanics, alveolar gas exchange, gas transport, cell gas exchange and control of breathing in the normal individual. The focus will then switch to mechanisms by which these processes are disrupted in disease and how this might result in disability or handicap. Classes will involve faculty introductory, interactive sessions and student presentations on current topics.

***747 / Pediatric Exercise Medicine / B. Timmons**

This course will provide an opportunity to study physiological and medical aspects of exercise and physical activity in healthy children and in children with a disease. The purpose and relevance of exercise testing and exercise rehabilitation in pediatric diseases will be highlighted, and student-directed seminars will further explore the role of exercise in specific pediatric populations with a disease or disability.

***749 / Human Molecular Genetics / J. Waye**
Review of recent advances in human genetics by the use of recombinant DNA technology. Basic principles and novel insights in gene structure and function, molecular etiology, diagnosis, and treatment of genetic diseases will be discussed in detail. Consideration of their clinical and societal relevance.

***750 / Topics in Host Resistance / J. Bramson**
This half-course is designed to cover any special topic within molecular virology, immunology or host resistance. Students will decide as a group the subject that will be investigated. In the first part of the course, the students will investigate the chosen area. The students will then identify issues that need to be investigated with guidance from the course coordinator. In the second part of the course, the students will prepare CIHR-style grant applications focused on extending the questions raised in class. In the final part of the course, the students will evaluate the grants using a peer-review system similar to CIHR.

***751 / Topics in Tumourigenesis / B. Lichty**
An introduction to the major elements in the multi-step development of a malignant tumour. The student will be introduced to a range of concepts including oncogenes, tumour suppressor genes, epigenetic alterations, the multi-step nature of tumourigenesis, angiogenesis, metastasis and immune evasion. The course will utilize seminal scientific publications from the field to exemplify these various aspects of tumourigenesis.

***756 / Human Nutrition and Metabolism / S. Atkinson,S. Phillips**
The course is a study of areas of nutritional biochemistry and human nutrition that integrate previous knowledge in biochemistry, physiology, genetics and endocrinology. Topics are discussed in relation to normal regulation of metabolism and nutritional aspects of specific human disease states. The approach to learning is through critical appraisal of the current research in specific areas of nutrition and metabolism with the objectives: to gain an appreciation of current areas of nutrition research; to understand appropriate models of investigation in the nutrition field; and to appreciate the limits to which research in animal and cell models can be extrapolated to human nutrition in both health and disease states.

***758 / Smooth Muscle Structure and Function I / L. Janssen**
An in-depth analysis of the structure, biochemistry, physiology, and pharmacology of smooth muscle cells. This will be a lecture course with major student participation, which will consist of preparation and presentation of seminars and a major critical essay.

***763 / Medical Virology / J. Mahony, K. Mossman**
Selected advanced topics in the study of clinically relevant human viruses will be covered using specific examples from the medical literature. Students will take turns presenting papers for discussion. Topics will include the epidemiology, natural history, and pathology of viruses causing human disease with an emphasis on molecular mechanisms of infection, virus replication, how viruses manipulate the host cell's innate immune response to infection, and the use of viruses as vectors for gene therapy.

765 / Advanced Functional Brain Imaging / M. Noseworthy (cross-listed as Biomedical Engineering *765)

Functional brain imaging using magnetic resonance techniques (MRI, and in vivo NMR) will be thoroughly discussed. Advantages and disadvantages, relative to other brain imaging modalities (CT, PET, SPECT, NIRS, US) will be discussed where appropriate. This course will provide students with an appropriate, yet complete, understanding of the underlying physics surrounding magnetic resonance and its relevance to neuroscience for the design of functional brain imaging experiments.

***766 / Causes and Consequences of Obesity / S. Raha,A. Holloway**

The goal of this course is to provide students with an understanding of the clinical consequences of obesity and the biological mechanisms that determine the pathogenesis of this condition. Topics will range from cellular mechanisms underlying obesity to population studies of obesity and its co-morbidities. We will also focus on adipose tissue as an endocrine organ, as well as the effects of the environment in promoting obesigenic pathways.

***767 / Physiology and Pathophysiology of Interstitial Cells of Cajal / J. Huizinga**

The objective of the course is to give the student an in-depth understanding of interstitial cells of Cajal (ICC). The discovery of these cells and the major advances in the understanding of their physiology in the last 15 years has changed the field of gastrointestinal motility irreversibly. The student will view the topic form a structural, physiological and clinical point of view. The student will get a new perspective on pacemaker functions in the gastrointestinal tract and other organs and on aspects of innervations of the gut by extrinsic and intrinsic nerves. The role of ICC in gastrointestinal diseases will also be discussed.

***768 / Clinical Topics in Nephrology and Renal Disease /R. Austin, A. Ingram**

The goal of this course is to provide students with an understanding of kidney structure/function as well as the clinical consequences of renal disease and the biological mechanisms that determine the pathogenesis of this condition. Initial focus will be on kidney structure, physiology and function, including renal anatomy, renal circulation and microcirculation, and fluid filtration. The focus will then switch to hypertension, diabetes, chronic renal failure and genetic renal diseases. The final focus will provide an overview on renal transplantation and dialysis. Sessions will comprise faculty presentations, interactive student sessions and student presentations.

***769 / Integrated Systems in Gastrointestinal Health and Disease II / J. Huizinga, W. Khan**

The course will provide an understanding of the gastrointestinal tract emphasizing the integration of basic science and pertinent clinical issues. Each topic will highlight advances in cell physiology and molecular biology including the clinical perspective. Emphasis will be given to immunology, inflammation and microbiology of the gastrointestinal tract. All will be put in the context of gastrointestinal health and diseases reflecting the bench to bedside approach of the clinical and basic researchers working in these areas. The course will include lectures, student presentation, discussion and essay writing by the student. It is a non-compulsory companion course with MS *713.

***770 / Advanced Introductory Immunology / M. McDermott**

This is an advanced course in immunology intended to rapidly educate students who have no formal training in this subject. The course will include all principal aspects of innate and adaptive immunity and a variety of specialty topics. Completion of this course will qualify students for enrolment in more advanced courses in immunology.

+*799 / Independent Study in Medical Sciences / Area Coordinator and Staff

This half-course is designed to allow students to tailor their learning by selecting specific topics in Medical Sciences relevant to their thesis research and do advanced work in this area. A student will identify a topic and, in consultation with a faculty member with expertise in the area, a course outline will be developed that is tailor-made to meet the student's particular requirement. The student will then study under the guidance of a faculty member and examine the pertinent literature critically. This course may be taken only once during the student's graduate studies.

NEUROSCIENCE

The McMaster Neuroscience Graduate Program is a collaborative partnership among the Faculties of Science, Health Sciences, Engineering and Social Sciences. All four faculties are within a few minutes walking distance, facilitating interactions among graduate students, postdoctoral students, and faculty. Our goal is to attract the brightest graduate minds available each year to the field of neuroscience, by providing meaningful research opportunities in a collaborative, resource-rich environment. We offer programs in five research areas: Cellular & Molecular Neuroscience; Clinical & Health Neuroscience; Cognitive Neuroscience; Computational Neuroscience and Systems & Behavioural Neuroscience. Programs offered at the Master's level include research project, coursework and thesis requirements, leading to a Master of Science degree in Neuroscience. Ph.D. programs include research project, coursework, seminar, comprehensive and thesis requirements, leading to a Doctoral degree in Neuroscience.

Email: neuroinfo@mcmaster.ca
Website: http://neuroscience.mcmaster.ca

Faculty / Fall 2012

DISTINGUISHED UNIVERSITY PROFESSORS

John B. Bienenstock, M.B., B.S. (U.K.), M.R.C.P, F.R.C.P.(C), F.R.C.P., F.R.S.C./ Director, The Brain Body Institute , Pathology & Molecular Medicine
Simon Haykin, B.Sc., Ph.D., D.Sc. (Birmingham), F.R.S.C., F.I.E.E.E/ Electrical & Computer Engineering

PROFESSORS

Alexander K. Ball, B.Sc., Ph.D. (Dalhousie)/ Pathology & Molecular Medicine
Sigal Balshine, B.Sc., (Toronto), Ph.D. (Cambridge) Canada Research Chair / Psychology, Neuroscience &Behaviour
Suzanna Becker, B.A., M.Sc. (Queen's), Ph.D. (Toronto)/ Psychology, Neuroscience &Behaviour
Patrick Bennett, B.Sc. (Tufts), Ph.D. (California-Berkley), Canada Research Chair/ Psychology, Neuroscience &Behaviour
Ana R. Campos, B.Sc., M.Sc. (Rio de Janerio), Ph.D. (Brandeis)/ Biology
Stephen Collins, M.B. B.S. (London), F.R.C.P. (U.K.), F.R.C.P.C./ Medicine
John Connolly, Ph.D. (London) / Linguistics & Languages
Denys deCatanzaro, B.A., M.A. (Carleton), Ph.D. (British Columbia)/Psychology, Neuroscience & Behaviour
Margaret Fahnestock, B.Sc. (Stanford), Ph.D. (California-Berkeley)/ Associate Director, McMaster Neuroscience Graduate Program, Psychiatry &Behavioural Neurosciences
Audrey Lyn Hicks, B.P.E., M.Sc., Ph.D. (McMaster)/ Kinesiology
J. Roger Jacobs, B.Sc. (Calgary), M.Sc., Ph.D. (Toronto)/ Biology

Timothy D. Lee, B.H.K., B.Sc. (Windsor), Ph.D. (Louisiana State) / Kinesiology
Terri L. Lewis, B.A. (Toronto), Ph.D. (McMaster)/ Psychology, Neuroscience & Behaviour
Daphne M. Maurer, B.A. (Swarthmore), M.A. (Pennsylvania), Ph.D. (Minnesota) / Psychology, Neuroscience & Behaviour
Michael F. Mazurek, B.A., M.D. (Toronto), F.R.C.P.(C) / Psychiatry & Behavioural Neurosciences
Ram K. Mishra, B.Sc. (Udaipur, India), M.S. (Punjab Agricultural University, India), M.S. (Louisiana State), Ph.D. (Memorial) / Psychiatry &Behavioural Neurosciences
Kathryn M. Murphy, B.A. (Western), M.A. Ph.D. (Dalhousie) / Director, McMaster Neuroscience Graduate Program, Psychology, Neuroscience & Behaviour
Lennard P. Niles B.A. (Western), M.Sc., Ph.D. (Toronto) / Psychiatry & Behavioural Neurosciences
Colin A. Nurse, B.E.Sc. (Western), Ph.D. (Harvard) / Biology
Michel P. Rathbone, M.B., Ch.B. (Liverpool), Ph.D. (McMaster), F.R.C.P.(C)/ Medicine - Neurology
James Reilly, B.A.Sc. (Waterloo), M. Eng., Ph.D. (McMaster) / Electrical and Computer Engineering
C. David Rollo, B.Sc., M.Sc. (Guelph), Ph.D. (British Columbia) / Biology
Patricia I. Rosebush, B.Sc. N., M.Sc.N. (Toronto), M.D. (McMaster), F.R.C.P.(C) / Psychiatry & Behavioural Neurosciences
Louis A. Schmidt, B.A. (Maryland), B.S. (Baltimore), Ph.D. (Maryland) / Psychology, Neuroscience & Behaviour
Allison B. Sekuler, B.A. (Pomona), Ph.D. (California–Berkeley), Canada Research Chair / Psychology, Neuroscience & Behaviour
David Shore, B.Sc. (McMaster), Ph.D. (British Columbia) / Psychology, Neuroscience & Behaviour
Claudio Soares, M.D., Ph.D. (Sao Paulo), F.R.C.P.C.
Peter Szatmari, B.Sc, M.Sc., M.D. (McMaster)/ Psychiatry & Behavioural Neurosciences
Henry Szechtman, B.Sc. (McGill), Ph.D. (Pittsburgh) / Psychiatry & Behavioural Neurosciences
Laurel J. Trainor, B.Mus., M.A., Ph.D. (Toronto) / Psychology, Neuroscience & Behaviour
Michael Van Ameringen, B.Sc., M.D. (McMaster) / Psychiatry & Behavioural Neurosciences
Judith A. West-Mays, B.Sc. (Wilfrid Laurier), M.Sc., Ph.D. (Waterloo) / Pathology & Molecular Medicine

ASSOCIATE PROFESSORS

Ramesh Balasubramaniam, Ph.D. (Connecticut) / Kinesiology
James R. Bain, N.S. (Western), M.Sc. (Toronto), M.D. (Western) / Surgery
Ian Bruce, B.Eng., Ph.D. (Melbourne) / Electrical & Computer Engineering
Bruce K. Christensen, B.A. (British Columbia), M.A. (Wayne State), Ph.D. (Vanderbilt) / Psychiatry & Behavioural Neurosciences
Laurie C. Doering, B.Sc (Queen’s), M.Sc., Ph.D. (Saskatchewan) / Pathology & Molecular Medicine
ReuvenDukas, B.A. (Jerusalem), Ph.D. (North Carolina State) /Psychology, Neuroscience & Behaviour

Paul Faure, B.Sc, M.Sc. (Calgary), Ph.D. (Cornell) / Psychology, Neuroscience & Behaviour
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Victoria Galea, B.Sc, M.Sc. (Waterloo), Ph.D. (McMaster) / Kinesiology
Deda C. Gillespie, B.Sc (Yale), Ph.D., (California- San Francisco) / Psychology, Neuroscience & Behaviour
Daniel Goldreich, B.Sc. (California-San Diego), Ph.D. (California-San Francisco) / Psychology, Neuroscience & Behaviour
Bhagwati Gupta, B.Sc. (Banaras Hindu), M.Sc. (Jawaharlal Nehru), Ph.D. (TATA Institute / Biology
Geoffrey B.C. Hall, B.Sc., M.Sc. (Guelph), Ph.D. (McMaster) / Psychology, Neuroscience & Behaviour
Karin Humphreys, Ph.D. (Indiana) / Psychology, Neuroscience and Behaviour
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Shucui Jiang, B.Sc. (Qingdao), M.Sc. (Shanghai), M.D. (Qingdao), Ph.D. (Fed. Inst. Neurobiology, Germany) / Medicine - Neurosurgery
Wolfgang Kunze, Ph.D. (McMaster) / Psychiatry & Behavioural Neurosciences
James Lyons, B.A., M.Sc. (McMaster), Ph.D. (Simon Fraser)/ Kinesiology
Randi McCabe, B.Sc., M.A., Ph.D. (Toronto) / Psychiatry & Behavioural Neurosciences
Michael Noseworthy, H.B.Sc., M.Sc. Ph.D. (Guelph) / Electrical & Computer Engineering
Elyanne Ratcliffe, M.D. (McMaster) / Pediatrics
Mel Rutherford, B.A. (Yale), Ph.D. (California-Santa Barbara)/ Canada Research Chair / Psychology, Neuroscience & Behaviour
Boris Sakic, B.Sc., M.Sc., Ph.D. (Belgrade, Yugoslavia) / Psychiatry & Behavioural Neurosciences
Ravi Selvanagapathy, B.S. (CERI), M.Sc., Ph.D. (Michigan) / Mechanical Engineering
Elisabet Service, Ph.D. (London) / Linguistics & Languages
Alex Sevigny, Ph.D. (Toronto) / Communication Studies & Multimedia
Judith M. Shedden, B.Sc. (Alberta), M.Sc., Ph.D. (Pittsburgh) / Psychology, Neuroscience & Behaviour
Hong-Jin Sun, B.Sc., M.Sc. (Peking), M.A. (Western), Ph.D. (Queen's) / Psychology, Neuroscience & Behaviour
Ray Truant, B.Sc., Ph.D. (Toronto) / Biochemistry & Biomedical Sciences
John Turnbull, B.Sc. (York), M.Sc. (Laval), M.D. (Western), Ph.D. (Montreal), F.R.C.P.(C) / Medical Sciences
Scott Watter, Ph.D. (Indiana) / Psychology, Neuroscience & Behaviour

ASSISTANT PROFESSORS
Paul Andrews, B. Eng. (Arizona), L.L.B. (Illinois), Ph.D. (New Mexico) / Psychology, Neuroscience & Behaviour
Steven Brown, Ph.D. (Columbia) / Psychology, Neuroscience & Behaviour
David Feinberg, B.Sc. (Rutgers), Ph.D. (St. Andrews) / Psychology, Neuroscience & Behaviour
Benicio Frey, M.D., M.Sc., Ph.D. (Universidade Federal do RioGrande do Sul) / Psychiatry & Behavioural Neurosciences

Joe Gabriele, Ph.D. (McMaster) / Psychiatry & Behavioural Neuroscience
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Margaret C. McKinnon, B.A. (Windsor), M.A., Ph.D. (Toronto) / Psychiatry & Behavioural Neurosciences
Zena Samaan, M.Sc. (Trinity College Dublin, Ireland), DMMD (Royal College of Surgeons of Ireland, Dublin), Ph.D. (Institute of Psychiatry and Kings College London, UK), MRCPsych (Royal College of Psychiatrists, London, UK) / Psychiatry & Behavioural Neurosciences
Roberto Saddi, M.D., Ph.D. (Sao Paulo) / Psychiatry & Behavioural Neurosciences
Elisabet Service, M.Sc. (Finland), Ph.D. (Helsinki) / Linguistics
Sheila Singh, B.Sc. (McGill), M.D. (McMaster), Ph.D., F.R.S.C. (Toronto) / Surgery
Valerie Taylor, M.D., Ph.D. (McMaster) / Psychiatry & Behavioural Neurosciences

PROFESSORS EMERITI
Larry E. Roberts, B.A., Ph.D. (Minnesota)/ Psychology, Neuroscience & ehaviour
Meir Steiner, M.D. (Tel Aviv University), Ph.D. (Michigan), F.R.C.P.C., C.P.S.O/ Psychiatry & Behavioural Neurosciences and Obstetrics & Gynecology
Sandra Witelson, B.Sc., M.Sc., Ph.D. (McGill) / Psychiatry & Behavioural Neurosciences

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M.Sc. Degree

All students will be required to take the 700-level Neuroscience course *The Nervous System* (full course). This course will cover the breadth of the field of Neuroscience in a series of modules, different instructors will contribute to teaching the modules and the course will be directed by a course coordinator. Students will also attend seminars as described below for the Ph.D. degree.

Students will complete a Master's research project. A written thesis and oral presentation describing the student's Master's research will be made to a committee of three faculty members appointed by the Director. The committee will examine the student on the Master's thesis and general knowledge of Neuroscience from the course taken in the first year.

Ph.D. Degree

A minimum of 1 one-term course beyond the Master's degree requirements (all students must take Neuroscience 700). The course must be from the list of Neuroscience courses and at the 700-level. The supervisory committee, in consultation with the student, may require additional course work. The list of Neuroscience courses covers the five areas represented in the graduate program: Clinical & Health Neuroscience, Cognitive Neuroscience, Computational Neuroscience, Cellular & Molecular Neuroscience, Systems & Behavioural Neuroscience; as well as Statistics and Quantitative Methods for research.

Students will complete an original research project and this will form the basis of the Ph.D. thesis that will be presented following the School of Graduate Studies regulations.

Seminar Requirement
Students will be expected to attend the seminars in the Neuroscience Program Seminar Series, including weekly journal club seminars presented by students and faculty, and regular colloquia presented by invited speakers. Master's and Ph.D. students will be required to present one seminar in the weekly series that describes their research.

Ph.D. Comprehensive Requirement
The Ph.D. comprehensive requirement must be completed within two years of entering the Ph.D. program and is designed to examine the student's ability to define a major question in Neuroscience research, to evaluate the research literature critically, to design experiments to address the research question, and to become familiar with a broad range of approaches across several of the five areas of Neuroscience research. The student, in consultation with their committee, will select an area of concentration that is relevant to, but distinct from, their thesis research. The comprehensive will take the form of a grant-style research report focused on the student s area of concentration and will address the four goals stated above. The student will submit the written proposal and be examined orally on the proposal as well as knowledge of the area of concentration. The committee will include the student's thesis supervisor (non-voting member), one member from the Supervisory committee, and two additional members from the Neuroscience faculty. The student's performance will be judge as Pass with Distinction, Pass, or Fail. Students who fail will have a second opportunity to take the comprehensive exam.

Progress Reports
Each year all students enrolled in the Neuroscience program will be required to submit a progress report to their supervisory committee detailing their achievements for the current year and objectives for the next year.

Supervisory Committee
Each student enrolled in the Neuroscience program will be required to have a supervisory committee that will help to direct the student's research. The committee will consist of the student's research Supervisor and 2-3 additional faculty members from the Neuroscience program. The committee will meet at least once a year to review the student's progress and objectives for the next year.

Thesis Evaluation Procedure
Theses will be evaluated following the School of Graduate Studies regulations.

Courses

Courses marked with an asterisk (*) are half courses and courses marked with a number sign (#) are quarter courses. Please note not all courses are offered every year.

700 / The Nervous System (Core) / K. Murphy

This course is designed to give the student fundamental and in-depth knowledge of the field of Neuroscience. The course will focus on the five areas of Neuroscience research (Cellular/Molecular, Clinical/Health, Cognition, Computational, Systems/Behavioural) and will include a section on ethical and professional issues in neuroscience research.

****705 / Neurochemistry / R.K. Mishra (cross-listed as Medical Sciences *705)***

A detailed analysis of the molecular mechanisms underlying the action of neurotransmitters and neuropeptides in the nervous system. Topics will include: synaptic transmission, biochemical pathways of neurotransmitters and neuropeptides, using selected examples. Basic concepts in the interactions of transmitters and peptides with their receptors, structural and pharmacological differences, receptor affinity vs. efficacy, and receptor-coupling to second messengers will be discussed. The role of neurotransmitter-peptide interactions and their relevance in selected diseases will also be addressed.

****709 / Clinical Neuroanatomy / A. Ball, L. Doering (cross-listed as Medical Sciences *709)***

This course deals with the basic organization of the central nervous system (CNS) with an emphasis on pathways and diseases affecting the CNS. A different topic is dealt with each week. Topics include: (a) blood supply, CSF, meninges; (b) CNS topography, CT scans; (c) spinal cord tracts and reflexes; (d) medulla, pons, mesencephalon; (e) cranial nerves, base of skull; (f) cerebellum; (g) forebrain, ventricles, thalamus, olfaction, audition, vision; (h) basal ganglia, hippocampus, hypothalamus; (i) cortex; (j) Autonomic Nervous System.

****711 / Psychoneuroimmunology / B. Sakic (cross-listed as Medical Sciences *711)***

Psychoneuroimmunology (or science about mind-body interactions) examines bi-directional communication among the nervous, endocrine and immune systems. By critically reviewing contemporary topics, the students are expected to learn about the role of the "regulatory metasystem" in the maintenance of homeostasis. The etiology of common neuroimmunologic diseases and the immune theory of some classical mental disorders will also be topics of discussion. The learning method involves both didactic and problem-based approaches, accompanied by computerized and interactive video animations.

#715 / Neuroscience Computational Methods / K. Murphy

Students will learn computational methods used in neuroscience research. These will include analytical methods for interpreting experimental data as well as methods for simulating predictions of computational models. Students will be introduced to both theoretical and practical aspects, including implementing algorithms in Matlab.

#721 / Lab Rotation in Neuroscience

The lab rotations give the student the opportunity to learn about the diversity of research problems in Neuroscience and the wide array of research methodologies used to address the research questions. Under the guidance of a faculty member the student will conduct a laboratory research experiment. This course may be taken twice with the permission of the Neuroscience Program Director.

***722 / Independent Study in Neuroscience**

This course is designed to allow students to tailor their studies to the particular topics in Neuroscience relevant to their area of research interest and to do advanced work in the area. The student will work under the guidance of a faculty member to critically evaluate literature on the selected topic in neuroscience.

****740 / Advanced Concepts of Drug-Receptor Interaction / R. Mishra, L. Niles (cross-listed as Medical Sciences *740)***

Detailed analysis of drug-receptor data. The course includes theory of ligand binding and analysis of graphical plots applicable to drug receptor studies. Selected topics include discussion of binding sites for the major neurotransmitters and hormone classes, the functional aspects of the binding in normal and disease state, and application of biotechnology to study cell surface receptors and signal transduction mechanisms.

Additional courses that are relevant to Neuroscience are offered by the following departments/programs.

Biology Course

***6T03 /** Neurobiology

Electrical and Computer Engineering Courses

***6BC4 /** Modeling of Biological Systems
***772 /** Neural Networks
***791 /** Sensory and Neuromuscular Engineering
***792 /** Medical Visualization
***795 /** Quantitative Electrophysiology
***796 /** Models of the Neuron

Kinesiology Courses

***705 /** Motor Behaviour
***707 /** Cognitive Dysfunction
***709 /** Neuromuscular Function in Aging and Disease
***711 /** Motor Control

Medical Sciences Courses

***708 /** *Signal Transduction: Dynamic Mechanisms of Action of Growth Factors and Nuclear Receptors (cross-listed as Biochemistry *709)*

***719 /** Electrophysiology of Excitable and Non-excitable Membranes

***744 /** Functional Neuroanatomy of Psychiatric Disease

***765 /** Advanced Functional Brain Imaging

Psychology Courses

***710 /** Statistics and Research Design

***724 /** Perception

***726 /** Behavioural Neuroscience

***728 /** Animal Behaviour

***729 /** Physiological Psychology

***730 /** Quantitative Methods

***734 /** Neural Networking of Cognition and Perception

#711 / Advanced Statistics and Computational Methods I

#712 / Advanced Statistics and Computational Methods II

Health Research Methodology Course

***731 /** Advanced Linear Models for Health Data

NURSING

The Graduate Program in Nursing provides the opportunity for advanced education and research in Nursing. M.Sc. and Ph.D. degree programs are offered on a full-time and part-time basis. The M.Sc. program allows selected students to obtain the extra requirements for the neonatal critical care specialist certificate. Those specializing as a Primary Health Care Nurse Practitioner may apply for advanced credit toward an M.Sc. Our programs provide students with the opportunity to become clinical health science investigators in Nursing, contributing to the development of the theoretical basis of practice and to the development and evaluation of health care interventions andprograms.

Students in the M.Sc. and Ph.D. programs can declare their intentions to focus within one of the following six areas of excellence. They are:

1. <u>Health Populations</u>

Our research focuses on health outcomes, patterns of health determinants,policies and interventions. Examples of topics may include the impact of socio-economic status, the environment, culture, and gender on health and quality of life. Nursing studies examining the impact of globalization are also included.

2. <u>Wellness and Healing Across the Lifespan</u>

Our research focuses on the study of interventions, relationships and interactions that foster a sense of belonging, well-being, and coherence. This field includes the study of traditional or alternative nursing modalities in periods of illness and crisis, and the role of spirituality in health.

3. <u>Health Services and Policy</u>

Health services research is a multidisciplinary field of inquiry, both basic and applied, that examines access to, and the use, costs, quality, delivery, organization, financing, and outcomes of health care services to produce new knowledge about the structure, processes, and effects of health services for individuals and populations. New knowledge in relation to nursing services is our focus.

Related to Health Services is Health Policy Research, which addresses the history, structure, theory and process of health policymaking to plan, implement, and evaluate policies. Topics may include the economic, ethical, and social implications of policy decisions, and may develop or assess strategies to advocate for policy change. Effective policies are essential to quality nursing services.

4. <u>Nursing Leadership and Management</u>
Research in Leadershipfocuses on studying the identificationand development of the skills and knowledge needed for leadership roles in nursing.

5. <u>Advance Nursing Practice</u>
Research in practice involves the study of relationships among advanced nursing practice, theory, and scholarly inquiry. Research may also focus on the development and evaluation of practice specialties with specific populations or settings (e.g., nurse practitioner) and knowledge exchange.

6. <u>Nursing Education</u>
Our research focuses on the investigation of teaching-learning modalities (e.g., self-directed learning, technology) for enhancing nursing education as a practice discipline, the development of the knowledge base related to learning to nurse, and the evaluation of educational programs and strategies. Examples of topics may include inter-professional learning, program evaluation, critical thinking, and reflective practice.

For those students wishing to pursue a graduate level advanced nursing practice program, graduate diplomas are offered in the following fields of specialization: Advanced Neonatal Nursing, and Primary Health Care Nurse Practitioner, details of which are set out under the Graduate Diploma Programs section at the back of this Calendar.

The Ontario Public Hospitals Act requires that all persons working in a hospital setting meet certain criteria regarding surveillance for infectious diseases. In order for the requirement of the legislation to be met, once students have been enrolled in the Nursing Program they must complete Pre-Clinical Communicable Disease Screening.

More information will be sent to specific applicants prior to registration. Specific questions can be directed to the Health Sciences Graduate Programs Office.

Enquiries: 905 525-9140 Ext. 22983
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E-mail: taym@mcmaster.ca
Website: http://www.fhs.mcmaster.ca/gradnursing

Faculty / Fall 2012

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ASSOCIATE MEMBER
Carrie McAiney (Psychiatry & Neurosciences)

M.Sc. Degree

A. M.Sc. by Thesis

The admission requirements are:

1. Baccalaureate degree (60 units taken at a university) with a minimum of a B+ average over the final 60 units from an undergraduate nursing program, or its equivalent, which will include 20 units of course work at the 400-level. Applicants who are graduates of a baccalaureate nursing degree program for registered nurses *and who have between 50 and 59 units* of university study will be considered on a case-by-case basis.
(Notes: Applicants who do not hold a professional degree may be required to do make-up course work prior to admission. These 60 units will not include advanced credit for college courses.)

2. Two academic and one clinical references.

3. Evidence of current registration or eligibility for registration with the College of Nurses of Ontario.

4. A letter outlining career plans, research interests, and suitability for this professional nursing program.

5. Identification of a faculty member who agrees to supervise the student.
(Note:Assistance will be provided in obtaining a supervisor for students residing outside Canada.)

For information on the Advanced Neonatal Nursing Diploma and the Post-Master's Graduate Diploma (Primary Health Care Nurse Practitioner) programs, please refer to the 'Diploma' Section of this Calendar.

A graduate level diploma in Health Services and Policy is also outlined under the Graduate Diploma Programs section.

The general requirements for the M.Sc. degree appear under the Regulations for Master's degrees near the beginning of this Calendar.

Candidates may be full-time or part-time and must:

1. Complete, with at least a B– standing, a minimum of five graduate half courses which must include NUR *701, NUR *745, HRM *721, NUR *709 or HRM *701/*702, and one additional half course selected by the student in conjunction with his/her supervisory committee which may be at the 600 level.

2. Complete a thesis on an approved health care issue and defend the thesis at a final oral examination.

Students wishing to be transferred to the Ph.D. program prior to the completion of a master's degree (see section 2.1.2 of the General Regulations of this Calendar and the statement entitled "Policy and Procedure for Transfer from M.Sc. to Ph.D. - Nursing") must have completed the minimum course requirements for the M.Sc. curriculum (as detailed above in item 1), and strictly adhere to the Policy and Procedure for Transfer from M.Sc. to Ph.D. - Nursing document. The Transfer Report must be submitted to the Transfer Committee within 18 months from entry at the M.Sc. level as a full-time student. Approval to transfer will be determined at a meeting of the Transfer Committee.

B. M.Sc. by Course Work

A course-based M.Sc. degree option in Nursing is offered on a full-time or part-time basis. The admission requirements are the same as for the M.Sc. thesis option 1-4 (see above). Each student will have a Faculty Advisor assigned by the Assistant Dean. Each student will be required to complete a minimum of seven graduate half courses which must include the four required courses: NUR *701, NUR *711, NUR *745 and HRM *721. The remaining courses will be chosen by the student with the approval of his/her faculty advisor and usually center around a theme. With the permission of the course instructor and faculty advisor, a student's minimum course requirements may include up to two 600-level graduate half courses. In addition, each student must write a 15 to 20-page scholarly paper on a topic approved by two examiners approved by the Assistant Dean.

For those wishing to obtain a Primary Health Care Nurse Practitioner certificate and a course-based M.Sc. degree, admission requirements are the same as for other course-based M.Sc. students with the additional requirement of two years' full-time nursing practice within the past five years.Students complete three core courses (NUR *701 (seminar only), NUR *712, NUR *768), write the 15-20 page scholarly paper, and complete the seven courses offered through the NP Consortium (NUR *761-*767). Since the seven PHCNP courses are offered every year, they can be completed in 12 months of full-time study. The program typically requires 3 years to complete. Once the PHCNP courses have been completed successfully, students are eligible to write their RN (Extended Class) exams.

Ph.D. Degree

The admission requirements are:

1. Master's degree or demonstrated readiness to transfer from the M.Sc. to the Ph.D. degree within the McMaster program.

2. Completion of a research thesis or equivalent (e.g., the candidate has already conducted funded research).

3. Same as requirements 2 through 5 under the M.Sc. Degree.

A candidate for the Ph.D. degree must comply with the School of Graduate Studies Regulations for the Degree Doctor of Philosophy.

Candidates must:

1. Obtain at least B- standing in a minimum of three half courses beyond those required for the M.Sc. degree, one of which must be NUR *700. NUR *701 must also be taken as one of the three required courses for the degree, if an equivalent course was not previously taken at the Master's level.

2. In addition to the above minimum course requirements for the Ph.D., candidates must successfully complete an approved research methods half course, and one HRM statistics half course, if equivalent courses were not previously taken at the Master's level.

3. Pass a Comprehensive Examination before the eighteenth month from their date of entry into the doctoral program.

4. Submit a thesis on an approved topic and defend the thesis at a final oral examination.

Students entering the Ph.D. program after transferring from the McMaster M.Sc. Program in Nursing must obtain at least B- standing in a minimum of three half courses beyond those required for the M.Sc. degree, one of which must be NUR *700. For students who have completed this course at the master's level, another course must be selected by the student and the supervisory committee. Items 3 and 4 of the above listed Ph.D. requirements must also be completed.

Courses

Courses marked with an asterisk (*) are half courses. Electives may be drawn from Health Sciences, including Health Research Methodology courses. NUR *702 and NUR *703 can be taken more than once at the M.Sc. level and more than once at the Ph.D. level but only one of these two courses can be counted towards the minimum course requirements of the program at each level. Students taking NUR *702 cannot also receive credit for any subsequent regular course offering on the same topic. Not all courses are offered each year. Appropriate courses may be selected from other departments in consultation with the supervisory committee.

***700 / Philosophical Basis of Nursing Research / C. Tompkins**
This course will explore, in seminar format, paradigms for clinical nursing research by examining the philosophical basis for development of clinically relevant knowledge. Topics include: history of the separation of science and religion, natural from social sciences; basic tenets of scientific method; critiques of modern/positivistic thinking (social construction of knowledge); assumptions of qualitative and quantitative research paradigms; and generation of clinically relevant knowledge. Anti-requisite: HRM *700.

***701 / Theoretical Basis of Nursing Practice / J. Ploeg, E. Staples**
Students will carry out supervised field-based practice to provide them with the opportunity to develop autonomous roles in multiple clinical settings, allowing critical analysis and evaluation of concepts and theories relevant to the proposed research topics. Practice will be complemented by seminars focused on the related concepts and theories including biological, psychological,epidemiological, and environmental perspectives. Students will make presentations and write assignments using theoretical frameworks and concepts appropriate for the clinical situations. Note: Students registered in the M.Sc. leading to the Primary Health Care Nursing Practitioner Certificate will complete the seminar only, and received advanced credit for the practice component.

***702 / Selected Topics in Nursing / J. Skelly**
This selected topics course will present leading edge thinking in relation to specific areas or issues in nursing. The specific topics will be developed in response to needs identified by faculty or students.

***703 / Independent Study in Nursing / J. Skelly**
The course is designed to allow the student to tailor their learning to specific topics in nursing or health care relevant to their nursing and research interests and to do advanced work in this area. The topic studied will not overlap with the student's thesis topic. Under the guidance of a faculty member, the student will examine critically the pertinent literature.

***706 / Research Issues in the Introduction and Evaluationof Advanced Practice Nursing Roles / D. Bryant-Lukosius**
The search for more cost-effective strategies to deliver health care and the nursing profession's emphasis on the development of advanced practice nursing (APN) roles have afforded the opportunity to consider expanded roles for nurses in a variety of primary, secondary and tertiary health care settings. A major change in the delivery of health services should be based on scientific evidence where possible. This course will focus on the steps involved in introducing and evaluating new roles for APNs, related research methods, APN models, working with decision-making partners, and writing successful related research proposals. A separate distance education fee will apply.

***707 / Theoretical Foundations of Leadership andManagement in Nursing / C. McKey**
This course explores, in particular, leadership and management paradigms that inform the nurse and the profession. The pertinent literature related to leadership and management within nursing and the broader health care environment is critically analyzed and applied. Topics include, but are not limited to: a) exploration of leadership and management frameworks in nursing and health care; b) critique of leadership theories; and c) examination of leadership's impact on the role of the nurse, the profession, and the health care system. The foci of the course are the exploration, critical analysis, and application of theory and research findings related to leadership.

***709 / Statistical Methods in Nursing Research / N. Akhtar-Danesh**
This course focuses on the main statistical issues that might be useful in nursing research. Some specific topics of the course are descriptive statistics, probability distributions (binomial, Poisson, normal), comparison between two mean values, one-way and two-way Analysis of variance (ANOVA) and post-hoc tests, correlation and simple linear regression analysis of the frequency tables, and some non-parametric tests.

***711 / Advanced Practicum in Nursing / J. Ploeg, Staff**
This course is designed to allow the student to tailor learning to a selected practicum in clinical, education, research or administration, which meets specific educational needs. Students choose clinical activities in their selected practicum to develop expert skills complemented by critical appraisal of existing theories and testing of concepts. The clinical practicum should be completed in a setting other than that used for NUR *701. This course is required for students enrolled in the course-based M.Sc.

***712 / Evidence-Based Health Care / D. Ciliska, J. Yost**
Evidence-based health care (EBHC) is the integration of best research evidence with patient preferences, clinician skills and available resources when making health care decisions. It involves the definition of questions that allow clear answers, the efficient searching for the best information to answer the question, the critical appraisal of the evidence to determine its strength, the extraction of the clinical/management/education/policy message, and the dissemination and utilization in health care decision-making.

720 / Advanced Nursing Care of High Risk Infants and Families / J. Wilson, Staff
This problem-based learning course allows students to apply advanced problem-solving skills using selected clinical problems relevant to neonatal critical care. Students will acquire advanced theoretical knowledge in the physiological, behavioural, medical, and nursing sciences required for solving neonatal-focused problems through the identification and analysis of literature reviews and research papers. Students will develop differential medical and nursing diagnoses and plans of care and critically analyze the health and illness management strategies and outcomes of each case.

721 / Advanced Neonatal Nursing Clinical Practice I/ J. Wilson, Staff
This course provides an opportunity for students to develop advanced skills and knowledge by progressive clinical experiences through exposure to patient and family situations in the neonatal intensive care unit. Students will develop and implement a plan of care for a selected patient(s) and families, utilizing a variety of skills and knowledge applications. Students will provide health and illness management of neonates who require intensive medical and nursing care.

***722 / Advanced Neonatal Nursing Clinical Practice II / J. Wilson, Staff**
Students will have the opportunity to consolidate their advanced skills and knowledge in an intensive clinical experience and to demonstrate increasing responsibility and independence in the care of patients and families with complex needs and problems. This experience will

provide students the opportunity to refine their diagnostic and therapeutic clinical skills. Seminar discussions will cover issues relevant to the student's new role, including systems entry and clinical issues: parental support, premature infant feeding, long-term follow-up of ill neonates, pain management.

724 / Theoretical Foundations of Leadership and Organizational Effectiveness / C. McKey
This course will explore organizational effectiveness and leadership paradigms and theories that inform the nurse and the profession. The pertinent literature related to issues impacting organizational effectiveness and leadership, in particular, recruitment, retention, professional practice environments, mentorship, and entrepreneurship in nursing and the broader health care environment will be critically analyzed and applied.

****725 / Knowledge Exchange and Translation / J. MacDermid***
(cross-listed as Rehabilitation Science *725)
This modular course will present students with an introduction to basic principles, conceptual frameworks, research design, and interventions used in knowledge exchange and translation. Faculty with specific expertise in knowledge exchange and translation for different target audiences (patients/public, policy makers, clinicians) will facilitate modules that address theoretical and practical issues around using developed knowledge to improve health or health care systems. Students will present their research protocol or KET project in the final module.

***728 / Issues in International and Intercultural Health /B. Majumdar**
This course is intended for students who have had little or no professional work experience in international or northern Canadian settings and who desire an orientation to the priorities, issues and strategies for health and development. The course will provide students with a structured introduction to health issues in a rural Canadian and international context, and challenge them to build a conceptual framework that is useful for analysing these problems. During this course students will be introduced to the literature of development, political economy, medical and social anthropology and international and intercultural theories for nursing practice in these settings.

****745 / Qualitative Research Methods / P. Baxter, S. Jack(cross-listed as HRM *745)***
This course introduces learners to theoretical traditions and corresponding methods of qualitative research using health and health care research as examples. Specific topics covered include: theoretical paradigms of qualitative research, types of research questions best answered by qualitative methods, sampling objectives and procedures, methods of data collection, methods of analysis and interpretation, and ethical issues and responsibilities of qualitative researchers. Criteria for evaluating qualitative research will be discussed and applied to specific research studies. Learners will gain "hands on" experience using qualitative methods through in-class and take-home exercises.

758 / Qualitative Research Methods for Collecting,Analysing and Interpreting Data / L. Lohfeld, (cross-listed as HRM *758 and Rehabilitation Science *758)

This intermediate-level course builds on prior knowledge about qualitative research approaches and their philosophical bases. The emphasis in this course will be on how the approaches affect sampling and data collection, data management, analysis, interpretation, and write-up. Students will also examine the writing of qualitative research proposals, including consideration of ethical issues. The course is based on active involvement of learners through student-directed discussions and hands-on experiences, guidance and facilitation by graduate faculty with expertise in qualitative research, and interdisciplinary collaboration with faculty and classmates.

The following courses, *761-767, are required courses for the Primary Health Care Nurse Practitioner.

***761 / Pathophysiology for NPs / K. McHugh, M. van Soeren**

A system's approach is used to examine concepts in pathophysiology (patho) as a basis for advanced nursing practice. Case studies will provide a comprehensive overview of the etiology, pathogenesis, and clinical manifestations of disease in adults and children. Building on knowledge of normal anatomy and physiology across the lifespan, the student will learn to demonstrate an understanding of physiological principles such as clinical manifestations, alterations in physiological function in organs and systems, and the impact of stress on age-related, acute, episodic, and chronic conditions found in primary health care practice.

***762 / Advanced Health Assessment and Diagnosis I**

This course introduces concepts and frameworks integral to advanced health assessment and diagnosis in nursing practice. It emphasizes comprehensive and focussed health assessment, including history taking, physical assessment and diagnostic reasoning as well as laboratory and diagnostic test selection and interpretation for the adult client. This lays the foundation for clinical decision making from data collection to diagnostic plan of care.

***763 / Advanced Health Assessment and Diagnosis II**

This course builds on the knowledge and skill acquired in AHAD I and applies the framework, concepts and methods of health assessment and clinical decision making studies in AHAD I to specific populations across the lifespan, to families and to the community. In addition, advanced practice skill pertaining to diagnostic test assessment is examined.

***764 / Therapeutics in Primary Health Care I / F. Schroeder, C. Dara**

This course introduces concepts integral to pharmacotherapy, advanced counselling, and complementary therapies predominantly related to common episodic conditions of clients across the lifespan. It emphasizes the therapeutic care plan approach, which focuses on the following aspects: drug-related problems, goals of therapies, analysis of different therapeutic approaches, need for referral, monitoring parameters, acceptability to the client, and follow-up.

***765 / Therapeutics in Primary Health Care II / F. Schroeder, C. Dara**
This course builds on the knowledge acquired in both Therapeutics I and AHAD I and applies the frameworks and concepts of pharmacotherapy, advanced counselling, and complementary therapies predominantly to clients with chronic conditions and special populations.

***766 / Roles and Responsibilities / D. Edge, S. Karp**
In Roles and Responsibilities (R&R), the learner will be expected to engage in reflection of their previous and present nursing practice. Reflective practice promotes both personal and professional growth.

***767 / Integrative Practicum / F. Donald**
The Integrative Practicum (IP) course is the final course in the Primary Health Care Nurse Practitioner Program. AHAD Part I and Part II, R&R, Patho, and Therapeutics Part I and Part II are pre-requisites for IP. The IP course will provide the Primary Health Care Nurse Practitioner student an opportunity to consolidate advanced nursing knowledge, theory, and skills. The course is divided into two integrated and concurrent parts: seminars, and clinical placements, both of which build upon critical thinking, self-directed learning and collaborative methods to assist the student to integrate theory and research based practice.

***768 / Building a Repertoire of Decision-Making Skills / S. Boblin**
This course presents concepts, models and theories related to clinical decision-making. A combination of large group lectures by experts and small group tutorials will be used. The course will provide learners with a combination of theoretical knowledge and practice-based skills, including clinical reasoning, judgement and critical thinking. Active learning is an expectation, with evaluation focusing on the application of knowledge to the clinical situation.

****770 / Mixed Methods Research Designs for Health Services and Policy Research / S. Jack, Staff (cross-listed as HRM *770)***
This course introduces students to the major concepts and issues involved in mixed methods approaches to tackle important questions in the field of health services and policy. LearnLink is used as the mode of instruction. A framework for thinking about mixed methods will be developed that provides guidance to decision-making about when and how to use mixed methods and models to study health services and policy problems. The course will provide students with knowledge of the current controversies and major challenges in the use of mixed methods and models of research. Students are expected to design a mixed method study as part of the course and critically evaluate the design options chosen by a classmate.

CLINICAL HEALTH SCIENCES

***719 / Foundations of Education in the Health Sciences/ L. Martin, Staff**
This course will explore the education literature through discussion and application to health sciences issues, including health professional education. Examination of early education literature and changes over time in the philosophy and practice of education will provide the framework of approaches to teaching and learning. Topics include: recurrent issues in health professional education; teacher and learner centred educational approaches; psychomotor learning; cognitive psychology and learning; instructional and evaluational methods.

OCCUPATIONAL THERAPY

The Faculty of Health Sciences Graduate Programs and the School of Rehabilitation Science offer a Master of Science in Occupational Therapy degree program. The goal of the Master of Science (OT) is to prepare graduates to be occupational therapists who possess the requisite knowledge, skills and professional behaviours to practice in the emerging realities of the new health care system and the broader societal context of rapid and constant change, within our local, national and international communities. Students will achieve an understanding of the influence of family, society, culture and environment as they explore the concepts of occupation and health across the lifespan within the context of client-centred practice. The M.Sc. (OT) is a full time course-based Master's degree. Graduates with a strong research interest may be eligible to proceed to thesis-based graduate programs should they wish to do so in the future.

Enquiries: 905 525-9140 Ext. 27829, Admissions Coordinator
Fax: 905 524-0069
Email: otpt@mcmaster.ca
Website: http://www.discovermacsrs.ca/

Faculty / Fall 2012

PROFESSORS
Susan Baptiste, Dip. OT (England), M.H.Sc. (McMaster)
Mary Law, B.Sc. OT (Queen's), M.Sc. (McMaster), Ph.D. (Waterloo)
Cheryl Missiuna, B.Sc.OT (Western), M.Sc (Calgary), Ph.D. (Toronto)

ASSOCIATE PROFESSORS
Jacqueline Bosch, B.Sc.OT (Queen's), M.Sc. (McMaster)
Carol DeMatteo, Dip. P&OT (Toronto), M.Sc. (McMaster)
Lori Letts, B.Sc. OT (Western), M.A. (Waterloo), Ph.D. (York)
Debra Stewart, B.Sc. OT (Toronto), M.Sc. OT (McMaster)
Joyce Tryssenaar, B.Sc.OT (Western), M.Ed. (Brock), Ph.D. (Western)/ Part-time
Brenda Vrkljan, B.A. (Wilfrid Laurier), M.C.Sc.OT, Ph.D. (Western)

ASSOCIATE CLINICAL PROFESSOR
Nancy Pollock, B.Sc.OT (Queen's), M.Sc. (McGill)

ASSISTANT PROFESSORS
Rebecca Gewurtz, B.Sc. (Toronto), B.Sc.OT (Queen's), M.Sc., Ph.D. (Toronto)
Jocelyn Harris, B.A. (Waterloo), B.H.Sc. (McMaster), M.Sc., Ph.D. (British Columbia)
Bonny Jung, B.Sc.OT (Toronto), M.Ed. (Brock), Ph.D. (Western)
Sandra Moll, B.Sc. OT, M.Sc. OT (Western), Ph.D. (Toronto)
Lorie Shimmell, Dip.OT (McMaster), B.H.Sc.OT, M.Sc. (McMaster)

ASSISTANT CLINICAL PROFESSOR
ShaminderDhillon, B.Sc. (McMaster), B.H.Sc.OT, M.Sc. (McMaster)

Admission Requirements

To be eligible for admission to the M.Sc.(OT) program, applicants must have completed a four-year baccalaureate degree or the equivalent number of courses (120 units/credits) and have achieved a minimum grade-point average of "B" or 75% or 3.0/4.0 or 8.0/12.0 in their final 60 units of credit. Post-graduate coursework is also considered in this GPA calculation, and calculated on a case-by-case basis.

Applicants may apply during the fourth year of their degree. In this case, the pre-admission GPA for eligibility purposes is calculated using the most recent 60 units of credit towards their degree. If an applicant in this category is subsequently offered admission to the program, the offer is "conditional" upon successful completion of their four-year degree by June 30 in that year and maintenance of a B average in their final 60 units of credit.

An offer of admission is contingent upon a "clear" approved police check or approval by the Assistant Dean (as per the Police Records Check Policy approved by McMaster University Senate December 8, 2010).
See www.srs-mcmaster/Portals/20/pdf/admissions/Ot_PT_Student_Police_Records_Check.pdf for the full policy.

Application Procedure

Applicants are required to apply via the ORPAS online application service located at the Ontario Rehabilitation Sciences Programs Application Service (ORPAS), Guelph, Ontario website: http://www.ouac.on.ca/orpas/.

Top ranked applicants (based on GPA) will be invited for a personal interview, which entails a series of seven “mini interviews.” Personal qualities and life experiences are assessed at these “mini” interviews. Interviewers are drawn from the faculty, the community, and current students.

Enquiries: 905 525-9140 Ext. 27829, Admissions Coordinator
Fax: 905 524-0069
Email: otpt@mcmaster.ca
Website: http://www.discovermacsrs.ca/

Program Requirements

The Master of Science in Occupational Therapy is a full time course-based accredited professional Master's program. It prepares students with knowledge, skills, and professional behaviours to practice as entry level occupational therapists. The program utilizes a problem-based self-directed learning philosophy. Students will complete course work, clinical practica, and an independent evidence-based practice project during their two extended study years, from September to July (Year 1) and September to September (Year 2). All courses are required.

The University reserves the right to cancel academic privileges of a student at any time should the student's scholastic record or conduct warrant so doing. For details on procedures and requirements related to university-based courses, clinical practica courses, remediation, and required withdrawals for the Occupational Therapy Program, students should consult the relevant sections of Graduate Calendar and the program's Student General Guide, Curriculum Guide, Professional Practica Handbook, and Term handbooks. In the event of a discrepancy between these documents and the Graduate Calendar, the Graduate Calendar represents the official policy.

Courses

***616 / Foundational Knowledge I**

Foundational Knowledge I is the first of two half courses in the first year of the occupational therapy program, which focus on the requisite knowledge in foundational sciences (biological, social and research) for occupational therapy education, research and practice. Using a self-directed learning approach, students identify their current knowledge level in the three foundational sciences and develop a learning plan. A variety of learning resources are provided by faculty for students to access. Resources include formal learning sessions with faculty, modules on ELM, electronic text, online resources and quizzes. Total in-class time is approximately 36 hours. At the completion of the course, students develop a portfolio on foundational knowledge with evidence to support the achievement of their individual learning objectives.

617 / Wellness, Health and Occupation: Inquiry and Integration

This problem based learning and Inquiry course provides students with the opportunity to understand the concepts of wellness, health and occupation, and to become aware of issues which are influencing the direction in which health care is changing. By exploring global health concepts and issues specific to health professions, students will begin to build a sound basis and context which will help develop a professional understanding and awareness relative to occupational therapy. To facilitate evidence-based discussion of these concepts and issues, the process of critical appraisal will be employed throughout.

618 / Wellness, Health and Occupation: Professional Reasoning and Skills
This Term 1 course focuses on developing foundational skills in communication, interviewing, identifying and analysing occupational performance issues, and critical thinking. The course will explore occupation in depth and begins application of Occupational Therapy Process Models, in preparation for occupational therapy practice.

***619 / Occupational Therapy Practicum I**
The Occupational Therapy Practicum I course provides the opportunity for students to apply occupational therapy knowledge, skills, and professional behaviours in a variety of environments in which occupational therapists provide service. Prior to completion of the full-time two-year program, students will gain experience in four settings, one of which will offer exposure to mental health issues.This is a Level 1 placement, the foci of which are on knowledge application, introduction to the role of the occupational therapist, engagement in professional activities and learning about the realities of professional practice.

***626 / Foundational Knowledge II**
This half course builds on Foundational Knowledge I to provide students with the requisite knowledge in foundational sciences (biological, social and research) for occupational therapy education, research and practice. Using a self-directed learning approach, students identify their current knowledge level in the three foundational sciences and develop a learning plan. A variety of learning resources are provided by faculty for students to access. Resources include formal learning sessions with faculty, modules on Avenue to Learn, electronic texts, online resources and quizzes. Total in-class time is approximately 36 hours. At the completion of the course, students update their portfolio on foundational knowledge and develop an ongoing learning plan to achieve their individual learning objectives.

627 / Person, Environment and Occupation: Inquiry and Integration
This Problem Based Learning and Inquiry course will provide students with opportunities to integrate new and existing knowledge of person, environment and occupation through the exploration of problem scenarios developed from real world situations and experiences. Areas of focus include: theoretical underpinnings of practice, ethics, spirituality, development and determinants of occupation.

628 / Person, Environment and Occupation: Professional Reasoning and Skills
This course is designed to provide students with knowledge and skill in assessment and developing intervention strategies for individuals within the environments in which they fulfill daily occupations of self-care, productivity, and leisure. The course provides students with opportunities to reason using accepted occupational therapy process models.

***629 / Occupational Therapy Practicum II**
Occupational Therapy Practicum II provides the opportunity for students to apply occupational therapy knowledge, skills and professional behaviours in a variety of environments in which occupational therapists provide service. Prior to completion of the full-time two-year program, students will gain experience in four settings, one of which will offer exposure to mental health

issues. This is a Level 2 placement, the foci of which are on development of professional knowledge, skills, attitudes and behaviours; development of professional reasoning and problem-solving skills; planning, implementation and evaluation of all aspects of a program of occupational therapy; integration of constructive feedback into performance; and integration of previous academic and fieldwork experiences with current experience.

637 / Disability and Occupation: Inquiry and Integration
This course is designed to provide students with opportunities to develop an understanding of models of disability and occupation through large group discussion and exploration of learning issues developed from problem scenarios. Thecourse will focus on disability theory, models of occupationand the application of these theories andmodels to occupational therapy practice.

638 / Disability and Occupation: Professional Reasoning and Skills
This Term 3 course builds on applying the occupational performance process model in a number of clinical scenarios. Course content will move into consideration and understanding of multi-system problems, and clinical problems which illustrate complexity and chronicity. Students will be expected to apply principles of evidence-based practice, critical thinking and clinical reasoning. Areas of focus include: working with children through play and in school settings, home and community practice, group interventions, psychosocial interventions, neurology, and using technology.

Year 2

***717 / Youth and the Development of Self: Inquiry and Integration**
The purpose of this course is to provide students with an opportunity to gain a more in-depth understanding of childhood and adolescence. Students will investigate a variety of factors that may impact on individuals as they experience occupation during their development. Students will participate in large group sessions and problem-based tutorials where theory, family-centred care, legislation and ethics, complexities of practice, emerging occupational therapy roles and multifaceted systems will be explored.

***718 / Youth and the Development of Self: Professional Rolesand Experiential Practicum**
This course is designed to provide opportunities for the student to learn advanced practice skills in occupational therapy for children and adolescents. Course content is based on the most prevalent health problems, the most commonly used and evidence-based assessments, interventions and service-delivery models in pediatric occupational therapy. Emphasis will be placed on applying the learning to case-scenarios and more in-depth exploration of roles, models of practice and settings.

***727 / Adulthood Community and Participation: Inquiry and Integration V**
This half course is the second part of a series of three half courses which are designed to work together across a full academic year, therefore, their content and design are similar. The emphasis in this term is upon adulthood and disability. The purpose of this half course is to provide the students with opportunities to pursue advanced knowledge and understanding of

complex concepts underlying occupational therapy practice with adults and older adults within specialized areas of professional practice. Students will consider, through large group seminar sessions and in-depth exploration within small group problem-based tutorials, issues that pertain particularly to adults and older adults within the scope of occupational therapy practice. Large group seminar and small group tutorial formats are utilized.

***728 / Adulthood, Community and Participation: Professional Roles and Experiential Practicum V**

This course is designed to provide opportunities for students to learn practice skills in occupational therapy as they relate to working with adults andolder adults with disabilities in their communities. Course content builds on knowledge and skills from previous terms with a focus on in-depth and“hands-on” exploration of evidence based assessments, interventions and service delivery models in complex areas of occupational therapy practice.Students have opportunities to apply rehabilitation strategies that relate to individuals, their occupations and their community environments.Emphasis will be placed on applying learning to case scenarios.

***737 / Transition to Practice: Inquiry and Integration VI**

The purpose of this half course is to provide the students with opportunities to pursue advanced knowledge and understanding ofcomplex concepts underlying occupational therapy practice in the evolving healthcare environment. Students will participate in inter-professional large group seminar sessions and in-depth exploration within small group problem-based tutorials, to explore issues thatpertain their transition into practice, and prepare them for entry to practice, considering issues related to systems within which they willwork. Large group seminar and small group tutorial formats are utilized.

***738 / Transition to Practice: Professional Roles and Experiential Practicum VI**

This practically-based half course will provide students with the opportunity to develop advanced practice skills within laboratory andreal world situations. The focus of the skills labs will provide access to a broad spectrum of applied practical knowledge, whereas theplacements in practice settings will focus more specifically upon areas relative to each student’s learning needs. The course coordinatorwill advise and approve all students’ learning plans, which will allow students to address individualized learning needs.

***747 / Transition to Practice: Evidence Based Practice IV**

The course is a half course that runs in Term 4 of the second year of the M.Sc. (OT) Program. It is organized based on small group learning with facilitators to support each group. The focus is on students refining their skills in searching, appraising, and applying research and other evidence related to practice dilemmas. Each student will present his/her analyses of the evidence on two practice dilemmas. Large group resource sessions will be offered to ensure students gain appraisal skills and knowledge needed to support their work in seminar groups.

748 / Transition to Practice: Evidence Based Practice V
This full course runs in Term 5 of the second year of the M.Sc. (OT) program. It builds on EBP IV *747 in Term 4 and will continue to focus on evaluating the evidence, interpreting the evidence, and more advanced, specific topics pertinent to Evidence Based Practice. It consists of large group resource sessions once per week. The sessions will involve guest experts and resource people who will focus discussion relating EBP to the practice of occupational therapy. Students will have the opportunity to engage in an interactive format and raise issues for discussion. It also includes a Program Evaluation Web Course, an interactive, self-directed web learning experience. Students will also begin their research project which includes a five-week research practicum.

***749 / Transition to Practice: Evidence Based Practice VI**
This half course runs in Term 6 of the second year of the M.Sc. (OT) program. It builds on 748 - Transition to Practice: Evidence BasedPractice V, in Term 5. It focuses on: 1. understanding how evidence is generated, integrated and applied, and 2. synthesizing anddisseminating research evidence-based knowledge in a scholarly forum. It consists of individual work on research projects that wereinitiated earlier in the year in Term 5 and completed in Term 6.

Review of Student Progress

The progress of graduate students enrolled in the Master's Program in Occupational Therapy is overseen by a team of McMaster faculty and registered therapists. Student progress in the program is regularly reviewed by a Program Academic Study Committee (PASC). The committee is responsible for, but not limited to, determining if a student may proceed to the next term of study.

The program may, in appropriate circumstances, defer or remove a student from a clinical practicum if the student, including but not limited to, fails to maintain communication with the program, exhibits behaviours that place clients or others at risk, or fails to comply with other academic or non-academic (e.g., obtain and receive clearance for mandatory health screening, mask fit testing, etc.) requirements. Deficits in matters pertaining to work in clinical settings, research ethics, or professionalism may result in restrictions or termination of the work in a clinical practicum or research project. Unsatisfactory standing or deficits in matters pertaining to professionals skills, which include, but are not limited to: patient safety, professionalism, ethical behavior, and technical skills, as articulated in the Essential Competencies of Practice for Occupational Therapists in Canada and Occupational Therapy Standards of Practice (available at www.coto.org), may result in a decision to terminate the clinical placement or research project. Termination of the clinical placement or research project constitutes a failure and will result in the student receiving a grade of F in the course, and may result in dismissal from the program.

Accreditation

The M.Sc. (OT) Program is accredited by the Canadian Association of Occupational Therapists (CAOT).

Regulation of Practice

All occupational therapists in Canada must be registered with the appropriate provincial regulatory organization in order to practice in that province. Each regulatory body has a separate and distinct registration process; however, in all circumstances, an approved degree in occupational therapy and successful completion of the CAOT national certification examination are required. In Ontario, graduates from the M.Sc. (OT) Program will be granted a provisional practicing certificate of registration by the College of Occupational Therapists of Ontario (COTO) until they write and pass the Canadian Association of Occupational Therapists (CAOT) examination, at which point a general practicing certificate is granted.

PHILOSOPHY

The Department of Philosophy offers programs leading to the M.A. and Ph.D. degrees.

Part-time M.A. studies are permissible.

Enquiries should be directed to the Department Chair at
905 525-9140, Ext. 24312
E-mail: phlosgrd@mcmaster.ca
Website: http://www.humanities.mcmaster.ca/~philos/

Faculty / Fall 2012

PROFESSORS
Barry Allen, B.A. (Lethbridge), Ph.D. (Princeton)
Richard Arthur, B.A. (Oxford), M.A. (McGill), Ph.D. (Western)
Nicholas J. Griffin, B.A. (Leicester), Ph.D. (Australian National)
David L. Hitchcock, B.A. (McMaster), Ph.D. (Claremont)
Wilfrid Waluchow, M.A. (Western), D. Phil. (Oxford) / SenatorWilliam McMaster Chair in Constitutional Studies, Humanities

ASSOCIATE PROFESSORS
Nancy C. Doubleday, B.Sc. (Brock), B.Ed. (Toronto), LL.B., M.E.S. (York), Ph.D. (Queen's) / Hope Chair in Peace and Health
Diane Enns, B.A. (Ottawa), M.A. (Carleton), Ph.D. (Binghamton)
Elisabeth Gedge, B.A., M.A. (Alberta), Ph.D. (Calgary),M.Th. (Newman Theological College) / Chair
Violetta Igneski, B.A., M.A. (Western), Ph.D. (Toronto)
Brigitte Sassen, B.A. (Toronto), M.A., Ph.D. (Pennsylvania State)
Mark Vorobej, B.A. (Carleton), M.A., Ph.D. (Toronto)

ASSISTANT PROFESSORS
Mark Johnstone, B.A. (Canterbury), M.A. (Melbourne), Ph.D. (Princeton)
Stefan Sciaraffa, B.A. (South Methodist), M.A. (Ohio State), J.D. (Texas School of Law, Ph.D. (Arizona)

ADJUNCT MEMBERS
Kenneth Blackwell, B.A. (Victoria), M.L.S. (Western), M.A. (McMaster), Ph.D. (Guelph) / Honourary Russell Archivist
Claudia Emerson, B.Sc. (Guelph), B.A., M.A., Ph.D. (McMaster)
Michael Giudice, B.A. (New Brunswick), M.A., Ph.D. (McMaster)
Leslie Green, B.A. (Queen's), M.A., M.Phil., D.Phil. (Oxon.)

ASSOCIATE MEMBERS
Caroline Bayard (French)
Dana Hollander (Religious Studies)
Howard Jones (Classics)
Lisa Schwartz (Clinical Epidemiology & Biostatistics)

PROFESSOR EMERITUS
G.B. Madison, B.A. (St. Joseph's College, Ind.), M.A. (Marquette),Ph.D. (Paris)

M.A. Degree

Admission to the M.A. program in Philosophy requires, subject to the general regulations of the School of Graduate Studies, a B.A. with at least B+ standing in Honours Philosophy, or Honours Philosophy in combination with another subject. Other students may be admitted as candidates for the degree upon completion of prerequisite studies prescribed by the Department.

The requirements for the M.A. are: B- standing or better in course work, normally amounting to six one-term courses or the equivalent, and a satisfactory thesis and oral defense on a subject approved by the Department. The Department recommends that students with deficiencies in their undergraduate preparation in Philosophy should remedy these deficiencies through the courses they select. The thesis should demonstrate a capacity for independent study and critical judgement.

Ph.D. Degree

Admission to the Ph.D. program requires an M.A. in Philosophy or an equivalent degree. Selection is made by the Ph.D. Program Committee of the Department of Philosophy, and any student admitted comes under the general regulations of McMaster University.

The normal course load in the doctoral program is six half courses or the equivalent including the Ph.D. research seminar, which is a required course. Candidates are required to demonstrate a comprehensive knowledge of the central areas of philosophy by meeting five area requirements, chosen in consultation with the Ph.D. advisor.

These areas are: Ancient and Medieval Philosophy; Modern Philosophy 1600 to 1800; Continental Philosophy from 1800; British and American Philosophy from 1800; Ethics and Value Theory; Metaphysics and Epistemology; Social, Political, and Legal Philosophy; Logic, Philosophy of Language, and Philosophy of Science.

Students in the program may be required to demonstrate competence in one or more skills, which their supervisory committee decides, in consultation with the program officer, is needed for their dissertation (e.g., a language other than English, logic). Also required are successful completion of an Oral Qualifying Examination in which the dissertation proposal is presented; a satisfactory dissertation and oral defense.

A detailed description of the doctoral program is available at
http://www.humanities.mcmaster.ca/~philos/PHD.html.

Courses

Courses marked with an asterisk (*) are half courses. Topics courses differ in content from year to year and, under different descriptions, may be taken a second time for credit. A topics course may not be taken for credit by a student who has already received credit for the same topic under a course listed in a previous calendar. Candidates should consult the Chair for the specific offerings in a given year. 600-level courses, which are also available to senior undergraduate students at the 400-level, may be offered for graduate credit. Graduate students will be required to complete extra work as detailed in the course outline in addition to that required of undergraduate students.

***6A03 /** Early Modern Philosophy
***6B03 /** Theory of Value
***6BB3 /** Theory of Value II
***6C03 /** Philosophy of Constitutional Law
***6D03 /** Twentieth Century Analytic Philosophy
***6F03** / Recent European Philosophy
***6I03 /** Medieval Philosophy
***6K03 /** Topics in Ancient Philosophy
***6P03 /** Feminist Epistemologies: Gender, Knowledge, Science
***6XX3 /** Intermediate Logic

The following 700-level courses are offered for graduate credit:

***706 /** Basic Symbolic Logic
***720 /** Reading Course
***721** / Reading Course
***731 /** Special Studies in Philosophy
***743 /** Graduate Seminar I
***744 /** Graduate Seminar II
***750 /** Selected Topics in Ancient Philosophy
***751 /** Selected Topics in Medieval Philosophy
***752 /** Selected Topics in Modern British Philosophy (1600-1900)
***753 /** Selected Topics in Early Modern European Philosophy(1600-1800)
***754 /** Selected Topics in Kant

***755 /** Selected Topics in 19th Century European Philosophy
***756 /** Selected Topics in 20th Century European Philosophy
***757 /** Selected Topics in 20th Century British Philosophy
***758 /** Selected Topics in American Philosophy
***759 /** Selected Topics in Applied Ethics
***760 /** Selected Topics in Logic & The Theory of Argumentation
***761 /** Selected Topics in Philosophy of Language
***762 /** Selected Topics in Metaphysics
***763 /** Selected Topics in Epistemology and Philosophy
***764 /** Selected Topics in Social & Political Philosophy
***765 /** Selected Topics in Ethical Theory
***766 /** Selected Topics in Philosophy of Religion
***767 /** Selected Topics in Aesthetics
***768 /** Selected Topics in Existential Phenomenology & Hermeneutics
***769 /** Selected Topics in Philosophy of Law
***770 /** Selected Topics in Philosophy of Education
***771 /** Selected Topics in Philosophy of Science

Another course that may be of interest is the following:

Health, Aging and Society Course

***713 /** Critical Perspectives on Aging

PHYSICS AND ASTRONOMY

The Department of Physics and Astronomy provides facilities for students intending to proceed to the M.Sc. and Ph.D. degrees.

Enquiries: 905 525-9140 Ext. 24558
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Website: http://www.physics.mcmaster.ca

Faculty / Fall 2012

DISTINGUISHED UNIVERSITY PROFESSOR
Jules P. Carbotte, B.Sc. (Manitoba), M.Sc., Ph.D. (McGill), F.R.S.C. / Emeritus

PROFESSORS
Clifford Burgess, B.Sc. (Waterloo), Ph.D. (Texas)
Hugh M. Couchman, B.A., M.A., Ph.D. (Cambridge)
Kari Dalnoki-Veress, B.Sc., M.Sc., Ph.D. (Guelph)
Bruce D. Gaulin, B.Sc. (McGill), Ph.D. (McMaster)
William E. Harris, B.Sc. (Alberta), M.Sc., Ph.D. (Toronto)
Harold Haugen, B.Sc. (Acadia), M.Eng. (McMaster), Ph.D. (Aarhus)/ Joint appointment with Engineering Physics
Paul Higgs, B.A., Ph.D. (Cambridge) / Joint appointment withBiochemistry
Takashi Imai, B.Sc., Ph.D. (Tokyo)
Catherine Kallin, B.Sc. (British Columbia), A.M., Ph.D. (Harvard)
Graeme M. Luke, B.Sc. (Queen’s), Ph.D. (British Columbia)
Ralph E. Pudritz, B.Sc. (British Columbia), M.Sc. (Toronto), Ph.D.(British Columbia)
An-Chang Shi, B.Sc. (Fudan), M.Sc., Ph.D. (Illinois) / Associate Chair and Graduate Advisor
Alison Sills, B.Sc. (Western), Ph.D. (Yale)
Erik Sorensen, B.Sc., M.Sc. (Aarhus), Ph.D. (U.C. Santa Cruz)
Peter G. Sutherland, B.Sc. (McGill), M.S., Ph.D. (Illinois)
David E. Venus, B.Sc. (Queen's), Ph.D. (Toronto) / Chair
Douglas L. Welch, M.Sc., Ph.D. (Toronto)
Christine D. Wilson, B.Sc. (Toronto), Ph.D. (Caltech)

ASSOCIATE PROFESSORS
Alan Chen, B.Sc. (Toronto), M.Sc., Ph.D. (Yale)
Cecile Fradin, B.Sc., Ph.D. (Paris) / Joint appointment withBiochemistry
Sung-Sik Lee, B.Sc. (Korea Adv. Inst. of Science and Technology), Ph.D. (Pohang)
Duncan O’Dell, B.Sc. (Imperial), Ph.D. (Bristol)
James Wadsley, B.Sc. (Monash), Ph.D. (Toronto)

ASSISTANT PROFESSORS
Laura Parker, B.Sc. (Mount Allison), Ph.D. (Waterloo)
Maikel C. Rheinstadter, B.Sc., M.Sc., Ph.D. (Saarland, Germany)
Itay Yavin, B.Sc. (York), Ph.D. (Harvard)

ASSOCIATE MEMBERS
Jeffrey J. Hoyt (Materials Science and Engineering)
José Moran-Mirabal (Chemistry)
John S. Preston (Engineering Physics)

ADJUNCT MEMBER
Ethan T. Vishniac, B.S./B.A. (Rochester), M.A., Ph.D. (Harvard)

PROFESSORS EMERITI
A. John Berlinsky, B.Sc. (Fordham College), M.Sc., Ph.D.(Pennsylvania)
Rajat K. Bhaduri, M.Sc. (Calcutta), Ph.D. (McMaster)
Dennis G. Burke, B.E., M.Sc. (Saskatchewan), Ph.D. (McMaster)
Yukihisa Nogami, B.Sc., D.Sc. (Kyoto)
Donald W.L. Sprung, B.A. (Toronto), Ph.D., D.Sc. (Birmingham),F.R.S.C.
Thomas Timusk, B.A. (Toronto), Ph.D. (Cornell), F.R.S.C.
Wytse van Dijk, B.Sc., Ph.D. (McMaster)
James C. Waddington, B.Sc. (Queen's), Ph.D. (McMaster)

M.Sc. Degree

Applicants will be considered for admission to the M.Sc. program if they have a B+ average in the final year of an B.Sc. honours degree in Physics and/or Astronomy, or in a related area. They may apply to follow one of three options. In all options, at most one half 600-level graduate course may be used to fulfill the minimum course requirements.

A. Thesis Option
A candidate for the M.Sc. with thesis must complete a minimum of two full graduate courses and present a thesis which embodies the results of original research. This option will normally require between 16 and 24 months for completion.

B. Project Option
A candidate for the M.Sc. without thesis must complete a minimum of three full graduate courses and complete a research project. The project may be in an area of research of one of the Department members, or may be related to the teaching of Physics. This option will normally require 12 months for completion.

C. Transfer Option

Candidates who wish to proceed to the Ph.D. program without completing an M.Sc. may register first in the M.Sc. thesis option, and apply to transfer directly to the Ph.D. after 9 to 20 months. The transfer typically requires the completion of a minimum of two full graduate courses with an average of A-, and the submission of a transfer report for oral examination. Successful applicants may apply all the work accomplished during the M.Sc. to the Ph.D. Unsuccessful applicants must choose one of the other options for completing an M.Sc.

Ph.D. Degree

Applicants will be considered for admission to the Ph.D. program if they have completed a M.Sc. degree in Physics and/or Astronomy (or in a related area) with a B+ average, or are admitted through the M.Sc. transfer option described above.

The minimum course requirement for the Ph.D. is one full graduate course at the 700-level beyond the M.Sc., for a minimum total of 3 full graduate courses in the combined M.Sc. and Ph.D. degrees. The Department expects that most candidates will be required by their supervisory committee to complete more than the minimum number of courses. Two of the four following half courses must be completed in either the M.Sc. or Ph.D.: Physics and Astronomy *739, *740, *746, *750.

All candidates are required to pass an oral Comprehensive Exam and defend a thesis embodying original research. In addition, all graduate students must attend Department colloquia and are expected to attend and participate in seminars relevant to their field of research.

Interdisciplinary Fields and Programs

<u>Chemical Physics</u>

This interdisciplinary area of research is supported by the Department of Physics and Astronomy and the Department of Chemistry and is described in section 11 of the Calendar.

Courses

Courses marked with an asterisk (*) are half courses, and courses marked with a pound (#) sign are quarter courses or modules. Courses marked with a plus sign (+) may differ in content from year to year and may be taken more than once. Not all courses listed are offered in a given year—please consult the department for current offerings.

The following 600-level courses, which are available to senior undergraduate students, may also be offered for graduate credit. Graduate students in 600-level courses will be required to complete extra work in addition to that required of undergraduate students in the corresponding 400-level course (e.g., lab assignment, extra questions on assignments), the nature of which will depend on the instructor.

***6B03/ Electromagnetic Theory**

Potential theory, electrostatics and magnetostatics in matter, electrodynamics, electromagnetic waves and wave guides, radiation from dipoles; Special Relativity and electromagnetism.

***6E03 / Nuclear Physics**

Nuclear masses and stability; radioactivity and nuclear reactions; elementary nuclear models.

***6F03 / Quantum Mechanics**

A sequel to Physics 3MM3, including general structure of quantum mechanics, matrix mechanics, scattering, perturbation theory and the variational method.

6G03 / Computational Physics *(cross-listed as Computational Science and Engineering *6G03)

A course using computers to solve selected problems in physics. The emphasis is in applying a range of computational methods to physics, rather than numerical methods or computer programming.

***6K03 / Solid State Physics**

Crystal structure and binding; lattice vibrations; electron energy bands; metals and semiconductors; magnetism.

****6S03 / Introduction to Molecular Biophysics (cross-listed as Biochemistry *6S03)***

Overview of the field of biophysics and its influence on molecular biology. Topics include: structure, elasticity, and mobility of biomolecules; molecular motors; mechanical properties of cells; mobility of bacteria; cell adhesion. We will discuss both theoretical aspects (statistical mechanics models for structure and folding of DNA, RNA and proteins) and experimental techniques (optical tweezers, AFM, fluorescence, etc).

The following 700-level courses are offered for graduate credit. Among these, *729, *730, *739, *740, *746, and *750 are offered every year. Many courses are offered on a 2- or 3-year rotation. Other courses may be offered according to demand.

#715 / Mathematical Introduction to Fluid Mechanics (same as Part I of Mathematics *749)

We derive the Euler and Navier-Stokes equations from the first principles of continuum mechanics. Mathematical properties of these systems of equations are discussed, such as the boundary conditions, potential and rotational flow and representation of the equations in different coordinate systems. We also briefly consider shocks, boundary layers and turbulence as well as the limits of small and large Reynolds number. Finally, we survey analytical solutions of the Euler and Navier-Stokes equations.

#716 / Incompressible Computational Fluid Dynamics
(same as part II of Mathematics *749)

We survey standard numerical methods for the solution of the incompressible fluid equations. Numerical properties of both the primitive (velocity-pressure) and non-primitive (stream function-vorticity) formulations analyzed. Particular attention is given to various discretization techniques, such as the use of staggered grids, explicit/implicit time-stepping and spectral approximation. Additionally, certain more advanced computational techniques will be mentioned, for instance, mesh generation in complicated domains, fast solvers (FFT, multigrid, wavelet) and high-order compact schemes. Approaches alternative to grid-based techniques such as Lagrangian particle methods will also be briefly introduced. Computer codes representing solution of some simple problems will be presented.

#719 / Compressible Computational Fluid Dynamics
(cross-listed as Computational Science and Engineering #721)

Numerical methods for the solution of equations governing the motion of compressible fluids. The course focuses on modelling features common to high Mach number and compressible gas flows such as the development of shocks and discontinuities. Approaches include Eulerian and Lagrangian methods, explicit artificial viscosities, flux correction and averaging, Godunov-type methods and discrete and semi-discrete schemes. Computer models in one and higher dimensions will be developed and used to compare methods on problems such as steepening waves, shock tubes and blast waves.

***721 / Nuclear Physics**

Nuclear masses, moments, and gamma transitions. Single- and multi-particle models of nuclear structure.

+*724 / Advanced Topics in Nuclear Physics

Examples of possible topics: applications of many-body techniques to nuclear structure and nuclear matter; experimental methods; medium energy phenomena; theory of nuclear reactions.

***729 / Condensed Matter Physics I**

Principles of condensed matter physics: a comprehensive survey of electronic and transport properties of solids with emphasis on crystalline forms.

***730 / Condensed Matter Physics II**

Principles of condensed matter physics: a comprehensive survey of vibrational and magnetic properties of solids. Prerequisite: Physics and Astronomy *729.

***731 / Condensed Matter Theory**

Many-body Green's function theory.Equations of motion, boundary conditions, Feynman diagrams and rules for the perturbation theory.Applications to electron systems, magnetism and photons.

+*734 / Special Topics in Condensed Matter Physics
Topics, which could differ from year to year, include at the introductory level, group theory, neutron scattering, crystallography, applied superconductivity, quasi crystals, experimental techniques, modern optics, disordered systems, etc. One term covers three topics with different lecturers.

***735 / Superconductivity**
Survey of superconductivity with emphasis on the high T_c oxides.The Cooper pair problem, BCS theory, thermodynamic properties, anisotropy, energy dependence of the electronic density of states.The electron-photon interaction and other mechanisms.

***737 / Quantum Field Theory I**
Relativistic quantum field theory and its application to the standard model in the tree-level: quantization of relativistic fields; perturbative theory and Feynman diagram; S-matrix; introduction to gauge theories and the standard model; calculation of cross sections in the tree level.

***738 / Quantum Field Theory II**
Quantum field theory beyond the tree-level approximation: radiative corrections; renormalization group methods; critical phenomena; anomalies; topological defects and non-perturbative methods.

***739 / Advanced Quantum Mechanics I**
General principles of quantum mechanics.Potential problems and symmetry, rotations and angular momentum, potential scattering, time-independent perturbation theory, spin, identical particles and second quantization.

***740 / Advanced Quantum Mechanics II**
(Although it is usually taken after Physics and Astronomy *739, this course may be taken on its own by students who demonstrate sufficient background knowledge.) Clebsch-Gordan coefficients, the Wigner-Eckart theorem, time-dependent perturbation theory, quantization of fields, relativistic quantum mechanics, path integral formulation, modern topics.

***746 / Advanced Classical Electrodynamics**
Basic theory of radiation fields, radiative transfer, radiation from moving charges, relativistic covariance and kinematics, synchrotron radiation, Compton scattering, plasma effects, Cherenkov radiation, multiple scattering.

+*747 / Special Topics in Theoretical Physics I
This course will cover special topics in theoretical physics, taught as opportunity arises by physicists at McMaster or one of the institutions in the surrounding area (University of Guelph, Perimeter Institute for Theoretical Physics, University of Toronto, University of Waterloo, University of Western Ontario, York University).

+*748 / Special Topics in Theoretical Physics II

This course will cover special topics in theoretical physics, taught as opportunity arises by physicists at McMaster or one of the institutions in the surrounding area (University of Guelph, Perimeter Institute for Theoretical Physics, University of Toronto, University of Waterloo, University of Western Ontario, York University).

+*749 / Special Topics in Theoretical Physics III

This course will cover special topics in theoretical physics, taught as opportunity arises by physicists at McMaster or one of the institutions in the surrounding area (University of Guelph, Perimeter Institute for Theoretical Physics, University of Toronto, University of Waterloo, University of Western Ontario, York University).

***750 / Statistical Mechanics**

Statistical ensembles.Entropy and density of states.Application of canonical and grand canonical ensembles to simple physical systems.Thermal properties of a Fermi gas.Bose condensation.Superfluidity of liquid helium. Phase transitions. Fluctuations, the Fluctuation-Dissipation, and Wiener-Khintchine theorems.Liquids and dense gases.

***753 / Advanced Statistical Mechanics**

The course is devoted to phase transitions and critical phenomena. Recent topics have included scaling laws, the renormalization group, statistical mechanics in one and two dimensions, and the statistical mechanics of fluids.

***755 / Physical Properties of Polymers**

This course is intended to be an introduction to the fundamental topics in polymer physics. Topics include polymer chain conformations, elasticity of polymer chains and networks, excluded volume effects, polymer mixtures and phase behaviour, polymer crystallisation, polymer dynamics and the glass transition, mechanical properties like viscoelasticity, non-Newtonian flow, yield processes and fracture. Current research topics such as polymer self-assembly, morphologies and polymer thin films will be discussed.

****756 / Special Topics in Biophysics (cross-listed as Computational Science and Engineering *757)***

The course will emphasize the links between statistical physics and biology, focusing on the design and use of computational models. Students will learn to design and simulate their own models. Topics will include: rugged fitness landscapes in molecular evolution; autocatalytic chemical reactions; self-organized criticality; evolutionary game theory; cellular automata.

***760 / High Energy Physics**

A qualitative description of particle physics.Basic particles and interactions, the quark model, chromodynamics, electroweak interaction, grand unified theories.

#761 / Introductory Astrophysics I
The physics of light and radiative transfer as applied to astrophysical situations; an overview of the tools and techniques of observational astronomy at all wavelengths; an introduction to astrophysical objects.

#762 / Introductory Astrophysics II
An introduction to astrophysical objects; an introduction to the structure in the universe and its formation.Intended for students who have completed Introductory Astrophysics I.

#763 / High Energy Astrophysics
A review of major topics in high energy astrophysics: X-ray and gamma ray observational techniques, physical processes for producing X-ray and gamma rays in astrophysical contexts, and the objects which emit at high energy wavelengths.

#764 / Nuclear Astrophysics
An introduction to the many connections between atomic nuclei and different areas in astrophysics, ranging from energy generation to nucleosynthesis, with emphases on both present knowledge and current research questions. Topics include elemental abundances, reaction rates, Big Bang nucleosynthesis, hydrogen and helium burning, solar neutrinos, advanced burning stages, supernovae, nucleosynthesis beyond iron, and selected experimental techniques.

#765 / Advanced Stellar Astronomy
A detailed look at stellar structure and evolution, including discussion of rotation, pulsation and binary stars.

#766 / Statistics in Astronomy
An introduction to statistical methods necessary for the evaluation of observations and the analysis of theoretical models. Topics include an introduction to robust methods, goodness-of-fit statistics, Bayesian analysis, differential and cumulative distributions and their comparison (the Kolmorov-Smirnof test), and Monte Carlo techniques.

#768 / Observational Cosmology
A detailed overview of the principal observations that constrain our understanding of cosmology and the overall evolution of galaxies in the universe.

#769 / Optical and Infrared Instrumentation and ObservationalTechniques
Optical and infrared telescopes and instrumentation; observational and data analysis techniques; signal-to-noise prediction and evaluation; observing proposal requirements; data reduction best practices.

#770 / Radio and Far Infrared Instrumentation andObservational Techniques
Observational, calibration, and analysis techniques for single dish radio data; principles of radio interferometry; current space missions in the far-infrared; signal-to-noise prediction and evaluation; observing proposal requirements.

#773 / Education and Teaching in Physics
A profession in physics education is a common outcome for students with a graduate degree in Physics and Astronomy. This course is designed to provide an opportunity to discuss physics education research (PER) with peers. The course will be based on discussions of key papers in PER and lectures by invited speakers. Students will receive a pass/fail grade and this module will not count towards the required number of units for completion of the graduate program.

#775 / Planetary Astronomy
A current survey of the planets and planetary systems with attention to key processes in substellar objects and the solar system. Topics include dynamics, resonances and orbital evolution; energy transport; planetary atmospheres; an overview of mineralogy, geology, tectonics and surface morphology; impact cratering; planetary interior structure; meteorites, asteroids, comets and dust; moons, tides and rings; planet formation and extra solar planets.

#776 / Theoretical Cosmology
This course aims to provide the theoretical foundations for the modern understanding of cosmology. Starting from a brief review of general relativity and a discussion of Friedmann models, the course lays out the main features of the Hot Big Bang model of the early universe, including the physics of the early universe at different epochs, the formation of structure, the evidence for (and ideas about the origin of) dark matter and dark energy.

#778 / Star Formation
A review of the major processes involved in star formation. Observations theory, and computational studies will be combined to give a complete modern picture of this complex process. Topics include the dynamics and structure of molecular clouds, turbulent fragmentation, gravitational collapse, the formation of proto stellar disks and outflows, spectral energy distributions, multiple star formation, the initial mass function, and the formation of massive stars.

#781 / Galactic Dynamics
A theoretical underpinning of dynamical systems in astronomy. This includes stellar dynamics in star clusters, galaxies, and clusters of galaxies. Stability of dynamical stellar systems. Applications to galactic structure such as spiral waves, globular clusters, dynamics in elliptical galaxies, galactic mergers, and the dynamical influence of massive black holes on galaxies.

#782 / Galactic Astronomy
Observed internal properties and structure of the Milky Way galaxy; stellar populations in galaxies; observational properties of normal, active, and peculiar galaxies.

#785 / Interstellar Medium
Observational and theoretical understanding of the interstellar medium in the Milky Way galaxy; the diffuse interstellar medium; molecular clouds and cloud cores; structure of HII regions and photon dominated regions.

+#788 / Special Topics in Astrophysics
Specialized topics in astrophysics that will change from year to year. Examples of current interesting topics are gamma ray astronomy, high-energy astrophysics, star formation physics, variable stars, solar seismology, particle physics and cosmology, and globular cluster systems around galaxies.

The following two courses, offered by the Department of Engineering Physics, are often taken by Physics and Astronomy graduate students and form a core for students in modern optics.

Eng Phys ***721** - Lasers and Laser Physics I
Eng Phys ***722** - Lasers and Laser Physics II

Research in Physics and Astronomy

Opportunities for research are described in detail on the web at http://www.physics.mcmaster.ca/. The areas of research are concentrated in the following fields:

Astrophysics - A. Chen, H. Couchman, W. Harris, L. Parker, R. Pudritz, A. Sills, P. Sutherland, E. Vishniac, J. Wadsley, D. Welch, C. Wilson.
Atomic, Molecular, and Optical - H. Haugen, D. O'Dell, J. Preston.
Computational and Theoretical Physics - J. Berlinsky, R. Bhaduri, C. Burgess, J. Carbotte, H. Couchman, C. Kallin, S. Lee, Y. Nogami, R. Pudritz, A. Sills, E. Sorensen, D. Sprung, P. Sutherland, W. van Dijk, J. Wadsley, I. Yavin.
Condensed Matter Physics - J. Berlinsky, J. Carbotte, B. Gaulin, T. Imai, C. Kallin, S. Lee, G. Luke, E. Sorensen, T. Timusk, D. Venus.
Soft Condensed Matter of Biophysics - K. Dalnoki-Veress, C. Fradin, P. Higgs, J. Moran-Mirabal, M. Rheinstadter, A. Shi.

In addition, J. Waddington and A. Chen work in **Nuclear Physics Experiment**.

Facilities for Research

Excellent research facilities are available for research in Physics and Astronomy. In addition to the research laboratories of individual faculty, there are shared facilities on campus, and a consistent history of access to national and international facilities. Many faculty in condensed matter physics and optics are members of the Brockhouse Institute for Materials Research (described in section 7.7), and therefore have access to electron microscopes, an atomic force microscope, x-ray diffraction equipment, materials preparation facilities, a He liquifier and the best crystal growing facilities in Canada. McMaster is half-owner of a neutron spectrometer at Chalk River and has regular access to neutron scattering facilities elsewhere. McMaster is an associate member of the TRIUMF National Laboratories in Vancouver; faculty are involved in condensed matter and nuclear astrophysics studies there. The astronomers frequently use the Canada-France-Hawaii optical telescope, the James Clerk Maxwell millimetre telescope, the Cerro Tololo Observatory, the Kitt Peak Observatory and the Owens Valley Radio Observatory. Theorists connected to all these groups benefit from the SHARC-NET supercomputer network and the many powerful UNIX-based computers and workstations operated by the Department.

PHYSIOTHERAPY

The Faculty of Health Sciences Graduate Program and the School of Rehabilitation Science offer a Master of Science degree program in Physiotherapy, M.Sc. (PT). The Master of Science in Physiotherapy is a full-time accredited course-based professional Master's program that will prepare students with the knowledge, skills and professional behaviours to practice as an entry level physiotherapist in a variety of health care and community settings. The program's curriculum is problem-based and incorporates a self-directed learning philosophy. Students will complete academic and clinical course work and a research and evidence-based practice project, and will learn to integrate theory, evidence and practice to become evidence-based practitioners in the present and future health care environment.

Enquiries: 905 525-9140 Ext. 27829, Admissions Coordinator
Fax: 905 524-0069
Email: otpt@mcmaster.ca
Website: http://www.srs-mcmaster.ca

Faculty / Fall 2012

PROFESSORS
Joy MacDermid, B.Sc. (St. Mary's), B.H.Sc.PT., M.Sc., Ph.D. (Western)
Julie Richardson, Dip.PT (New Zealand), B.Sc.PT (Toronto), M.Sc. (New Zealand), Ph.D. (Toronto)
Patricia Solomon, Dip. PT (Manitoba), M.H.Sc. (McMaster), Ph.D. (Waterloo)
Paul Stratford, Dip. PT (Mohawk), M.Sc. (McMaster)

ASSOCIATE PROFESSORS
Vanina Dal Bello-Haas, B.Sc.PT (Toronto), M.Ed. (Brock), Ph.D. (Cleveland)
Vickie Galea, B.Sc., M.Sc. (Waterloo), Ph.D. (McMaster)
Normal MacIntyre, B.Sc.PT (Toronto), M.Sc. (Western), Ph.D. (McMaster)
Michael Pierrynowski, B.Sc. M.Sc. (Waterloo), Ph.D. (Simon Fraser)
Laurie Wishart, Dip. P&OT (Toronto), B.Sc. PT (Toronto), M.Sc., Ph.D. (McMaster)

ASSISTANT PROFESSORS
Liliana Coman, M.D. (Bucharest), M.Sc. (Waterloo), B.H.Sc.PT (McMaster)
Monica Maly, B.Sc., M.Sc., Ph.D. (Queen's)
Sarah Wojkowski, H.B.Kin., M.Sc.PT (McMaster)

CLINICAL PROFESSOR
Lynne Geddes, B.Sc. PT (Western), M.R.E. (Toronto)

ASSISTANT CLINICAL PROFESSORS
Pat Miller, B.Sc.PT (Toronto), M.H.Sc., Ph.D. (McMaster)
Greg Spadoni, B.A., B.H.Sc. PT, M.Sc. (McMaster)
Christopher Winn, B.Sc. Kinesiology (Simon Fraser), M.Sc. PT (McMaster)

Admission Requirements

To be eligible for admission to the M.Sc. (PT) program, applicants must have completed a four-year baccalaureate degree or the equivalent number of courses (120 units/credits), and have achieved a minimum grade-point average of "B" or 75% or 3.0/4.0 or 8.0/12.0 in their final 60 units of credit. Post-graduate coursework is also considered in this GPA calculation. Applicants may apply during the fourth year of their degree. In this case, the pre-admission GPA for eligibility purposes is calculated using the most recent 60 units of credit towards their degree. If an applicant in this category is subsequently offered admission to the program, the offer is "conditional" upon successful completion of their four-year degree by June 30 in that year, and maintenance of a B average in their final 60 units of credit.

Additional requirements include:
(a) a minimum of one biological or life science course at any level with a grade of at least B (75%) or higher
(b) a minimum of one social science or humanities course at any level with a grade of at least B (75%) or higher
Please see program website for more details regarding prerequisites.

An offer of admission is contingent upon a "clear" approved Criminal Record Check or approval by the Assistant Dean (as per the Police Records Check Policy approved by McMaster University Senate December 8, 2010). See http://www.srs-mcmaster.ca/Portals/20/pdf/admission/OT_PT_Student_Police_Records_Check.pdf for the full policy.

Application Procedure

Applicants are required to apply via the ORPAS on-line application service located at the Ontario Rehabilitation Sciences Programs Application Service (ORPAS), Guelph, Ontario website: http://www.ouac.on.ca/orpas/. Top ranked applicants (based on GPA) will be invited for a personal interview, which entails a series of seven "mini interviews." Personal qualities and life experiences are assessed at these "mini interviews." Interviewers are drawn from the faculty, the community, and current students.

Enquiries: 905 525-9140 Ext. 27829, Admissions Coordinator
Fax: 905 524-0069
Email: otpt@mcmaster.ca
Website: http://www.discovermacsrs.ca

Graduates with a strong research bias may be eligible to proceed to thesis-based graduate programs should they wish to do so in the future.

Program Requirements

The Master of Science (PT) will meet professional accreditation and practice standards. Students will complete course work, clinical placements and an independent research project. All students will be required to complete the equivalent of 23 half-courses over 6 terms of full-time study across two extended study years. All courses are required.

The University reserves the right to cancel academic privileges of a student at any time should the student's scholastic record or conduct warrant so doing. Serious deficits in matters pertaining to work in clinical settings, research ethics or professionalism when interacting with human or other subjects may result in termination of the work in a clinical placement or research project. Unsatisfactory standing or serious deficits in matters pertaining to professional skills, which include but are not limited to patient safety, professionalism, ethical behavior and technical skills, as described in the Essential Competency Profile for Physiotherapists in Canada (www.physiotherapy.ca), mayresult in a decision to terminate the clinical placement or research project. Termination of the clinical placement or research project constitutes a failure and will result in the student receiving a grade of F in the Clinical Practicecourse or the Research and Evidence-Based Practice course, and may result in dismissal from the program. For Health Sciences Graduate programs with clinical courses, all clinical activities associated with such courses must be successfully achieved for attainment of a passing grade in the course. Students will receive a Student General Guide, a Curriculum Guide, a Clinical Education Handbook and Unit Handbooks which provide additional information and details regarding procedures, guidelines and requirements. In the event of a discrepancy between these documents and the Graduate Calendar, the Graduate Calendar represents the official policy.

Courses

611 / Fundamentals of Physiotherapy Practice/Problem-based I
This Unit 1 tutorial course will introduce students to assessment, treatment and prevention of movement disorders of the upper extremity and cervical spine. There will be an introduction to the assessment of the cardio respiratory and neurological systems. Psychosocial, cultural and ethical influences on physiotherapy assessment and treatment will be addressed.

***612 / Fundamentals of Physiotherapy Practice/Clinical Laboratory I**
This Unit I clinical skills course develops skills in examination, diagnosis/classification, prognosis, physiotherapeutic intervention and outcome evaluation as applied to health conditions affecting the upper extremity, thorax, and cervical spine. Clinical decision-making and technical skill development integrates with relevant research evidence and theory (health frameworks, biology, biomechanics and measurement).

613 / Foundational Knowledge for the PhysiotherapyPractitioner
This first year course will address foundational knowledge for the physiotherapy practitioner. Topics will include professionalism, communication, evidence-based practice, models of practice and movement science. This course is offered over the three terms of study.

621 / Fundamentals of Musculoskeletal Practice/Problem-based II
This Unit II course will provide an overview of physiotherapy assessment and management of common, musculoskeletal disorders of the lower extremity and the lumbar spine. Epidemiological and clinical measurement concepts will be introduced.

***622 / Fundamentals of Musculoskeletal Practice/ClinicalLaboratory II**
This Unit II clinical skills course develops skills in examination, diagnosis/classification, prognosis, physiotherapeutic intervention and outcome evaluation as applied to health conditions affecting the lower extremity, pelvis, and lumbar spine. Clinical decision-making and technical skill development

integrates with relevant research evidence and theory (health frameworks, biology, biomechanics and measurement).

***624 / Physiotherapy Clinical Practice I**
This Unit II clinical practice course will provide the opportunity for students to apply physiotherapy assessment and management skills with clients that present primarily with musculoskeletal conditions in a clinical setting. Clinical facilities may include community, hospital and private practice settings. The course is evaluated on a Pass/Fail basis.

***631 / Fundamentals of Cardiorespiratory and Neurological Practice/Problem-based III**
This Unit III tutorial course will introduce students to physiotherapy assessment and management of common cardiac and pulmonary conditions. There will also be an introduction to physiotherapy assessment and management of neurological clients focusing on stroke and spinal cord injury.

***632 / Fundamentals of Cardiorespiratory and NeurologicalPractice/Clinical Laboratory III**
This Unit III clinical skills course will provide students with the clinical problem-solving skills to assess and treat clients with cardiorespiratory and neurological disorders (stroke, spinal cord injury). Students will use measures and models of practice to design physiotherapy management goals. Students will study relevant anatomical and physiological concepts.

***634 / Physiotherapy Clinical Practice II**
This Unit III clinical practice course will provide the opportunity for students to apply physiotherapy assessment and management skillswith clients who may present with musculoskeletal, neurological and/or cardio respiratory conditions related to complex health problemsin a variety of health care environments. Prior to completing the full time two-year program, students will gain experience in musculoskeletal, neurological and cardio respiratory practice settings.

Year 2

***711 / Advanced Neurological Physiotherapy Practice—Problem-based IV**
This Unit IV tutorial course will further develop the knowledge, skills and behaviours that are essential for physiotherapy management of clients with neurological disorders across the lifespan. Theories of movement control and learning, neuroplasticity and development will be examined and combined with critical evaluation of the clinical literature to determine effective and efficient physiotherapy management.

***712 / Advanced Neurological Physiotherapy Practice—ClinicalLaboratory Course**
The Unit IV clinical skills course will provide students with opportunities to develop advanced clinical reasoning skills necessary to assess and treat individuals with neurological disorders. Students will use standardized assessment measures and models of practice to identify physiotherapy goals and implement a management plan.

713 / Research and Evidence-based Practice
This 2nd year course will enable students to critically analyse the literature and engage in a research project to evaluate measures and interventions relevant to physical therapy. Students will be provided

with information on study design, data acquisition and data analysis. They will acquire skills in searching the literature, analysing and interpreting data, presenting results and making clinical decisions that incorporate best evidence, patient values and clinical expertise. This course is offered over three terms of study.

***714 / Physiotherapy Clinical Practice III**

This Unit IV clinical practice course will provide the opportunity for students to apply physiotherapy assessment and management skills with clients who may present with musculoskeletal, neurological and/or cardiorespiratory conditions in a clinical setting. Clinical facilities may include community, hospital and private practice settings. Prior to completing the full-time two-year program, students will gain experience in musculoskeletal, neurological and cardio respiratory practice settings. This course is evaluated on a Pass/Fail basis.

***721 / Community-based Physiotherapy—Problem-based V**

This Unit V tutorial course will provide an opportunity for students to explore the physiotherapeutic management of chronic conditions in established and emergent community roles in the context of various practice/health care environments. Students will learn skills that require them to diverge from a therapeutic role to that of a consultant and educator. Epidemiologic concepts such as natural history, risk assessment and causality will be a focus for this course.

***722 / Community-based Physiotherapy – Clinical Laboratory V**

This Unit V clinical laboratory course will provide students with skills that will enable them to assume traditional and emerging roles in community health, health promotion and disease prevention, with an emphasis on principles of client-centred practice. Students will also acquire the skills needed as physiotherapists in community practice for roles such as patient educator, mediator, consultant and patient advocate.

***724 / Physiotherapy Clinical Practice IV**

This Unit V clinical practice course will provide the opportunity for students to apply physiotherapy assessment and management skills with clients who may present with musculoskeletal, neurological and/or cardiorespiratory conditions in a clinical setting. Clinical facilities may include community, hospital and private practice settings. Prior to completing the full time two-year program, students will gain experience in musculoskeletal, neurological and cardiorespiratory practice settings. This course is evaluated on a Pass/Fail basis.

***731 / Integrated Physiotherapy Practice —Problem-based VI**

This Unit VI tutorial course is designed to enable students to assess and manage clients with complex health problems involving multiple systems and a range of health care issues. In addition, knowledge and skills related to musculoskeletal assessment and treatment are advanced. Students are expected to utilize both previous and new knowledge and skills to design, implement and evaluate effective physical therapy treatment.

***732 / Integrated Physiotherapy Practice —Clinical Laboratory VI**

This Unit VI laboratory course is designed to enable students to assess and manage clients with complex health problems involving multiple systems and a range of health care issues. Incorporating principles of client-centred practice and evidence-based practice, students will learn to use physiotherapy management strategies designed to mesh with those of other health care practitioners to result in an outcome that best meets the clients' needs and personal values.

***734 / Physiotherapy Clinical Practice V**
This Unit VI clinical practice course will provide the opportunity for students to apply physiotherapy assessment and management skills with clients who may present with musculoskeletal, neurological and/or cardio respiratory conditions related to complex health problems in a variety of health care environments. Prior to completing the full time two-year program, students will gain experience in musculoskeletal, neurological and cardio respiratory practice settings.

***735 / Professional Transition**
This Unit VI course is designed to provide students with the opportunity to examine current issues within the physiotherapy profession related to the health care system and the physiotherapy role within the system. Students will also learn management and business skills to enable them to create an effective practice environment upon graduation.

Review of Student Progress
The progress of students in the Master of Science (PT) program is overseen by a team of McMaster faculty and registered therapists. Student progress in the program is regularly reviewed by a Program Academic Study Committee (PASC). The PASC's responsibilities include, but are not limited to determining if a student mayproceed to the next unit of study.

The program may, in appropriate circumstances, defer or remove a student from a clinical placement if the student, including but not limited to, fails to maintain timely and professional communication with the program, exhibits behaviours that place clients or others at risk, or fails to comply with other academic or non-academic (e.g., obtain and receive clearance for mandatory health screening, mask fit testing, etc.) requirements.

Deficits in matters pertaining to work in clinical settings, research ethics or professionalism may result in restrictions or termination of the work in a clinical placement or research project. Unsatisfactory standing or deficits in matters pertaining to professional skills, which include but are not limited to patient safety, professional and ethical behavior, and knowledge and skills, as described in the *Essential Competency Profile for Physiotherapists in Canada* (www.physiotherapy.ca), may result in a decision to terminate the clinical placement or research project. Termination of the clinical placement or research project constitutes a failure and will result in the student receiving a grade of F in the Clinical Education course or the Research in Evidence-Based Physiotherapy Practice course, and may result in dismissal from the program.

Accreditation
The M.Sc. (PT) Program is accredited by the Physiotherapy Education Accreditation Canada (PEAC).

Regulation of Practice
All physiotherapists in Canada must be registered with the appropriate provincial regulatory body in order to practice in that province. Each regulatory body has a separate and distinct registration process; however, in all circumstances, a degree in physiotherapy is required. In Ontario, successful completion of the Physiotherapy Competence Examination (PCE) is also required.

POLITICAL SCIENCE

The Department of Political Science offers graduate programs leading to the M.A. and Ph.D. degrees.

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Faculty / Fall 2012

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Mark Sproule-Jones, B.Sc. (Econ) (London), M.A., Ph.D. (Indiana)

M.A. Degree in Political Science

Admission to the M.A. in Political Science degree program requires an average of B+ or better in Honours Political Science or, with the approval of the Department's Graduate Chair, in another discipline. The Department offers a regular M.A. in Political Science program in four areas: Canadian Politics, Comparative Politics, Political Theory and Public Policy. There is also a Collaborative M.A. Program with the University of Guelph in Public Policy and Administration. Students must indicate the area in which they wish to major in their application.

In the regular M.A. in Political Science program, studies in all areas may take the form of course work and comprehensive examinations, or course work and a thesis.

A. Course Work with Comprehensive Examinations
Six half courses (or equivalent) at the graduate level and written comprehensive examinations. Normally 3 half courses are taken during the Fall term and 3 half courses during the Winter term. The comprehensive examinations are written in the latter half of July. Students are responsible for one major (two subfields) and one minor (one subfield) area chosen from: Canadian Politics, Comparative Politics, International Relations, Political Theory, and Public Policy and Administration.

B. Course Work with Thesis
Five half courses (or equivalent) and a thesis, which must demonstrate independent research skills. Full-time students who wish to write a thesis must submit a thesis proposal for departmental approval by a date to be determined by the Department. If the thesis proposal is not approved, students may continue in the course/comprehensive option. The thesis option is normally a two-year program.

C.Public Policy and Administration
The Public Policy and Administration Program is offered in collaboration with the Department of Political Science at the University of Guelph. Students concentrating in this area must satisfy the following requirements:

a) Six half courses (or equivalent) at the graduate level including *783 - Comparative Public Policy, *794 - Public Policy and Administration Research Seminar, *784 - Statistical Analysis for Public Policy and either *785 - Public Sector Management or *786 - Organizational Theory and the Public Sector.

b) The two half year courses beyond those required may be taken on either campus or, with the approval of the Graduate Advisor, up to six units (2 half courses) may be taken from an allied discipline at the McMaster campus; and

c) Written comprehensive examinations in the major field of Public Policyand Administration with a minor field of Canadian Politics, Comparative Politics, International Relations or Political Theory.

M.A. in International Relations

Admissions to the M.A. in International Relations degree program requires an average of B+ or better in Honours Political Science or with the approval of the Department's Graduate Chair, in another discipline. The Department offers two streams in this M.A. program: (1) Global Politics; and (2) Global Political Economy. Students must indicate the stream in which they wish to major in their application.

Students in the M.A. in International Relations program are required to complete:

(a) Four International Relations courses; three in major stream, one other International Relations course
(b) One additional graduate course
(c) One M.A. in International Relations Colloquium course
(d) Major Research Paper (10,000 words) (*708)

Normally, completion of the M.A. in International Relations will take one year.

Ph.D. Degree

The Department of Political Science at McMaster University offers the Ph.D. degree in the fields of Comparative Public Policy and International Relations.

The public policy specialization will include courses and comprehensive examinations in:
- Approaches and methods for policy analysis
- A Policy field
- and at least two political systems (one of which may be Canada)

The international relations specialization will include courses and comprehensive examinations in:
- International Relations Theory
- International Political Economy
- Globalization and Transnationalism

Graduands can expect to be qualified to conduct research and teach at the university level in comparative public policy or in international relations and in one other field of political science in Canada.

A. Admission Procedures

Admission to the Ph.D. program normally will require an M.A. degree with an average of at least an A- from a recognized university. Applicants must complete the required online McMaster Admission Form, arrange to have 3 academic references submitted to the Department, submit one original transcript(s) from all universities and evidence of English proficiency where required, i.e., TOEFL, and submit a 500 word statement of their research interests and reasons for choosing McMaster University for their Ph.D. degree in Political Science. **The deadline for submission of applications is February 1.**

B. Degree Requirements

Normally, candidates for the Ph.D. will:

1. Complete 18 units (6 half courses) of course work beyond the M.A. level, including the following required courses:

   For Students in Public Policy
   ***783 /** Comparative Public Policy
   ***784 /** Statistical Analysis for Public Policy
   ***796 /** Research Design and Methods

   For Students in International Relations
   ***772 /** Theories of International Politics
   ***774 /** Global Political Economy
   ***796 /** Research Design and Methods

   Other approved courses will be drawn from other departmental courses, and courses offered by other departments and schools. At least three of these selected units should be from Major Field 2.

   All courses are half courses (three units) unless otherwise specified.

2. Demonstrate reading and research competence in an approved language other than English.

3. Complete the required comprehensive examinations in Public Policy or International Relations and one other field; and

4. Submit a thesis on an approved subject and defend it by oral examination.

C. Supervisors and Supervisory Committees

Successful applicants will be assigned a temporary supervisor of studies upon admission. Not later than six months following arrival, a supervisory committee for each Ph.D. student will be appointed by the Graduate Committee, on the recommendation of the student and a willing thesis supervisor. This committee will consist of at least three members: a thesis supervisor, one other member of the Department and a third member, whose scholarly interests include the area of the student's main interest, and who may be from outside the Department.

D. Comprehensive Examinations

Students in the Ph.D. program will write comprehensive examinations in two fields:

<u>For Students in Comparative Public Policy</u>

Students will write comprehensive examinations in two fields – public policy and a second field drawn from one of Canadian politics,comparative politics, international relations or political theory.

Major Field 1

In the Public Policy field, students will write examinations in two of three subfields of public policy:

- Theories and approaches to comparative public policy
- Administration, implementation and institutions
- International dimensions of public policy

In addition to these examinations but still part of the major field, students must write a major paper that provides a review of currentliterature on the politics of a specialized policy area. This paper will provide a basis for evaluating substantive knowledge of a policy area in at least two political systems. Normally, this paper must be submitted prior to the written comprehensive examinations.

Major Field 2

To be selected from:

- Canadian Politics
- Comparative Politics
- International Relations
- Political Theory

Students are normally required to have completed at least three units beyond the M.A. level at McMaster in this area prior to writing their comprehensive examination.

Normally, students will write their comprehensive examinations in December of their second year. Accordingly, the major paper thatcomprises part of the Comparative Public Policy field will be due in December of that year.

For Students in International Relations

Students will write comprehensive examinations in two fields -- international relations and a second field drawn from one of Canadianpolitics, comparative politics, political theory, or public policy.

Major Field 1

In the International Relations field, students will write examinations in two of the following subfields of international relations:

- International relations theory
- International political economy
- Globalization and transnationalism

In addition, students must write a major paper that provides a review of current literature in an area of international relations approved by the student's supervisor. Normally, this paper must be submitted prior to the written comprehensive examinations.

Major Field 2

To be selected from:

- Canadian Politics
- Comparative Politics
- Public Policy
- Political Theory

Students are normally required to have completed at least three units beyond the M.A. level at McMaster in this area prior to writing their comprehensive examination.

Normally students will write their comprehensive examinations in December of their second year. Accordingly, the major paper thatcomprises part of the International Relations field will be submitted in December of that year.

E. Other Regulations

Applicants should consult the Graduate Calendar for a complete listing of Regulations for the Degree Doctor of Philosophy.

Courses for the M.A. in Political Science and the Ph.D.

Courses marked with an asterisk (*) are half courses. The following courses are offered for graduate credit. The 600-level courses are also available to senior undergraduate Honours students. Graduate students normally may take no more than one 600-level course (or equivalent). A student may take only two half courses (or equivalent) offered by another department in the University. Not all courses are offered each academic year. The list of courses to be offered in the following academic year can be obtained from the Department of Political Science after March.

Comparative Politics
***702 /** Social Policy Transformations / Staff
***706 /** Comparative Politics of Health Policy / K. Boothe
***740 /** Theories of Comparative Politics / K. Bird
***741 /** Comparative Politics of Social Movements and PoliticalParties / D. Wells, Staff
***742 /** Politics of Developing Areas / N. Galleguillos
***744 /** Politics of Western Democracies / Staff
***746 /** Issues in Comparative Politics / Staff
***748 /** Democracy and Diversity: Multicultural Policies inComparative Perspective / K. Bird
***749 /** Topics in Gender and Politics / K. Bird, M. Dion, C. Frost,J. Ingram, L. Wylie
***769 /** The Political Economy of East Asia / R. Stubbs
***788 /** Comparative Foreign Policy: Canadian and U.S. Foreign Policy / L. Wylie
***790 /** The Politics of Economic Policy in Market Economies / H. Jacek

Political Theory
6E06 / Issues in Liberal-Democratic Theory / Staff *(Not open to students who took 6U06 in 1995-96)*
***750 /** Issues in Political Theory / Staff
***751 /** Classic Theories of "Realpolitik" / Staff
***753 /** Political Theory and Public Policy / Staff
****754 /** Critics of Modernity / T. Kroeker, Z. Planinc, J. Seaman (cross-listed as Religious Studies *773)*
***755 /** Lying in Politics / C. Frost
***756 /** The Autonomy of Politics / J. Ingram
***757 /** Theories of Political Community / C. Frost
****758 /** Cosmopolitanism and Its Critics / J. Ingram (cross-listed as Globalization *758)*

Canadian Politics
6O06 / Canadian Public Policy / H. Jacek
***760 /** Political Institutions of the Canadian State / Staff
***761/** The Social, Cultural and Economic Foundations of Canadian Politics / D. Wells, C. Yates
***770 /** Globalization and the Canadian State / S. McBride
***787 /** Intergovernmental Relations and Public Policy-Making / Staff

International Relations
****705 /** Global Public Policy / S. McBride (cross-listed as Globalization *705)*
***749 /** Topics in Gender and Politics / K. Bird, M. Dion, C. Frost,J. Ingram, L. Wylie
****758 /** Cosmopolitanism and Its Critics / J. Ingram (cross-listed as Globalization *758)*
***769 /** The Political Economy of East Asia / R. Stubbs
***770 /** Globalization and the Canadian State / S. McBride
***771 /** Advanced Concepts in International Relations Theory/ Staff
***772 /** Theories of International Politics / Staff
***773 /** Selected Topics in International Politics / Staff
****774 /** Global Political Economy / Staff (cross-listed as Globalization *774)*
***776 /** Advanced Issues in Critical Security Studies / M. Beier, P. Nyers
****777 /** Global Governance / R. O'Brien, T. Porter (cross-listed as Globalization *777)*
***778 /** Globalization / Staff
***788 /** Comparative Foreign Policy: Canadian and U.S. Foreign Policy / L. Wylie
****789 /** Global Finance / T. Porter (cross-listed as Globalization *789)*
***796 /** Research Design and Methods / K. Bird

Research Techniques and Methods
***784 /** Statistical Analysis for Public Policy / Staff
***796 /** Research Design and Methods / K. Bird

Special Courses
***765 /** Reading Course / Staff
***779 /** Major Research Paper / Staff *(This course is not available to students taking Course Work and a Thesis.)*
***780 /** Selected Political Problems I / Staff
***781 /** Selected Political Problems II / Staff

Public Policy and Administration
***701 /** Theory and Practice of Policy Analysis: Frameworks andModels / S. Huque
***702 /** Social Policy Transformation / Staff
****705 /** Global Public Policy / S. McBride (cross-listed as Globalization *705)*
****747 /** Welfare States in Comparative Perspective / Staff (cross-listed as Sociology *747)*
***748 /** Democracy and Diversity: Multicultural Policies in Comparative Perspective / K. Bird
***753 /** Political Theory and Public Policy / Staff
****774 /** Global Political Economy / Staff (cross-listed as Globalization *774)*
***782 /** Development Theory and Administration / S. Huque
***783 /** Comparative Public Policy / P. Graefe
***784 /** Statistical Analysis for Public Policy / Staff
***785 /** Public Sector Management / S. Huque, Staff
***786 /** Organizational Theory and the Public Sector / Staff
***787 /** Intergovernmental Relations and Public Policy-Making / Staff
***788 /** Comparative Foreign Policy: Canadian and U.S. Foreign Policy / L. Wylie
***790 /** The Politics of Economic Policy in Market Economies/ H. Jacek

***792 /** Public Choice / Staff
***794 /** Public Policy and Administration Research Seminar / Staff
***795 /** Research Project in Public Policy / Staff
***796 /** Research Design and Methods / K. Bird
***797 /** Readings in Comparative Public Policy / Staff
***798 /** Environmental Policies and Governance / Staff

Courses for the M.A. in International Relations

Courses marked with an asterisk (*) are half courses. The following courses are offered for graduate credit. Courses with a dagger (†) are offered by the Institute on Globalization and the Human Condition.

Global Politics Stream
†*703 /Acts of Global Citizenship
****705 /** Global Public Policy / S. McBride (cross-listed as Globalization *705)*
***708 /** Major Research Paper / Staff
***757 /** Theories of Political Community / C. Frost
****758 /** Cosmopolitanism and Its Critics / J. Ingram (cross-listed as Globalization *758)*
***771 /**Advanced Concepts in International Relations Theory/ Staff
***772 /**Theories of International Politics / Staff
***773 /**Selected Topics in International Politics / Staff
***751 /**Classic Theories of "Realpolitik" / Staff
***775 /**M.A. International Relations Colloquium / Staff
***776 /**Advanced Issues in Critical Security Studies / M. Beier, P. Nyers
****777 /**Global Governance / R. O'Brien, T. Porter (cross-listed as Globalization *777)*
***778 /**Globalization / Staff
***788 /**Comparative Foreign Policy: Canadian and U.S. ForeignPolicy / L. Wylie
***796 /** Research Design and Methods / K. Bird

Global Political Economy Stream
****705 /** Global Public Policy / S. McBride (cross-listed as Globalization *705)*
***708 /** Major Research Paper / Staff
***769 /** The Political Economy of East Asia / R. Stubbs
†*712 /International Trade and Economic Development
****774 /** Global Political Economy / Staff (cross-listed as Globalization *774)*
***775 /**M.A. International Relations Colloquium / Staff
****777 /**Global Governance / R. O'Brien, T. Porter (cross-listed as Globalization *777)*
***778 /**Globalization / Staff
***782 /** Development Theory and Administration / S. Huque
****789 /**Global Finance / T. Porter (cross-listed as Globalization *789)*
***796 /** Research Design and Methods / K. Bird

Other courses of interest:

†*704 Global Social Policy
†*714 / *The United States and Globalization since the Late Nineteenth Century (cross-listed as History *714)*
***740 /** Theories of Comparative Politics / K. Bird
***742 /** Politics of Developing Areas / N. Galleguillos
†*757 / *The British Empire and Global Integration (cross-listed as History *757)*

PSYCHOLOGY

The Department of Psychology, Neuroscience and Behaviour provides facilities for students intending to proceed to the M.Sc. and Ph.D. degrees.

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Faculty / Fall 2012

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Steven Brown, M.A., M. Phil., Ph.D. (Columbia)

PROFESSORS EMERITI
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Bennett G. Galef, A.B. (Princeton), M.A., Ph.D. (Pennsylvania)
Larry E. Roberts, B.A., Ph.D. (Minnesota)

M.Sc. and Ph.D. Degrees

Graduate training in Psychology at McMaster leads to the Ph.D. degree and is strongly research oriented. The basic approach is that of a research apprenticeship, with the student assigned to one faculty member as the research supervisor. The Department provides excellent opportunities for research in Animal Behaviour/Learning; Behavioural Neuroscience; Cognition/Perception; Developmental Psychology; and Social/Evolutionary Psychology. No special training is offered in the applied areas such as Clinical or Industrial Psychology, and applications in these fields are discouraged. Students are not usually required to complete a M.Sc. en route to the Ph.D., but they may do so if they wish. The general requirements for the Degree Doctor of Philosophy are described earlier in the calendar.

Applicants for graduate study in Psychology normally must have received, from a recognized university, either a Master's degree in Psychology, or a Bachelor's degree in Honours Psychology, with at least B+ standing. Occasional exceptions are made to the above requirements for students with a background in a related discipline. Students with strong backgrounds in biology, neuroscience, computer science or physics are encouraged to apply.

In the first Master's year, all students take two courses: Contemporary Problems in Psychology, Neuroscience and Behaviour (720), and Statistics and Research Design (*710). Students entering the program directly at the Ph.D. level usually are exempted from both Contemporary Problems (720) and Statistics and Research Design (*710). It is expected that at least one-half of the student's time will be devoted to research on a topic to be chosen by the student in consultation with the faculty supervisor. Each student submits a report on research progress by May 15 of the first year. Continuation to the Doctoral degree in the graduate training program is determined by the student's research progress and the student's performance in Contemporary Problems, Statistics and any other courses completed. If these performances are acceptable, students who enter without a Master's degree are permitted to proceed directly to Ph.D. studies.

In subsequent years, students complete the equivalent of an additional 1 1/2 full-year courses: Advanced Statistics and Computational Methods I and II (#711 and #712, or an approved course equivalent); two quarter courses (#713, #714); and the equivalent of one graduate half course (#721 cannot be counted towards this requirement). Students must complete *710, #711, #712 and 720 as well as a thesis to obtain a Master's degree. A variety of courses is available each year for all interested students.

Aside from these courses, the major activities of the student beyond the first year fall into two categories. First, students are expected to carry out their thesis research and report the progress of this research by May 15 of the second and each subsequent year. For the student to continue in the program this report must show that satisfactory progress is being made. Second, to satisfy the comprehensive requirement the student, in consultation with the supervisory committee, must select one or more topics for intensive study. These topics must not be in the student's thesis topic area, and must be approved by the Chair of the Graduate Studies Committee. The study of these topics is then taken up under the guidance of the student's comprehensive examining committee, which includes the student's supervisory committee and up to two other faculty members with relevant expertise. After a period of about six weeks the student will be expected to demonstrate mastery of the material to the satisfaction of the examining committee, first in a written submission and then followed by oral examination. The comprehensive examination must be successfully completed within 24 months of entering the Ph.D. program.

Students entering at the Master's level ideally complete the doctoral thesis and all other requirements for the Ph.D. degree by the end of four years of graduate training. Students admitted directly into the Ph.D. program ideally complete all requirements for the Ph.D. degree within three years. Doctoral students are strongly encouraged to give a departmental colloquium in their final year of study.

Students desiring admission to graduate training at McMaster can apply on line through the School of Graduate Studies. Separate application for financial assistance is not required as all applicants are automatically considered for financial support.

Courses

The following are all full courses:

720 / Contemporary Problems in Psychology, Neuroscienceand Behaviour

The following are all half courses:

***710 /** Statistics and Research Design
***722 /** Developmental Psychology
***723 /** Cognitive Psychology
***724 /** Perception

***726 /** Behavioural Neuroscience
***727 /** Learning
***728 /** Animal Behaviour
***729 /** Physiological Psychology
***730 /** Quantitative Methods
***733 /** Evolutionary Psychology
****734 /*** *Neural Network Models of Cognition and Perception*
*(cross-listed as Computational Science and Engineering *734)*
***741 /** Advanced Topics in Psychology, Neuroscience and Behaviour I
***742 /** Advanced Topics in Psychology, Neuroscience and Behaviour II
****770 /*** *Advanced Analysis of Survey Data / M. Boyle, K. Georgiades*
*(cross-listed as Economics *770, Health Research Methodology *790, Geography *770, Sociology *770)*

The following are quarter courses:

(Please note: The content of #711 and #712 varies significantly from year to year. The Special Topics courses (#713-#716) typically are taken by a single student working with one instructor.

#711 / *Advanced Statistics and Computational Methods I*
(cross-listed as Computational Science and Engineering #711)
#712 / Advanced Statistics and Computational Methods II
#713 / Special Topics in Psychology, Neuroscience and Behaviour I
#714/ Special Topics in Psychology, Neuroscience and Behaviour II
#715 / Special Topics in Psychology, Neuroscience and Behaviour III
#716 / Special Topics in Psychology, Neuroscience and Behaviour IV

Facilities for Research

The Department maintains extensive facilities for research in a variety of experimental areas including: Animal Behaviour & Learning, Behavioural & Cognitive Neuroscience, Cognition & Perception, Developmental Psychology, and Social & Evolutionary Psychology.

The Department possesses extensive facilities for human and animal research. The 20,680 square foot state-of-the-art animal facility houses rats, mice, gerbils, fish, cats, quail, and insects; a new bat colony is now operational. The procedure rooms include a physiological optical imaging laboratory, transgenic procedure suite, two animal surgery suites, electrophysiology and neurochemistry suites, and an automatic cage washing facility.

The recently renovated 19,700 square feet of human research facilities provide trainees with access to modern computing resources (Macintosh, Windows, and Linux environments), state-of-the-art eye-tracking systems (head mounted and remote), virtual reality systems, a transcranial magnetic stimulation system, and several electroencephalography (EEG) systems (the largest number of EEG systems in any single department in Canada). Human researchers also enjoy access to a 3T fMR system and an MR compatible EEG system at the Imaging Research Centre in nearby St. Joseph's Hospital through our ongoing collaborations with faculty in the Brain-Body Institute. As well, in conjunction with Brock University, we have created a mobile human electrophysiology and eye-tracking laboratory. This unique mobile facility is particularly useful in ongoing research with special populations, school-aged children, and seniors—participants for whom access to our Department-based facilities may be difficult.

In addition to these facilities, the Department maintains a full-time technical staff of 5 persons, available to members of the faculty and their students as required. Departmental technicians are well equipped to construct specialized laboratory apparatus and maintain computers and instrumentation.

Detailed descriptions of the research interests of each member of our faculty and lists of representative publications are available on our graduate studies website.

REHABILITATION SCIENCE

The School of Rehabilitation Science offers a M.Sc. and Ph.D. in Rehabilitation Sciences for individuals who have a prerequisite degree in Occupational Therapy, Physiotherapy or another field relevant to Rehabilitation Science; and wish to pursue graduate training in Rehabilitation Science.

There are two options within the Rehabilitation Science Master's programs:

1. The thesis option which may be undertaken on a full or part-time basis on campus, and

2. The course-based option which is offered on a part-time basis; and can be completed entirely through online education, or include on-campus course options.

The **M.Sc. course-based option** provides training to physiotherapists, occupational therapistsand other health professionals who want to obtain a master's degree relevant to their clinical practice. The program provides flexibility for working clinicians at a distance to complete the program entirely online and on a part-time basis. However, students also have the option to take on-campus courses. Courses emphasize evidence-based practice, clinical measurement/evaluation, critical thinking and application of knowledge to practice.

The **M.Sc. thesis option** provides training that will develop knowledge, appraisal and evaluation skills in Rehabilitation Science. Students study and apply theory, research design, analysis methods to a Rehabilitation Science research thesis. Students are prepared to assume future leadership role in health.

The **Ph.D.** in Rehabilitation Science provides training to develop rehabilitation scientists who will advance rehabilitation research and transfer newknowledge into practice and policy. This competency based program educates students in rehabilitation theory, research design and methods, grantsmanship, scientific writing, knowledge exchange and translation, and teaching/learning strategies. This option includes coursework, acomprehensive portfolio and a thesis. Graduates will be prepared to take on academic, leadership or research roles.

Enquiries: 905-525-9140 Ext. 24445
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Faculty / Fall 2012

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Cheryl Missiuna, B.Sc.OT (Western), M.Sc. (Calgary), Ph.D. (Toronto)
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The general regulations for the M.Sc. and Ph.D. degrees appear under the Regulations forMaster's and Ph.D. degrees near the beginning of this Calendar.

For foreign applicants whose native language is not English, evidence of proficiency in the useof the English language is required. The most common evidence is the Test of English. Theminimum university requirements are outlined in the *General Regulations of the GraduateSchool;* preferred standards for admission into the SRS degrees are:

- Paper Based TOEFL: Minimum score of 600 with a minimum speaking score of45 and minimum of 50 in the other areas.
- Computer Based TOEFL: Minimum score of 250 with minimum oral score of 45.
- Internet Based (iBT) TOEFL: Minimum total score of 92 with a minimum writingscore of 22.

M. Sc. Degree

<u>M.Sc. Course-based Option</u>

The admission requirements for the course-based option are:

1. Graduation from a Physical or Occupational Therapy Entry Level Degree Program; or a four-year health relevant degree program with a minimum of a B+ average in the final year of the program.

2. Two academic references. In addition, applicants have the option of providing one work-relatedreference.

3. Written application outlining clinical interests and experience, learning expectations and goals.

The following are the course requirements of the online Masters of Rehabilitation Science program. Student complete, with at least a B- standing,a minimum of three (3) required graduate half courses and four (4) electives, plus a scholarly paper. These include:

- RS *705, *706, *708, as the core mandatory (online) courses.
- Four elective courses may be chosen from online Rehabilitation Science options; and on-campus options, including on campus Rehabilitation Science courses. Up to two approved distance education courses can be taken at other universities with permission of the Program Coordinator. A list of preapproved courses for electives has been created (see the website) and approved bythe Associate Dean of Rehabilitation Science and the Associate Dean of Graduate Studies (Health Sciences).
- The RS 730 scholarly paper to demonstrate integrative thinking while addressing an issue in rehabilitation.

M.Sc. Thesis Option

The admission requirements for the thesis option are:

1. Graduation from a Physical or Occupational Therapy Entry Level Degree Program; or a four-year health relevant degree program with a minimum of a B+ average in the final year of the program.

2. Two academic references. In addition, applicants have the option of providing one work-relatedreference.

3. A letter (maximum two pages) outlining the proposed training plan (supervisor and research area), research interests and experience; and long term career goals.

For the thesis option, candidates must:

1. Complete, with at least a B- standing, a minimum of four graduate half courses:

- An approved Research Methods Course (e.g. RS *707);
- An approved Data Analysis course (e.g. RS *714)
- RS *700; and
- An additional approved course (e.g. RS*701, *702, *703, *704, *711, *712)

- SGS#101 - Academic Research Integrity and Ethics (an online module taken by all graduate students)
- The School of Rehabilitation Science has a series of seminars given by rehabilitation scientists. Regular attendance at these seminars is required.
- The student's supervisory committee may require students to take additional courses
- Students may choose additional courses, which may be taken once approved by the student's supervisory committee

2. Complete a research thesis on an approved rehabilitation science issue and defend the thesisat a final oral examination.

Transfer Process (from a Masters to Ph.D.program)

Exceptional students enrolled in the McMaster M.Sc. thesis option in the Rehabilitation Science Program can apply to transfer to the Ph.D. after meeting all the course requirements of the M.Sc.and establishing a thesis plan consistent with a PhD. The application must first be approved bythe student's committee. Then, a written application is submitted to the SRS AdmissionsCommittee, followed by an oral presentation; at which time a decision on transfer is made.

Ph.D. Degree

The admission requirements for the Ph.D. are:

1. Completion of a thesis-based M.Sc. degree in rehabilitation or a related field with a minimumof a B+ average. Students in non-thesis-based degrees such as entry-level professional Masters (OT or PT or health related professionals degree) or a course-based Masters in a rehabilitation related field may be considered based on a minimum B+ average, combined with evidence ofresearch experience and scholarly writing.

2. Two letters of recommendation from referees attesting to your academic/research abilities.

3. An up-to-date curriculum vitae.

4. A letter (maximum two pages) outlining the proposed training plan (research interests, proposed research project/line of investigation, identified potential supervisors) and previousresearch experience/training. The letter should also provide an explanation of expectations forfinancial support including any applications for external funding. Finally, a brief description of tentative future career plans should also be included.

The degree requirements for the Ph.D. are:

- The general regulations for the Degree Doctor of Philosophy appear earlier in theCalendar.
- RS *725 Effective Knowledge Transfer for Rehabilitation Scientists (3 credits)
- An approved Data Analysis or Methods course (3 credits)
- An approved Content Course Relevant to Thesis (3 credits)
- SGS#101 - Academic Research Integrity and Ethics (an online module taken by all graduate students)
- The School of Rehabilitation Science has a series of seminars given by rehabilitationscientists. Regular attendance at these seminars is required.
- The student's supervisory committee may require students to take additional courses. Ph.D. students are expected to have previously completed Masters level training in researchmethods, data analysis and theory. If these have not been completed during Masters leveltraining, then additional courses in research methods/analysis will be required. If a courseon the theory of science relevant to Rehabilitation has not been completed at the Master'slevel, students will be required to complete RS *700.
- Students may choose additional courses, which may be taken once, approved by the student's supervisory committee.
- Candidates are required to complete and pass the Ph.D. Comprehensive Examination.The comprehensive examination will include submission and oral defense of a portfolio designed to demonstrate breadth of knowledge and skills within their field, extending beyond the thesis topic. The candidate will use critical thinking and analysis to complete three tasks: a scholarly paper, a completed funding proposal, and an evaluated knowledge translation tool/intervention. The comprehensive examination will normally be completed within 20 months following registration for full time students, and 28 months for part-time students.
- The student will submit and defend a thesis demonstrating an original contribution to Rehabilitation Science. The supervisory committee determines when a candidate is ready to write the thesis and proceed to defense. The candidate submits a written thesis and defends it at a Final Oral Examination.

Research in Rehabilitation Science

The focus of the research in Rehabilitation Science includes thefollowing fields:

Participation across the life course – within this field, research focuses on the study of participation in everyday life when a disability or change in health occurs. We examine the impact of activity performance and environmental factors as well as study interventions to enhance participation. We research the impact of changes in a person's body function and structure on activity and participation. Primary populations within this field include children/youth with special needs, workers, and older adults.

Evidence-based rehabilitation and knowledge transfer – within this field, our research focuses on development and validation of outcome measures, systematic reviews of rehabilitation evidence, and utilization of research knowledge by clients, families, rehabilitation practitioners, students and policymakers.

Courses

Courses marked with an asterisk (*) are half courses.

Students are responsible for ensuring their course selections meet their program and learning requirements, in consultation with their committee and program faculty/administration. Thesis-basedstudents require permission of their supervisor before registering for courses. Some courses requirepermission of the course instructor and have enrollment restrictions. Not all courses are offered everyyear. Students may take more than one special topics (*703/*704) course, but only one may be countedtowards the minimum degree requirements. Students taking a special topics course cannot also receivecredit for a subsequent regular course offered on the same topic.

<u>Courses in the Thesis Option</u>

***700 / The Development, Evaluation and Utilization of Theoriesin Rehabilitation / L. Wishart**

This course will provide the foundation for students to discuss in depth the role that theories play in the development and application of knowledge in rehabilitation science. They will develop the skills to critically evaluate the theories used in rehabilitation and become familiar with examples of macro and micro theories currently in use.

***701 / Analysis and Rehabilitation of Functional Movement/ M. Pierrynowski**
This course examines the study of movement in a rehabilitation context. Different approaches to the study of movement and their utility in rehabilitation will be examined. Emphasis will be on mechanisms required for functional physical activity, particularly in persons with disability, and the role of rehabilitation interventions in maximizing function. Students will integrate evidence from movement analyses, rehabilitation models, and clinical research to make decisions about movement evaluation and intervention.

***702 / Participation and Community Living/ M. Law**
Participation in community living is regarded by the World Health Organization (WHO) as the optimal goal of rehabilitation. Participation refers tothe active engagement of humans in sets of everyday activities - personal care, physical activity, work, school, and leisure and recreation. This coursewill provide students with an understanding of the concept of participation as delineated in the World Health Organization InternationalClassification of Functioning, Disability and Health (ICF). Using a problem-based seminar format, students will review the predominant definitionsand theories of participation and community living, discuss and critique them in relation to current research, measurement methods and application torehabilitation.

***703 / Selected Topics in Rehabilitation Science / Assistant Dean, Faculty**
This selected topics course is designed to allow the development of courses that cover the leading edge of thinking about specific topics/issues in Rehabilitation Science. The specific topics will be developed in response to needs identified by faculty or students.

***704 / Independent Study in Rehabilitation Science / Assistant Dean, Faculty**
This course is designed to allow students to tailor their learning by selecting topics in Rehabilitation Science relevant to their area of study interest and do advance work in this area. A student will identify a topic, and in consultation with a faculty member with expertise in the area, a course outline will be developed that is tailor-made to meet the student's particular requirement. The student will then study under the guidance of a faculty member and examine the pertinent literature critically. The course may be taken only once during the student's graduate studies.

***707 / Research Methods in Rehabilitation Science / J. Richardson**
This course is designed to introduce students to the basic concepts and methods associated with observational and experimental research in the field of rehabilitation science. Topics include the following: clinical measurement concepts, qualitative methods, etiologic investigation, therapeutic intervention investigation, prognostic determination, and systematic review assessment. Common themes within these topics include: framing the research question, defining the patient sample, selecting the most appropriate study design, applying strategies for enhancing both internal and external validity, estimating sample size, understanding basic analytic methods, interpreting results, and considering ethical issues.

***714 / Statistical Methods in Rehabilitation Science / P. Stratford**
This course is designed to address basic statistical concepts and techniques that are applied frequently in rehabilitation research. The course covers graphical presentation of data, elementary probability, descriptive statistics, probability distributions (Normal, Binomial, Poisson, Hypergeometric), hypothesis testing and parameter estimation. Specific techniques covered include z-tests, t-tests, ANOVA, contingency table analysis, regression and correlation analyses. In addition to covering these statistical tests, this course also addresses how to effectively report statistical findings in publications.

***720 / Measurement and Evaluation of Quality of Life inRehabilitation / Faculty**
This course is designed for occupational therapists, physical therapists and practitioners in other rehabilitation disciplines who want to acquire the knowledge and skills to develop, interpret and integrate quality of life measures into clinical practice and research. Specific topics include a review of: constructs and conceptual frameworks underlying measurement of quality of life, psychometric issues relating to Quality of Life (QoL) measurement in rehabilitation, commonly used generic and rehabilitation-specific QoL measures, strategies to develop and select qualitative and quantitative QoL measures, issues relating to the administration and interpretation of QoL measures used to evaluate the impact of rehabilitation interventions.

***722 / International Classification of Functioning, Disability, and Health: Theory and Use / J. MacDermid, J. Gorter**
The International Classification of Functioning, Disability and Health (ICF) is an international, multidisciplinary, consensus-drivenframework and classification system of health and disability supported by the World Health Organization. This course will introducestudents to the historical, theoretical and measurement principles of the ICF. Presentations and discussions with clinicians andresearchers will highlight how ICF can be used to facilitate interdisciplinary evaluation and management of disability for practice orresearch. Students will complete a ICF-based project under supervision of a course mentor.

****725 / Knowledge Exchange and Translation / J. MacDermid (cross-listed as Nursing *725)***
This modular course will present students with an introduction to basic principles, conceptual frameworks, research design, and interventions used in knowledge exchange and translation. Faculty with specific expertise in knowledge exchange and translation for different target audiences (patients/public, policy makers, clinicians) will facilitate modules that address theoretical and practical issues around using developed knowledge to improve health or health care systems. Students will present their research protocol or KET project in the final module.

***747 / Selected Clinical Measurement Research Methods / J. MacDermid**
This modular course will cover a selection of topics relating to developing and evaluating existing clinical measures- with particular emphasis on content validity of patient reported outcomes. Faculty with expertise in clinical measurement will instruct topics in a modular arrangement. Modules covered will include: 1. Rasch analysis; 2. Assessment of content validity using ICF-linking or item prospective classification; 3. Cognitive interviewing as a clinical

measurement methodology and 4. Methods for cross-cultural validation methods. Students will identify a project and mentor to plan and conduct a project that applies these advanced topics to a clinical measurement project, resulting in a paper on a clinical measurement issue within their own research area.

758 / Qualitative Research Methods for Collecting, Analysing and Interpreting Data / L. Lohfeld (cross-listed as HRM *758 and Nursing *758)

This intermediate-level course builds on learners' prior knowledge about qualitative research from an introductory graduate course on qualitative research (HRM/NUR/RS 745) or its equivalent. During the course, learners will: gain first-hand experience with generic and sub-approach specific data analysis frameworks and methods; select one specific sub-approach (e.g., constructivist grounded theory) and follow its tenets while conducting a secondary analysis of data from a study on osteoporosis and aging among women; create and follow a data analysis plan congruent with the philosophy, goals and methods of the selected sub-approach; use appropriate methods to ensure rigour in data analysis and interpretation; maintain a reflective research journal throughout the course; and demonstrate a thorough understanding of course material and concepts in two written papers and an in-class presentation on their work. Learners are also expected to work towards create a positive and collegial learning environment for themselves and their classmates.

Courses in the Online Course-based Option

***705 / Evaluating Sources of Evidence**

The value of evidence to rehabilitation practice, and how to assess and use evidence to make practice decisions that lead to best clients outcomes.

***706 / Measurement in Rehabilitation / J. Law, K. Pontello**

The theory of measurement, and the critical review, selection, interpretation and integration of outcome measures and assessment instruments in practice.

***708 / Reasoning and Decision-Making / J. Tryssenaar**

Reasoning is the process by which rehabilitation practitioners consider alternatives and make decisions on a day to day basis. Guided by relevant conceptual frameworks, participants will practice strategies such as critical reflection, narratives, and assessment of the literature and other evidence to improve their reasoning and decision-making skills.

***710 / Facilitating Learning in Rehabilitation Contexts / J. Tryssenaar**

Approaches to creating positive and innovative learning experiences for clients, families, peers and students in rehabilitation.Incorporates principles of adult learning, learning styles, plain language, teaching tips and evaluation methods.

***711 / Musculoskeletal Health Assessment and Diagnostics forAdvanced Practice Therapists**

This course will introduce students to measurement properties of diagnostic evaluations using examples related to musculoskeletal disorders or diseases. In addition to an introduction to the basic concepts of radiology and laboratory testing, students will learn and practice performing a comprehensive musculoskeletal health assessment that includes biomechanical, physical and functional assessments of patients with musculoskeletal disorders or diseases, particularly lower extremity osteoarthritis. Expert faculty members from several disciplines will facilitate all sessions.

***712 / Therapeutics for Advanced Practice Musculoskeletal Care**

This course will focus on the management of clients with musculoskeletal disorders. Students will gain an understanding of the basic principles of pharmacology, surgical approaches, advanced counseling and the ability to critically appraise and integrate clinical practice guidelines for the conservative management of clients with musculoskeletal disease, particularly osteoarthritis of the lower extremity. Expert faculty members from several disciplines will facilitate all sessions.

730 / Scholarly Paper / J. Tryssenaar

This full course is designed as an opportunity for graduate course-based M.Sc. students to demonstrate, in writing, their ability to integrate ideas that reflect current knowledge in areas of rehabilitation practice, education, research, and/or policy. The scholarly paper is to demonstrate integrative thinking at a general and abstract level. A student will identify a topic, and in consultation with a faculty member with expertise in the area develop a proposal that is individualized to the student's area of interest. The student will then develop the paper under the guidance of a faculty member. The paper must be 25 to 30 pages, excluding references and appendices. The paper does not involve the collection or analysis of primary data or the conduct of research with subjects. It is a scholarly essay, not a thesis.

***770 / Leadership in Rehabilitation / C. Malachowski**

This course explores principles, practices, trends and issues of leadership in rehabilitation settings. Current theories of leadership with attention to styles, practices, tasks and models will be covered. Participants will be encouraged to reflect on and analyze their own leadership experiences in light of theories studied. Through the interplay of theory and practical application, participants will gain a deeper appreciation for the requirements, responsibilities, and consequences of effective leadership. The course encourages professional and personal development through action learning that is relevant and transferable to organizations.

***771 / Work Organization and Health**

This online, problem-based course addresses the political, economic, health system and workplace factors that contribute to workplace environments and the health of workers. Sessions initially incorporate broad based problems that will develop specific content knowledge nature of work environments, stressors, health systems and legislation and then move on to problems that target specific types of health issues requiring students to integrate knowledge across different disciplines.

RELIGIOUS STUDIES

The Department of Religious Studies offers work leading to both the M.A. and Ph.D. degrees in Religious Studies, i.e., the systematic study of religious phenomena.

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Faculty / Fall 2012

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The Department offers graduate work in seven areas of study, distributed among three fields:

Asian: Buddhism
East Asian Religions

Biblical: Early Judaism
Early Christianity

Western: Religion and Politics
Religion and the Social Sciences
Western Religious Thought

In order that all graduate students have the opportunity to develop both depth and breadth in their courses of study, candidates for M.A. and Ph.D. degrees are normally required to choose one major area of study and one minor area of study from the above list of seven areas.

To ensure acquaintance with the range of religious studies, and to facilitate dialogue and communication among all members of the department, all graduate students are required to have upon entry, or to acquire in the early stages of their program, some familiarity with the breadth of religious studies including both Eastern and Western religious traditions.

Upon arrival, each M.A. and Ph.D. candidate will meet with faculty members from the field in which the student's major area of study is located (see list above), who will advise the student on choice of advisory committee members, minor area of study, course work, and other requirements.

M.A. Degree

The normal minimum requirement for admission to M.A. study is graduation with B+ standing in an Honours program or equivalent in Religious Studies, or in a related discipline with significant emphasis on the study of religion. Related disciplines include Anthropology, Sociology, History, Philosophy, Theology, Classics, Near Eastern, South Asian, and East Asian studies. Graduates with preparation in related fields may be required to take a certain amount of undergraduate work in Religious Studies.

All incoming students should have completed the equivalent of six units (one full year course) of undergraduate work in Asian religions. Students who do not meet this requirement will be expected to fulfill their breadth requirement by taking six units of undergraduate courses, or by writing two Breadth Requirement examinations, or by taking a three unit undergraduate course and writing one Breadth Requirement examination.

A candidate for the M.A. degree will be required to spend at least one calendar year in full-time graduate study or the equivalent in part-time study. There are two routes to the M.A.: the thesis route and the project route.

A. M.A. with Thesis

The thesis route entails the following requirements:

1. The candidate must demonstrate a reading knowledge of a language other than English which is most useful in the area in which the thesis is written. Guidelines for fulfilling this requirement are specified in the Departmental Handbook. Additional languages may be required;

2. A minimum of six half courses must be completed with at least B- standing, four half courses must be at the graduate level and must be taken in the major area of study; the other two half courses must be in the minor area of study;

3. The completion of Religious Studies *701 / Issues in the Study of Religions;

4. A thesis must be completed; the thesis should show an ability to deal with first-hand material in a limited problem in Religious Studies; the thesis must be defended in an oral examination; all M.A. degree candidates who have completed their oral defence must submit their revised thesis to both the Department and the School of Graduate Studies by the deadline dates specified for the second convocation following their defence. (Note: Text-critical studies or translation with commentary are acceptable, with the approval of the advisory/supervisory committee, as the functional equivalent of a thesis.)

B. M.A. with Project

The project route entails the following requirements:

1. The candidate must demonstrate a reading knowledge of a language other than English appropriate to work on the project. Guidelines for fulfilling this requirement are specified in the Departmental Handbook. Additional languages may be required;

2. Completion of six half courses as defined above, plus Religious Studies *701 / Issues in the Study of Religions;

3. Completion of a project and the passing of an oral or written examination on the substance of the project. A "project" is defined by the faculty members of a departmental field. Normally a project will cover broad areas of learning. Projects will permit students to move into new areas, to read large and unfamiliar bodies of texts, and to deal comprehensively with large questions in central areas of concern.

Ph.D. Degree

Candidates for the Ph.D. program may be admitted at one of three stages in their academic work:

1. Normally, on completion of a Master’s program.
2. Occasionally, after completion of one year of a Master’s program.
3. In exceptional cases, an applicant with an honours degree in Religious Studies or a broad and comprehensive theological education may be admitted.

Further details and requirements for admission are specified in the Departmental Handbook.

A candidate for the Ph.D. degree must satisfy the general regulations for the degree Doctor of Philosophy of the School of Graduate Studies. The minimum requirements for a Ph.D. candidate are as follows:

1. Completion of the breadth requirement. Students who have not completed the equivalent of six units (one full year course) of undergraduate work in Asian religions may fulfil their breadth requirement by taking six units of undergraduate courses, or by writing two Breadth Requirement examinations, or by taking a three unit undergraduate course and writing one Breadth Requirement examination early in their Ph.D. program.

2. A reading knowledge of two languages other than English must be demonstrated; the method, time-limit and guidelines are specified in the Departmental Handbook; additional languages may be required.

3. At least five half courses at the graduate level at McMaster beyond the M.A. level. Two half courses may be taken outside of the Department. Additional courses may be required. Exceptions may be made by the candidate's advisory committee. Students who have completed an M.A. elsewhere must normally complete at least three units of graduate course work in the minor area of study. Students who have completed an M.A. in the Department of Religious Studies at McMaster do not have to do additional course work in the minor area, though they are encouraged to do so. Students must also complete Religious Studies *701 / Issues in the Study of Religions if they have not already done this course during their M.A. program.

4. Comprehensive examinations in the major and minor areas of study, which are chosen according to the regulation given above.

5. Completion of a thesis in the major area of study. The thesis must constitute original research and make a contribution to learning in the chosen field; the thesis must be defended in a final oral examination.

Courses

The following courses are offered for graduate credit. A list of courses offered in any one year and detailed descriptions are available each year in the Departmental Handbook. A student may take courses designated as “Topics in” more than once, as contents vary from year to year. Courses marked with an asterisk (*) are half courses. A student may receive credit for no more than two half courses entitled “Special Readings” (*705, *734, *769). Transcript credit is given for 6X06 and 6Y06, but these courses do not count toward the fulfillment of the minimum departmental course requirements.

Not all courses listed in the calendar will be offered in any given year, though the intention is to offer a listed course at least once in four years. Students should consult the Religious Studies *Graduate Handbook* for the list of courses to be offered in a particular year.

Asian Religions
6X06 / Introductory Sanskrit / Staff *(No 400-level equivalent)*
6XI6 / Intermediate Sanskrit / Staff
6Y06 / Introduction to Literary Chinese / Staff *(No 400-level equivalent)*

General Courses
***705 /** Special Readings in Asian Religions / Staff
***706 /** Topics in Sanskrit Texts / S. Clarke
***707 /** Tools and Methods for the Study of Asian Religions / J. Benn, S. Clarke, M. Rowe
***708 /** Topics in Asian Religions / Staff
***709** / Anthropological Approaches to the Study of Asian Religions / M. Rowe

Buddhism
***711 /** Topics in Buddhist Thought and History / S. Clarke
***712 /** Topics in the Study of Chinese Buddhist Texts I: Translated Texts / J. Benn
***713 /** Topics in the Study of Chinese Buddhist Texts II: Indigenous Chinese Writings / J. Benn
***714 /** Topics in Indian Buddhist Texts / S. Clarke
***715 /** Readings in Indian Buddhist Texts / S. Clarke
***716 /** Topics in Japanese Buddhism / S. Clarke, M. Rowe
***717 /** Readings in Japanese Buddhist Texts / S. Clarke, M. Rowe
***718 /** Topics in Buddhist Studies: Recent Scholarship / J. Benn,S. Clarke, M. Rowe
***719 /** Topics in Modern and Contemporary Buddhism / M. Rowe

East Asian Religions
***721 /** Topics in East Asian Religions / J. Benn, S. Clarke, M. Rowe
***722 /** Topics in Japanese Religions / S. Clarke, M. Rowe
***723 /** Readings in Japanese Religions / S. Clarke, M. Rowe
***724 /** Topics in Taoism / J. Benn
***725 /** Readings in Taoist Texts / J. Benn
***726 /** Topics in Chinese Religions / J. Benn

***727 /** Readings in Chinese Religions / J. Benn
***728 /** Readings in Academic Japanese / S. Clarke, M. Rowe

Biblical Studies

General Courses
***730** / Topics in the Relationship of Judaism and Christianity/ Staff
***731** / Topics in the Biblical Tradition / Staff
***732** / Topics in the Theory of Interpretation / Staff
***733** / Topics in Social History and Material Culture / Staff
***734** / Special Readings in the Biblical Tradition / Staff

Early Judaism
***737** / Readings in Hebrew I / E. Schuller, D. Machiela
***738** / Readings in Hebrew II / E. Schuller, D. Machiela
***739** / Readings in Aramaic Texts: Biblical Aramaic and Dead Sea Scrolls / E. Schuller, D. Machiela
***740** / Readings in Aramaic Texts: Targum and Talmud / D. Machiela
***741** / Readings in Greek Jewish Literature / Staff
***742** / Topics in the Dead Sea Scrolls / E. Schuller, D. Machiela
***743** /Topics in Apocrypha and Pseudepigrapha / E. Schuller,D. Machiela
***744** / Topics in Rabbinic Judaism / D. Machiela
***745** / Topics in Philo and Hellenistic Judaism / Staff
***746** / Topics in Early Jewish History / E. Schuller, D. Machiela
***747** / Topics in Early Jewish Literature / E. Schuller, D. Machiela

Early Christianity
***751** / Readings in Gospel Literature I / S. Westerholm,A. Runesson
***752** / Readings in Gospel Literature II / S. Westerholm,A. Runesson
***753** / Readings in Early Christian Epistolography I / S. Westerholm, A. Runesson
***754** / Readings in Early Christian Epistolography II / S. Westerholm, A. Runesson
***755** / Readings in Early Christian Historiography I / S. Westerholm, A. Runesson
***756** / Readings in Early Christian Historiography II / S. Westerholm, A. Runesson
***757** / Topics in Gospel Literature / S. Westerholm, A. Runesson
***758** / Topics in Early Christian Epistolography / S. Westerholm ,A. Runesson
***759** / Topics in Christian Origins / S. Westerholm, A. Runesson
***760** / Topics in Early Christian History / S. Westerholm, A. Runesson
***761** / Topics in Early Christian Literature / S. Westerholm, A. Runesson
***762** / Topics in the Christian Literature and Thought of Late Antiquity: The Trinity / P. Widdicombe
***763** / Topics in the Christian Literature and Thought of Late Antiquity: Christology / P. Widdicombe
***764** / Topics in the Christian Literature and Thought of Late Antiquity: Themes / P. Widdicombe

***765** / Topics in the Christian Literature and Thought of Late Antiquity: Major Figures / P. Widdicombe

Western Religious Traditions

General Courses
***769 /** Special Readings in Western Religious Traditions / Staff

Religion and Politics
***770** / Topics in Ancient Political Philosophy / Z. Planinc
***771** / Topics in Medieval Political Philosophy / Z. Planinc
***772** / Topics in Modern Political Philosophy / Z. Planinc
****773** / Critics of Modernity / T. Kroeker, Z. Planinc, J. Seaman (cross-listed as Political Science *754)*
***774** / Topics in Religion and Literature / T. Kroeker, Z. Planinc
***775** / Topics in Political Theology and Ethics / T. Kroeker
***776** / Topics in Technology and Ethics / T. Kroeker
****777** / Topics in Philosophy and Jewish Thought / D. Hollander (cross-listed as CSCT *777)*
****778** / Topics in Modern Jewish Thought / D. Hollander (cross-listed as CSCT *778)*
***779** / Phenomenology and Religious Experience II / D. Hollander
***792** / Topics in Continental Philosophy and Religious Thought/ D. Hollander, T. Kroeker

Religion and the Social Sciences
***709** / Anthropological Approaches to the Study of Asian Religions / M. Rowe
****766 /** Islamic Fundamentalism / L. Takim (cross-listed as Globalization *766)*
****767 /** Islam in a Global World / L. Takim (cross-listed as Globalization *767)*
****780** / Topics in Religion and Society / Staff (cross-listed as Sociology *708)*
****781** / Introduction to the Anthropology of Religion / E. Badone (cross-listed as Anthropology *704)*
****782** / Diasporas, Transnationalism and Religious Identities / E. Badone (cross-listed as Anthropology *782 and Globalization *782)*
****783** / Anthropological Approaches to Catholicism / E. Badone (cross-listed as Anthropology *784)*
****784** / Myth and the Interpretation of Oral Tradition / E. Badone (cross-listed as Anthropology *785)*
****785** / Death: Rituals and Meanings in Cross-Cultural Context / E. Badone (cross-listed as Anthropology *799)*
***786** / Ritual and Symbolic Healing / E. Badone, C. Rothenberg *(cross-listed as Anthropology *796)*
***787** / Topics in Belief and the Body / C. Rothenberg
****788** / Topics in Anthropological Approaches to Islam / C. Rothenberg (cross-listed as Anthropology *788)*
***789** / Topics in Gender and Feminist Theory and ReligiousStudies / C. Rothenberg

Western Religious Thought

***762** / Topics in the Christian Literature and Thought of Late Antiquity: The Trinity / P. Widdicombe
***763** / Topics in the Christian Literature and Thought of Late Antiquity: Christology / P. Widdicombe
***764** / Topics in the Christian Literature and Thought of Late Antiquity: Themes / P. Widdicombe
***765** / Topics in the Christian Literature and Thought of Late Antiquity: Major Figures / P. Widdicombe
****766 /** Islamic Fundamentalism / L. Takim (cross-listed as Globalization *766)*
****767 /** Islam in a Global World / L. Takim (cross-listed as Globalization *767)*
***774** / Topics in Religion and Literature / T. Kroeker, Z. Planinc
***775** / Topics in Political Theology and Ethics / T. Kroeker
****777** / Topics in Philosophy and Jewish Thought / D. Hollander (cross-listed as CSCT *777)*
****778** / Topics in Modern Jewish Thought / D. Hollander (cross-listed as CSCT *778)*
***779** / Phenomenology and Religious Experience II / D. Hollander
***790 /** Topics in Western Religious Thought / Staff
***791** / Topics in Philosophical Theology / T. Kroeker
***792** / Topics in Continental Philosophy and Religious Thought/ D. Hollander, T. Kroeker
***793** / Topics in Religious Ethics / T. Kroeker
***794** / Topics in Augustine and Augustinians / T. Kroeker,P. Widdicombe
***795** / Topics in Modern Christian Thought: Themes/ P. Widdicombe
***796** / Topics in Modern Christian Thought: Theologians/ P. Widdicombe
***797** / Topics in German Judaism / D. Hollander
***798** / Phenomenology and Religious Experience I: Introduction to Phenomenology / D. Hollander

Special Courses

***600 /** Studies in Religion / Staff *(No specific 400-level equivalent)*
***700 /** Topics in Religious Studies / Staff
***701 /** Issues in the Study of Religions / Staff
****768 /** Religion and Globalization / Staff (cross-listed as Globalization *707)*
****782 /** Diasporas, Transnationalism, and Religious Identities / E. Badone (cross-listed as Anthropology *782 and Globalization *782)*

SOCIAL WORK

The School of Social Work offers a one year (12-month) thesis-based program leading to the degree Master of Social Work (M.S.W.). A commitment to critical analysis in the service of social justice underpins this program. The program is accredited by the Canadian Association for Social Work Education as a graduate program in social work.

The School of Social work also offers a Ph.D. program focused on social justice. The program builds on our research-based M.S.W. and on faculty members' research strengths.

Enquiries: 905 525-9140 Ext. 24596
Fax: 905 577-4667
E-mail: socwork@mcmaster.ca
Website: http://www.socialwork.mcmaster.ca/

Faculty / Fall 2012

PROFESSORS
Jane Aronson, B.Sc. (New Univ. of Ulster, N. Ireland), B.S.W., M.S.W.(McGill), Ph.D. (Toronto) / Director
Donna Baines, B.S.W. (Calgary), M.S.W. (Carleton), Ph.D. (Toronto)
Roy Cain, B.S.W., M.S.W., Ph.D. (McGill)
James W. Gladstone, B.A. (McGill), M.S.W. (British Columbia), Ph.D.(Toronto)
Sheila Sammon, B.A. (Nazareth College, New York), M.S.W. (Toronto)
M. Susan Watt, B.A., M.S.W., Adv. Dip. S.W. (Toronto), D.S.W. (UCLA)

ASSOCIATE PROFESSORS
Stephanie Baker Collins, B.A. (Calvin College), M.A. S.W.P. (McMaster), Ph.D. (Toronto)
Mirna E. Carranza, B.S.W. (El Salvador), M.T.S. (Wilfrid Laurier),Ph.D. (Guelph)
Gary C. Dumbrill, B.Sc. (South Bank, London), M.S.W. (York), Ph.D. (Toronto)
L. William Lee, B.A. (St. Thomas, Texas), M.S.W., Adv. Dip. S.W., Ed.D. (Toronto) (Retired)
Christina Sinding, B.A. (Western), M.A. S.W.P. (McMaster), Ph.D.(Toronto)
Y. Rachel Zhou, B.A. LLM (Wuhan, China), M.A., Ph.D. (Toronto)

ASSISTANT PROFESSORS
Ann Fudge Schormans, B.P.E., B.A. (McMaster), B.S.W. (York),M.S.W. (McMaster), Ph.D. (Toronto)
Saara Greene, B.A. B.S.W. (Manitoba), M.S.W. (McGill), Ph.D.(Edinburgh, Scotland)

LECTURER
Rick Sin, B.S.W. (Hong Kong Baptist), M.S.W (McGill), Ph.D. cand.

ASSOCIATE MEMBERS
Karen A. Balcom (History), B.A. (Carleton), M.A. (Dalhousie), Ph.D. (Rutgers)
Amanda Grenier (Health, Aging & Society), B.S.W. (Windsor), M.S.W., Ph.D. (McGill)
Robert D. Wilton (Geography & Earth Sciences), B.A. (Hull), M.A.,Ph.D. (Univ. of Southern California)

ADJUNCT MEMBER
Ken Moffat, B.E.S. (Waterloo), M.S.W., Ph.D. (Toronto)

PROFESSORS EMERITI
Ralph A. Brown, B.A., M.S.W. (Waterloo Lutheran), D.S.W. (UCLA)
Sally Palmer, B.A. (Western), B.S.W., M.S.W., Ph.D. (Toronto)
James J. Rice, B.A. (Sir George Williams), B.S.W., M.S.W. (Calgary), Ph.D. (Exeter)

M.S.W. Degree

<u>Critical Analysis of Social Work</u>

A commitment to critical analysis in the service of social justice underpins this program. This degree focuses on the development of analytic skills with regard to social work practice and social policy. Students will build on existing knowledge to increase their ability to identify and analyze practice and policy theories and examine how they are utilized within a changing social, political, economic and global context.

Students will engage analyzing social problems and policies, critique existing practices, challenge established knowledge, research alternative approaches and contribute to the development of innovative policies and practices.

This program will prepare candidates for a range of positions in the field (e.g., policy analysts, directors of services or agencies, program managers, supervisors, senior practitioners, researchers, social planners and advocates) and for doctoral level study.

Candidates may be enrolled on a full- or part-time basis. Full-time students will complete the program in twelve consecutive months of study, beginning in September. Part-time students will normally be expected to complete the program in about three years.

Admission

To be eligible for admission to the Master of Social Work Program, applicants are required to hold a B.S.W. degree from an accredited social work program. In addition, admission requirements are:

(a) half course in introductory social research methods;
(b) B+ standing in senior level social work courses.

Applications should be made to the School of Social Work prior to December 15th for admission the following September.

Curriculum

The curriculum has three main components:

1. Required courses that provide the content and methodological skills necessary for policy and practice analysis;

2. Elective courses that enable students to deepen their knowledgeof practice and policy in the inner workings of social agencies and in social change efforts at the community level;

3. Thesis designed to integrate analytical and evaluative skills and to contribute to the critical analysis of policy and practice.

1. <u>Required Courses</u>

Four half courses:
***700 /** Social Work Practice: Critical Frameworks
***701 /** Social Policy: Critical Frameworks
***737/** Critical Approaches to Social Work Knowledge
***738 /** Research Methods for Social Work

2. <u>Two elective courses</u>

(i) at least one of:
***721 /** Community, Citizenship and Social Justice
***726 /** Changing Social Service Organizations: Tensions in Practice

(ii) One additional elective (see below)

Electives

Electives enable students to deepen their knowledge in a substantive field of their choice and to develop a capacity to analyze systematically existing policies or practices in that field. All students take one elective which can be selected from the following:

***705 /** Directed Readings
***711 /** Children and Families
***721 /** Community, Citizenship and Social Justice
***722 /** Topics in Advanced Social Work
***726 /** Changing Social Service Organizations: Tensions in Practice

In planning the course of study, students should consult with their advisor concerning possible elective(s) which may be taken outside the School of Social Work. Electives offered in a given year are subject to the availability of faculty.

3. A Thesis for Both Concentrations

Each student is required to complete a thesis. It offers students an opportunity to build upon their particular experiences and interests and upon perspectives and materials introduced in courses, and to demonstrate their capacities for critical analysis. The thesis (12,500 words) is supervised by a faculty member and orally examined by a committee including the supervisor and two other faculty members.

Ph.D. Degree

The School of Social Work offers a Ph.D. degree in Social Work in the field of Social Justice.

Admission

To be eligible for admission to the Ph.D. program, applicants are normally required to have:

a) a completed MSW degree with an average of at least an A-. (Applicants with Master's degrees in other subjects must be able to demonstrate substantial knowledge of the social service/ social welfare field and have experience of working in justice and equity-seeking services or organizations);

b) a completed graduate level course in social research methods; and

c) demonstrated interest and experience in critical approaches to policies, practices and knowledge-building in social work.

Applicants will be evaluated on the basis of their qualifications and the alignment of their interests with the research interests and availability of faculty.

Applications should be made to the School of Social Work prior to January 15th for admission the following September.

Curriculum

The curriculum has three main components:

1. **Course requirements.** Candidates for the Ph.D. are required to complete a minimum of six post-MSW courses.

    ***770 /** Social Work and Social Justice: Theoretical Tensions
    ***771 /** Research for Social Change
    ***772 /** Qualitative Methods for Social Work
    or a methods course selected from another department (e.g. quantitative, historical, mixed methods)
    ***773 /** Doctoral Research Seminar

    Two elective courses. Students will be encouraged to take at least one of their elective courses in another department in order to profit from the interdisciplinary opportunities at McMaster.

A Ph.D. candidate admitted without Master's level courses in epistemology (*737) and in critical analysis of practice/policy (*700 or *701) will be expected to complete these courses in addition to the requirements of the doctoral program.

Candidates may be required to complete courses beyond the minimum course requirements of the program in order that they achieve the breadth of perspective required by the program and are sufficiently prepared for their research.

2. Comprehensive Examination

The comprehensive examination is designed to evaluate the breadth of students' knowledge of debates and developments in contemporary scholarship in social work and social justice. Ph.D. candidates are required to situate their anticipated research topics in a wide and critical review of related theory and research, and to demonstrate their capacity for the integration of ideas and their skills in scholarly inquiry and writing.

3. Thesis

Students will be required to submit a thesis and defend it during a final oral examination.

Courses

Courses marked with an asterisk (*) are half courses. M.S.W. part-time students must take first either SW*700 (practice) or SW*701 (policy) in the fall term. The following courses are offered for graduate credit only:

***6G03 / Selected Topics**
Critical examination of social work practice in respect to selected social issues. Topics will vary from year to year and the School should be consulted for details for any particular year.

***700 / Social Work Practice: Critical Frameworks**
This course critically analyzes social work practice including discourse, practice theories and the nature of practice knowledge. Issuessuch as shifting sources and forms of profession power and authority are also examined.

***701 / Social Policy: Critical Frameworks**
This course will consider: theoretical perspectives on social policies and the construction of the social problems they address; the political, historicaland economic context of policy-making in Canada; and the repositioning of social policy in the context of state restructuring and ongoing globalization processes.

***705 / Directed Readings**
Concentrated studies in Social Welfare Policy and Social Work Practice. A course outline must be submitted to the Chair of the School of Social Work's Graduate Studies Committee.

***711 / Children and Families**
Analysis of child and family policy in Canada, especially Ontario, with special attention to: (a) differential treatment of service users related to social divisions such as class, race, gender, age, sexual orientation, and ability/disability; (b) identifying and understanding gaps between policy and practice, especially in child welfare. Content will be adapted to student interests.

***721 / Community, Citizenship and Social Justice**
This course examines contemporary theories and practices of community and citizenship in Canada. Rather than assuming a consensual and universalmodel of collectivity , we explore how notions of togetherness, common interests, active citizenship and rights and responsibilities are constituted,enacted, practiced and challenged in the community, and how social workers could affect social justice through grassroots organizing, advocacy andcommunity based research.

***722 / Topics in Advanced Social Work**
Examination of social welfare policies and/or social work practice issues regarding a specific substantive area or concern.

***726 / Changing Social Service Organizations: Tensions in Practice**
The course examines the changing forms and discourses of social service organizations and heir management. Central to the course focus is criticalanalysis of the constraints and possibilities fashioning practices and policies in the interests of service users and communities.

***737 / Critical Approaches to Social Work Knowledge**
An introduction to epistemological debates in practice and policy related research, emphasizing the challenges and possibilities of building knowledge for social change. Topics will include: different methodologies underpinning social research; power relations in knowledge production and communication; reflexivity in the research process.

***738 / Research Methods for Social Work**
Review and application of methods commonly used in practice and policy related research. Students will be encouraged to use the seminar to focus their thesis research.
Prerequisite: Social Work *737

***770 / Social Work and Social Justice: Theoretical Tensions**
This course addresses the fundamental tension in social work's location within social programs and state practices that have the potential both to redress and to deepen social inequalities. Theoretical and practical dimensions of this tension are explored in the contemporary context in which social programs in the public and voluntary sectors are the focus of neo-liberal restructuring and of the struggles and claims of marginalized populations.

***771 / Research for Social Change**
This course addresses the complexities of formulating and carrying out research explicitly designed to be part of social change processes. It explores how social research may be engaged when issues of inequality and marginalization are embedded in the research content and process.

***772 / Qualitative Methods for Social Work**
This course examines theory, techniques and issues of data analysis and interpretation in qualitative inquiry.Prerequisite: Social Work *737 or equivalent

***773 / Doctoral Research Seminar**
The course will examine key professional concerns among social work academics and researchers. Topics will include, among others, research funding and proposal writing; research publication; professional and research ethics; social work teaching, and career development among social work academics.

SOCIOLOGY

The Department of Sociology provides facilities for students intending to proceed to the M.A. and Ph.D. degrees.

Enquiries: 905 525-9140 Ext. 23613
E-mail: sociology@mcmaster.ca
Website: http://sociology.mcmaster.ca

Faculty / Fall 2012

PROFESSORS
Scott Davies, B.A. (Toronto), M.A. (McMaster), Ph.D. (Toronto)/ Joint, Offord Centre for Child Studies
Margaret A. Denton, B.A., M.A., Ph.D. (McMaster) / Joint, Health, Aging and Society
John Fox, B.A. (City College of New York), M.A., Ph.D. (Michigan)/ Senator William McMaster Chair in Social Statistics, SocialSciences
Cyril H. Levitt, B.A., M.A. (Waterloo), Dr.Phil. (Free Univ., Berlin)
Charlene E. Miall, B.A. (Ottawa), M.A. (Calgary), Ph.D. (York)
Victor Satzewich, B.A., M.A. (Saskatchewan), Ph.D. (Glasgow)
William B. Shaffir, B.A., M.A., Ph.D. (McGill)
Philip G. White, B.Sc. (London, U.K.), M.Sc., Ph.D. (Waterloo)/ Joint, Kinesiology

ASSOCIATE PROFESSORS
Art Budros, B.A. (San Jose), M.A., C.Phil., Ph.D. (UCLA)
Lori Campbell, B.A., M.A. (Western), Ph.D. (Guelph) / Joint,Health, Aging and Society
Tina Fetner, B.A. (California, Santa Cruz), M.A., Ph.D. (New York)
James Gillett, B.A. (Calgary), M.A., Ph.D. (McMaster) / Joint,Health, Aging and Society
Neil McLaughlin, B.A., M.A. (Cleveland), Ph.D. (CUNY)
Dorothy Pawluch, B.A. (Laurentian), M.A., Ph.D. (McGill)
Robert H. Storey, B.A. (Toronto), M.A. (Dalhousie), Ph.D. (Toronto)/ Joint, Labour Studies

ASSISTANT PROFESSORS
Jeffrey Denis, B.A. (Toronto, Trinity College), A.M., Ph.D. (Harvard)
Paul Glavin, B.Sc. (Strathclyde, Scotland), M.A. (Kent State), Ph.D. (Toronto)
Melanie Heath, B.A. (California, Berkeley), M.A. (California State,Sacramento), Ph.D. (Southern California)
Mark McKerrow, B.Sc., M.A. (Guelph), Ph.D. (Cornell)

ASSOCIATE MEMBERS
Jane Aronson (Social Work)
Roy Cain (Social Work)
John Cairney (Family Medicine; Psychiatry & Behavioural Neurosciences)
Graham Knight (Communication Studies)

PROFESSOR EMERITUS
W. Peter Archibald, B.A. (Mount Allison), M.A. (British Columbia), Ph.D. (Michigan)

M.A. Degree

Normally candidates for admission to the M.A. program are expected to have completed work in sociology equivalent to the honours degree (57 units, including 9 units of theory and 12 units of methods).A candidate for the M.A. degree in Sociology may follow either of three programs. Regardless of which M.A. program option is chosen, all students must pass one 700-level theory course, namely one of Sociology *750, *751, *757. Students completing the Course Work or Major Research Paper program options must pass one 700-level method course, namely one of Sociology *740, *742, *743.

A. Thesis Option

A candidate must pass a minimum of four half courses and must complete and defend a satisfactory thesis based on research. Students are limited to one supervised research course (Sociology *730), one 600-level half course, and one half course in another department. In the first term, the candidate must enrol in three half courses and by the end of the term, present a thesis proposal to the Department. If the proposal is approved, the candidate may then prepare a thesis. If the proposal is not approved, the student must complete the course work option.

B. Course Work Option

A candidate must pass a minimum of eight half courses. Of these, at least one half course must be a course in Sociological Theory and another half course in Sociological Methods. Students are limited to two supervised research courses (Sociology *730), two 600-lelvel half courses, and two half courses in another department. All courses will normally be completed by the end of the summer term.

C. Major Research Option

A candidate must pass a minimum of six half courses and complete a satisfactory major research paper (MRP). Of the six half courses, at least one must be in a course in Sociological Theory and another in Sociological Methods. Students are limited to one 600-level half course and one course in another department. Sociology *730 may not be used to complete the course requirements. In the first term, the candidate must enrol in three half courses and by the end of the term, present a proposal for the MRP to the Department. If the proposal is approved, the candidate may then prepare a MRP. If the proposal is not approved, the student must complete the course work option. Courses will normally be completed through September-April, while the MRP will be completed through the summer.

Ph.D. Degree

To be admitted directly to the Ph.D. program, applicants must have received a Master's degree from a recognized University.

The Department is willing to consider applications for admission to the Ph.D. program on a part-time basis. However, the Department prefers that students register for the Ph.D. on a full-time basis.

The course requirements will normally be six half courses chosen in consultation with the student's supervisor, and Sociology #724 and #725.

Ph.D. students are required to complete Sociology #724 during the first year of the program and Sociology #725 during the second year of the program. These are professional development courses and cannot be counted towards the six half courses required for the degree.

Any Ph.D. student admitted without 9 units of undergraduate sociological theory or without Master's level sociological theory will be required to complete the requisite number of courses at the appropriate level, in addition to the regular graduate program.

Ph.D. students who have not successfully completed a 700-level theory course at the M.A. level at McMaster with a grade of B+ or better within the last two years must take one 700-level theory course, namely, one of Sociology *750, *751, *757, and pass the course with a grade of B+ or better.

Ph.D. candidates will be required to demonstrate competence in quantitative methods by taking Sociology *740/Statistical Methods for Social Research and pass the course with a grade of B+ or better. Persons admitted to the Ph.D. program without the equivalent of Sociology 3H06/Research Techniques and Data Analysis or Sociology *6Z03/Introduction to Social Statistics, however, will be expected to complete *6Z03 before taking Sociology *740. Admission is governed by the general regulations.

Ph.D. candidates will also be required to satisfy the Department of suitable competence in either qualitative methods or historical methods according to procedures delineated by the Department in the Graduate Handbook, normally by taking either Sociology *742 or *743 and achieving a grade of B+ or better in the course.

Students who have completed equivalent course work at another university may request to be exempted from the methodology requirements.

In addition to the theory and methods requirements, all Ph.D. students must take at least three regularly scheduled 700-level half courses. Other than Sociology *6Z03, no 600-level courses are permitted. Students are limited to one supervised research course (Sociology *730) and two half courses in another department. Students who have completed a Sociology course work Master's program at McMaster may petition the Department Graduate Committee on a case-by-case basis for greater flexibility.

Ph.D. candidates are required to take two comprehensive area examinations, both in Group A, or one from Group A and one from Group B. These will constitute the student's Comprehensive Examination.

GROUP A: Individual and Society; Occupations and Organizations; Social Inequality

GROUP B: Aging; Deviance and Social Problems; Education; Gender; Health and Health Care; Ideology and Culture; Methodology; Political; Race/Ethnic Relations; Theory.

By the end of their first year in the program, doctoral students must complete six half courses, or at least four half courses and one comprehensive exam. By the end of their second year in the program, they must complete all six half courses, both professional development courses, both comprehensive exams, and must present a satisfactory dissertation proposal.

The student's supervisory committee and the Graduate Committee may require Ph.D. students to demonstrate competence in a second language if their chosen area of study and research makes knowledge of a second language desirable.

Candidates for the Ph.D. degree will present a thesis which shows competence in original research. Each candidate will be required to defend the thesis in a Final Oral Examination.

Research in Sociology

The Department has the capability of supervising M.A. theses in a broad range of topics. At the Ph.D. level, the Department is officially certified in three main areas: Individual and Society, Occupations and Organizations; and Social Inequality. These three areas are broadly defined and a variety of approaches and topics are possible within each. Students normally select more narrowly focused topics under the general rubric of these areas. Many are guided by the Group B list above which are further specifications of the three broad areas.

In order to ensure proper supervision, the Department attempts to match as closely as possible the research interests of incoming students with those of the faculty. Applicants should consult the Department's web site on the Internet for the most current areas of expertise and research activities of the faculty.

While the Department has specialized in its areas of Ph.D. supervision, students are nonetheless encouraged to pursue their studies more broadly in the courses taken. The list below gives the titles of the various courses offered. Details about which of these courses will be offered in any particular year, the actual course content and the name of the instructor can be obtained from the Administrative Assistant, Graduate Programs, Department of Sociology, Room 627, Kenneth Taylor Hall.

Courses

Courses marked with an asterisk (*) are half courses. The following courses are offered for graduate credit and are also available to senior undergraduate students.

***6E03 / Self and Identity**
A consideration of theoretical and empirical questions relating to self and identity viewed from historical, cross-cultural and cross-disciplinary perspectives.

***6J03 / Selected Topics in Sociology I**
Topics of contemporary interest to sociologists, with emphasis upon current theory and research.

***6JJ3 / Selected Topics in the Sociology of Technology**
The purpose of this course is to examine the economic, political and social organization of the internet, and its social effects, in such areas as education, work, and leisure.

***6K03 / Selected Topics in Sociology II**
Topics of contemporary interest to sociologists, with emphasis upon current theory and research.

***6R03 / Individual and Society**
An intensive examination of selected problems involving the relationship of individuals to social structures.

***6Z03 / Introduction to Social Statistics**
This is a basic course in social statistics, which introduces students to the role of statistical methods in social research and to the fundamentals of statistical reasoning. The course is intended to equip students to read sociological research that uses basic statistical methods, to undertake elementary data analysis, and to take more advanced courses in social statistics. *(No 400-level equivalent)*

The following courses are offered for graduate credit only:

***700 / Selected Topics in Sociology I**
This is a special topics course addressing current debates within sociology. Topics may be of a general nature, covering debates and new directions in the discipline as a whole, or more specific to sub-areas within the discipline.

***701 / Selected Topics in Sociology II**

This is a special topics course addressing current debates within sociology. Topics may be of a general nature, covering debates and new directions in the discipline as a whole, or more specific to sub-areas within the discipline.

***704 / Deviance and Social Problems**

Critical consideration will be given in this course to theoretical perspectives on the origins, emergence, nature and development of social problems.

***705 / Sociology of Organizations**

This course introduces students to classical and contemporary theories of organizations and to empirical (qualitative and quantitative) research that evaluates these theories. Representative theories include Weber's theory of bureaucracy, institutional theories of organizational change, and network perspectives on organizations. Representative topics include organizational downsizing and restructuring, internal labour markets, and the divergent organizational experiences of women and men.

****708 / Topics in Religion and Society (cross-listed as Religious Studies *780)***

This course introduces students to recent developments in the sociology of religion, with attention to theoretical debates and specific case studies. Among the topics considered are: secularization and religious revival; the dynamics of religious recruitment, conversion, defection and schisms; the social organization of religious institutions and movements; religion and the body; religious consumerism and popular culture; religion and globalization; religion and media. Emphasis will shift from year to year. (Prerequisite: Permission of the instructor)

***710 / Introduction to Research Design in Sociology**

This course is designed for entry level Master's students to identify a critical research issue of relevance to the field of sociology and to develop a research proposal to help better understand the issue chosen. The course is structured such that each week students work on a skill that leads them further through the process of developing all of the critical elements of a research proposal. The course will also enable students to gain experience to work both within and outside of the university research setting.

***713 / Social Inequality**

This course reviews and assesses decades of sociological theory and research on inequality. It examines classic and contemporary theories and employs concepts from the burgeoning sub-fields to comprehend economic, institutional and cultural change. Using both macro and micro approaches, this course discusses ways in which forms of inequality are changing in contemporary times.

***714 / Political Sociology**
This course is an advanced treatment of theories and empirical research on the state, social and political movements, political attitudes and culture, political behaviour and voting, organization of political parties, elites, citizenship, democracy, civil society, political conflict, nations, nationalism, and globalization. The role of socio-economic factors, such as gender, race/ethnicity, education, income, occupation, and class, will also be considered.

***716 / Sociology of Education**
This course investigates the relationship between formal schooling and society. Topics include educational inequalities by class, race and gender, the expansion, institutionalization and stratification of schooling, the transformation of knowledge, and the politics of education. Students will be exposed to both current theories and research in the field at micro, meso and macro levels.

***718 / Sociology of Occupations**
This course examines theory and research in the sociology of occupations. Topics include the emergence of competing occupations in jurisdictions such as health, education, law, engineering, and academe, and their shifting demographics. Consideration will be given to macro, meso and micro factors influencing the professions with emphasis on current issues including globalization and the ‘knowledge economy.’

***719 / Sociology of Health and Health Care**
This course addresses the key theoretical debates in the sociology of health, illness and health care literatures. Topics covered could include: the social determinants of health, the social construction and experience of illness, the social organization of health care, the social dynamics of the health care division of labour, the role of the state, and comparative health issues.

***720 / Sociology of Aging**
This course provides an overview of three distinct theoretical focuses in the sociology of aging: (1) the sociology of age, which analyses the ways in which age is an organizing principle in society; (2) the sociology of aging, which focuses on continuity and change in the lives of individuals as they grow older; and (3) the sociology of the aged, which tends to view older people from a social problems perspective.

***721 / Sociology of Popular Culture and Subcultures**
This course offers a selected overview of American and European theories of popular culture. Particular emphasis is given to how the politics of class, gender, ethnicity and sexuality are embedded in the material production and consumption of mass mediated cultural forms. Attention is also directed toward the ways by which pop cultural commodities and images are globally exchanged, negotiated and resisted.

***722 / Sociology of Culture**
This course offers an overview of theoretical perspectives in the sociology of culture. Theories to be discussed could include critical theory and cultural studies, the production of culture approach, neo-institutionalism, Bourdieu, neo-Gramscian, neo-Durkheimian or globalization theories. Substantive areas in the sociology of culture considered might include music, art, sports, literature, intellectuals and knowledge, love and intimacy, mass media and cultural institutions.

#724 / Doctoral Research and Professional Development Part 1
This course is the first of two courses designed to support students in their progress through the Ph.D. program and to facilitate their transition into careers. The course introduces Ph.D. students to faculty and their areas of research interest.

#725 / Doctoral Research and Professional Development Part 2
This course is the second of two courses designed to support students in their progress through the Ph.D. program and facilitate their transition into careers. The course involves a series of professional development workshops on such topics as awards, dissertation proposals, grantsmanship and careers.

***730 / Supervised Research Course**
Directed study of a research problem through published material and/or field inquiry and/or data analysis. To be undertaken with a Sociology faculty member. Research courses undertaken with a faculty member from another department must obtain the appropriate course designation from that department. Coursework M.A. students may take this course twice in the same term.

***740 / Statistical Methods for Social Research**
This is a second course in social statistics, required of our Ph.D. students. The course focuses on regression analysis, linear models, and generalized linear models, such as logistic regression. Emphasis is placed on the practical application of statistical methods, including the use of modern statistical computer software. (Prerequisite: Sociology *6Z03 or equivalent, or Permission of the Instructor)

***742 / Qualitative Methods**
The seminar examines a range of qualitative research methods as a means of studying aspects of society and social life. Depending on the instructor, the emphasis may centre, for example, on participant observations and informal interviews, the content analysis of documents, or the practical application of qualitative methods for problem-solving purposes. In addition to considering the challenges and advantages of qualitative methods, the seminar also focuses on the underlying theoretical principles encompassing qualitative methods. (Prerequisite: Permission of Instructor)

***743 / Historical Methods**
This course examines how sociologists design historical research projects, and then develop systematic strategies for retrieving archival data. Students gain experience in locating, gathering and interpreting forms of historical data such as government records, personal narratives, media documents, existing statistics and other secondary sources. Critiques of classical sociology, historiography, genealogy and comparative methods are typically addressed.

***744 / Computer Applications in Qualitative Data Analysis**
This is hands-on training in qualitative computer software (QSRNud*ist or Nvivo) in analyzing text materials: interviews, field notes, diaries, internet content, or archival documents. Covered are document format and import, inductive and deductive coding, nodes, memo writing, open text and node searching, qualitative/quantitative interface, and theoretical modeling. Students will develop a project using a qualitative software program. (Prerequisite: Permission of the Instructor)

****747 / Welfare States in Comparative Perspective (cross-listed as Political Science *747)***

***750 / Classical Sociological Theory**
This seminar will introduce students to the classical sociological tradition. The class will focus on selected thinkers, themes, theories and/or theoretical perspectives related to classical sociological theory. In past years, the focus of the class has been on such classical sociological theorists as Marx, Weber, and Durkheim. The specific choice of readings, theories and theorists covered and the framing of the class will depend on the instructor.

***751 / Contemporary Sociological Theory**
This seminar will introduce students to the contemporary sociological tradition. The class will focus on selected thinkers, themes, theories and/or theoretical perspectives related to contemporary sociological theory. In past years, the focus of the class has been on such contemporary sociological theorists as Giddens, Collins, Goffman, Smith and Habermas and micro-macro integration. The specific choice of readings, theories and theorists covered and the framing of the class will depend on the instructor.

***755 / Individual and Society**
This course addresses the nature of the relationship between individual and society, emphasizing normally the contributions of symbolic interactionism and other interpretive theories, though other approaches may be considered. Topics covered may include self, identity, roles, motives/accounts, the agency/structure debate, generic social processes, the construction of meaning, emotions, and negotiated order.

***756 / Media, Culture and Society**

This course explores how social relationships are generated, sustained and transformed through institutions, practices and technologies of mediated communication. Among the topics considered are: the organization of media institutions; the production of audiences; media and social movements; promotionalism, advertising and consumer culture; media and globalization; media and the human sensorium. Emphasis will shift from year to year.

***757 / History of Sociological Theory**

This seminar will introduce students to the history of sociological theory. The class will focus on the history of selected thinkers, themes, theories or theoretical perspectives within sociological theory. In past years, the focus of the class has been on such topics as the history of the Frankfurt School, Marx and Marxism, conflict theorists such as C. Wrights Mills and Alvin Gouldner, Canadian sociological theories, feminist theory, post-modernism and symbolic interactionism. The specific choice of readings, theories and theorists covered and the framing of the class will depend on the instructor.

***758 / Sociology of Race and Ethnicity**

This course will examine the major approaches and concepts used to understand patterns of race and ethnic relations. Issues such as assimilation, identity, racism, state policy and multidimensional inequalities will be addressed through historical, contemporary and comparative analysis.

***759/ Sociology of Gender**

An examination of classical and contemporary theoretical perspectives on gender relations, with an emphasis on the development of feminist thought, and the links between gender, and race, ethnicity, citizenship, and class. The discussion of analytical frameworks for understanding gender construction, gender difference, and gender inequalities will be informed by research in selected substantive areas such as: the economy, work, family, sexuality, popular culture, and law.

***761 / Topics in Statistical Methods for Social Research**

This is a moderately advanced course in social statistics, meant to introduce students to several statistical methods that are frequently used in social research. Representative topics include structural-equation modeling; survival analysis; mixed-effects models for hierarchical and longitudinal data; missing data; and data from complex survey samples. (Prerequisite: Sociology *740 or equivalent, or Permission of the Instructor)

***770 /	Advanced Analysis of Survey Data***
(cross-listed as Economics*770, Geography *770, HRM *790, Psychology *770)

This course is divided into two parts. The objective of Part 1 is to have students identify a suitable data set (research study) and develop a proposal describing their secondary analysis project. Students will be helped to develop their 1-2 page proposals which will include the research question, a brief outline of its relevance and importance; identification of the appropriate data set(s); a brief statement about analytical approach to be used; and the identification of 3-4 key references. The instructors have access to several data sets that can be used for this course. This part will occur between October and December. There will be two class sessions—one in October and the other in November and the opportunity for two individual sessions. The objective of Part 2 is to complete the research paper (review of the literature, analysis of data, write-up and revision of the report) with the purpose of submitting the paper for review to a peer reviewed journal. This part will occur between January-May and include 10 class sessions. Prerequisite: Permission of the instructor.

STATISTICS

The Department of Mathematics and Statistics offers an M.Sc. program in Statistics which is administered by a Graduate Committee with faculty from several university departments.

Enquiries should be addressed to the Coordinator, Graduate Program in Statistics,
905 525-9140, Ext. 23420
E-mail: statistics@math.mcmaster.ca
Website: http://www.math.mcmaster.ca/graduate/msc_stats/

Ph.D. in Mathematical Statistics is offered (see "Mathematics" section of this Calendar for details).

Faculty / Fall 2012

PROFESSORS
N. Balakrishnan, B.Sc., M.Sc. (Madras), Ph.D. (I.I.T., Kanpur)
S. Feng, B.Sc., M.Sc. (Beijing Normal), Ph.D. (Carleton)
J. Fox, B.A. (City College of New York), M.A., Ph.D. (Michigan) / Sociology
F.M. Hoppe, B.Sc. (Toronto), M.Sc. (Weizmann Institute of Science),M.A., Ph.D. (Princeton)
L.J. Magee, B.Math. (Waterloo), M.A., Ph.D. (Western) / Economics
M. Min-Oo, B.Sc. (Rangoon), Dip. Math., Dr.rer.nat.Habil. (Bonn)
J.S. Racine, B.A., M.A. (McMaster), Ph.D. (Western) / Economics
H.S. Shannon, B.A. (Oxford), M.Sc. (Birmingham), Ph.D. (London)/ Clinical Epidemiology & Biostatistics
M.R. Veall, B.A. (McMaster), M.A. (Western), Ph.D. (M.I.T.) / Economics
R. Viveros-Aguilera, B.A. (Veracruzana, Mexico), M.A. (NationalPolitechnic Inst., Mexico), Ph.D. (Waterloo)
S.D. Walter, B.Sc. (London), Ph.D. (Edinburgh) / Clinical Epidemiology& Biostatistics
K.M. Wong, B.Sc.(Eng.), Ph.D., D.Sc. (London), D.I.C. (ImperialCollege), F.I.E.E.E., F.I.E.E., F.Inst.P., F.S.S., C.Eng., P.Eng./Electrical and Computer Engineering

ASSOCIATE PROFESSORS
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A. Canty, B.Sc. (College Cork, Ireland), M.Sc., Ph.D. (Toronto)
A. Childs, B.Sc., M.Sc., Ph.D. (McMaster)
L. Thabane, B.Sc. (Lesotho), M.Sc. (Sheffield), Ph.D. (Western) /Clinical Epidemiology & Biostatistics

ASSISTANT PROFESSORS
N. Akhtar-Danesh, B.Sc. (Ferdowsi, Iran), M.Sc. (Shiraz, Iran), Ph.D.(Newcastle, U.K.) / Nursing
Bei Chen, M.Sc., Ph.D. (Waterloo)
Jemila Hamid, B.Sc. (Addis Ababa), M.Sc., Ph.D. (Uppsala) / Clinical Epidemiology & Biostatistics

S. McDonald, B.A. (Princeton), M.D., M.Sc. (Toronto), F.R.C.S.C. /Obstetrics & Gynecology; Radiology
E. Pullenayegum, B.A.Hons., CASM (Cambridge), Ph.D. (Toronto) /Clinical Epidemiology & Biostatistics

PROFESSORS EMERITI
P.D.M. Macdonald, B.Sc., M.Sc. (Toronto), D.Phil. (Oxford), P.Stat.
J.F. MacGregor, B.Eng. (McMaster), M.S., Ph.D. (Wisconsin), P.Eng./ Chemical Engineering
S.G. Mohanty, B.A. (Utkal), M.A. (Punjab), Ph.D. (Alberta)

Areas of Specialization

With the approval of the Ontario Council of Graduate Studies, students in the Master Program in Statistics have the opportunity to specialize in the areas of:

- Medical Statistics (Biostatistics)
- Applied Statistics
- Statistical Theory
- Applied Probability

A variety of elective courses will be available to cater to individual interests. All students will be required to complete core courses on the foundations of statistics. Students interested in a particular application area may receive graduate credit for certain courses given in other departments.

Although a student with a good undergraduate background in statistics should be able to complete the requirements for the M.Sc. degree in one calendar year of study, it is expected that some students will require longer. Students entering the program after receiving an undergraduate degree in science or engineering with minimal preparation in statistics may be required to take some background courses. Students with a good undergraduate background in statistics may want to study statistics as applied to a particular application area. These students will be required to take courses outside of statistics to become familiar with the application area of interest. For example, a program in medical statistics would involve taking courses in health research methodology. Students will also be expected to develop their report-writing and presentation skills and become familiar with the use of statistical packages on microcomputers and workstations.

The particular areas of specialization to be emphasized in the program will be those in which the faculty members have special expertise. Statistics faculty drawn from five different faculties and schools make this program uniquely interdisciplinary. Since several of the faculty are biostatisticians in the Health Sciences Centre, one of the major areas will be health and medical statistics. Students specializing in this area will learn the various issues involved in the conduct of large multi-centre clinical trials, and the methods for analyzing survival data and multi-dimensional contingency tables. These students will interact closely with their peers enrolled in the Health Research Methodology Program, and will take courses in medical sciences. Through thesis work supervised by members of the biostatistics faculty, they will have opportunities to gain experience in statistical consulting in a health sciences context.

Students who do not wish to specialize exclusively in health and medical statistics, but rather in a broader area of applied or theoretical statistics, may obtain training in one or more of the following areas: environmetrics, time series analysis, stochastic models in biology, statistical methods in genetics, economics, nonlinear models, applied statistics, order statistics, reliability, analysis of censored data, the booststrap and other resampling methods, non-parametric methods, comparative inference, and quality control. Our Research Data Centre, a Statistics Canada unit at McMaster, holds large real-life data sets from longitudinal surveys that are suitable for statistical analyses for theses and other research projects. Students interested in business or industrial applications may arrange to do their thesis work off-campus. Those interested in combining statistics with financial mathematics can take courses offered by the PhiMac Group at McMaster.

The Graduate Program in Statistics is subject to all existing University regulations and specifically to the general regulations governing Master's degrees as established by the School of Graduate Studies and set out near the front of this Calendar. Either a full-time or a part-time program of study may be undertaken.

A. Admission Standards

B.A. or B.Sc. honours degree, B+ standing, or equivalent, with a good background in statistics and mathematics. Students with a degree in engineering, science, health sciences, or social sciences will enthusiastically be considered, provided they have a B+ average with sufficient mathematics and statistics background. Students coming from other areas may be required to take additional undergraduate courses to make up any deficiencies.

B. Program Requirements

Students can earn the M.Sc. degree following one of the options below. In both options students can take up to two 600-level courses to fulfill their graduate course requirements. All Master statistics students are required to attend the weekly Statistics seminar during the Fall and Winter terms, and also submit written reports on six seminars delivered during the year.

<u>Thesis Option</u>
Students choosing the **Thesis Option** are required to complete six one-semester graduate courses (consisting of four compulsory and two elective courses) and a thesis. Equivalent in work to two one-semester courses, the thesis is written under the supervision of a faculty member of the program in a topic of mutual interest to student and supervisor. The degree requirements are normally completed in four academic terms.

<u>Coursework Option</u>
The **Coursework Option** requires completion of eight one-term graduate courses (consisting of four compulsory and four elective courses). The degree requirements are normally completed in four academic terms.

C. Examinations

No examinations will be required except as stipulated by individual instructors in individual courses.

D. Thesis

For those in the **Thesis Option**, a thesis will typically be 50 to 150 pages in length, exclusive of tables, graphs and appendices, written and bound in the usual format for a thesis. Standard statistical analyses applied to a novel application, or original contributions to statistical methodology with adequate presentation of background material will be acceptable thesis work. Students will be required to defend their theses orally.

Courses

Courses marked with an asterisk (*) are half courses. Courses marked with a plus sign (+) may differ in content each time they are offered and may be taken a second time for graduate credit.

In the Statistics Program, there are required, elective, and special topics courses. Required courses, STATS 743 (two one-term courses) and STATS *752 (one one-term course), cover the basic theoretical concepts that are considered essential for all students. The elective courses are traditional statistics courses covering a sufficient variety of topics to offer students a choice based upon their individual interests. STATS *770 is another required course that develops a broad knowledge of statistics through attendance at research seminars as well as report-writing skills through critical written reviews of the seminars. The elective courses are traditional statistics courses covering a sufficient variety of topics to offer students a choice based upon their individual interests. Approved courses from other graduate programs may be taken as elective courses for graduate credit. Students concentrating in Medical Statistics will be required to take courses in Health Research Methodology, such as Fundamentals of Health Research and Evaluation Methods (HRM *721) and Introduction to Research Methods for Randomized Controlled Trials (HRM *730). Some Medical Sciences courses have prerequisites and limited enrolment, so students should contact the Health Research Methodology Program office at ext. 27718 before registering. special topics courses are intended to be highly flexible and vary from year to year. They are usually offered in the areas of specialization of individual faculty members.

Graduate students taking the combined graduate/undergraduate courses *6A03, *6C03, *6D03, *6E03, *6F03, *6M03, or *6P03 for graduate credit will be required to do more work than undergraduates in the same class. The additional work may include a project, an essay, a class presentation, or a more difficult examination, at the discretion of the instructor. For the M.Sc. in Statistics, at most two 600-level courses may be taken for graduate credit. The following 600-level courses are available for the Statistics Program.

*__6A03 /   Time Series__

Stationary, auto-regressive and moving-average series, Box-Jenkins methods, trend and seasonal effects, tests for white noise, estimation and forecasting methods, introduction to time series in the frequency domain.

***6C03 /   Generalized Linear Models**

Review of the normal linear model, the exponential family, the iteratively-reweighted least squares algorithm, logistic regression for binary data, Poisson regression and log-linear models, other families of GLM's, quasi-Likelihood, analysis of deviance and model checking, residuals in generalized linear models, linear mixed models, analysis of longitudinal data, generalized linear mixed models.

***6D03 /   Intermediate Probability Theory**

Construction of probability spaces and random variables, integration, conditional expectation, law of large numbers, convergence of series, weak convergence, characteristic functions and central limit theorems, martingales.

*__6E03 /   Brownian Motion and Diffusion__

Brownian motion, stochastic integrals, one-dimensional Ito's formula, diffusion processes, option pricing and other financial applications.Simulation of the Black-Scholes formula and related models.

***6F03 /   Categorical Data Analysis**

Two-way and three-way contingency tables, logistic regression, log-linear models for contingency tables, collapsibility, ordinal associations, multi-category logit models.

***6M03 /   Multivariate Analysis**

Multivariate distributions: Normal, Wishart, T^2 and others; regression, correlation, factor analysis and principal components, general linear hypothesis.

***6P03 / Advanced Applied Statistics**
Statistical computing, statistical software packages; working with large data sets; exploratory data analysis; graphical methods; statistical consulting practice.

The following 700-level courses are available to graduate students:

***721 / Statistical Modelling in Practice**
Sampling distributions, point estimation, interval estimation, linear regression, time series, model fitting and validity, multivariate models anddependence structures. Statistics 743 is an anti-requisite to this course.

***741 / Theory of Estimation**
General principles of estimation, sufficiency, completeness, Rao-Blackwell and Lehman-Scheffe theorems, Cramer-Rao inequality, maximum likelihood estimation, Bayes estimation, minimax estimation, admissibility and complete classes.

***742 / Theory of Testing Hypotheses**
Statistical tests, uniformly most powerful tests, unbiased tests, invariant tests, minimax principle.

743 / Foundations of Statistics
A systematic treatment of the central concepts and methods of statistical inference, including sampling distributions, point and interval estimation, and testing of statistical hypotheses. Both frequentist and Bayesian approaches are presented. The course ends with an introduction to resampling methods, including the bootstrap and the jackknife, and to inferential aspects of regression methods, including logistic and generalized linear models.

+*744 / Special Topics
One or more Special Topics courses based on courses of study planned by the program Coordinator for individual students. Topics may be selected from the following list, to which others will be added from time to time: Biostatistics; Categorical data; Censored data; Comparative inference; Data analysis; Distribution theory and applications; Environmetrics; Financial mathematics; Large deviations and applications; Limit theorems in statistics; Mixture distributions; Nonparametric methods; Order statistics; Operations research; Probability; Process control; Queuing theory; Reliability; Response surfaces; Robust methods; Statistical decision theory; Stochastic processes; Survival analysis.

***752 / Linear Models and Experiment Designs**
This course covers the general linear model. Applied regression analysis. Incomplete block designs, intra- and inter-block analysis, factorial designs. Random and mixed models.Distribution theory, hypothesis testing, computational techniques.

***753 / Advanced Survey Sampling**
Sampling designs, unbiased estimation for element sampling, unbiased estimation for cluster and several-stages designs, estimation through linear associations with auxilliary variables.

***754 / Stochastic Processes and Applications**
Review of probability methods for applied scientists: functional transformations, convolution, correlation, power spectral density, Monte Carlo methods, Markov processes, queuing theory.

***756 / Topics in Biostatistics**
Categorical data, multi-dimensional contingency tables.Survival analysis.Demography.Design of retrospective and prospective studies.Designs to reduce bias and confounding.Models for epidemics and chronic diseases.

***758 / Multivariate Analysis and Applications**
Multivariate normal distribution. Multivariate analysis of variance, tests of hypotheses. Canonical correlation.Principal components.Factor analysis. Discriminant functions. Computational techniques in multivariate analysis.

***761 / Advanced Time Series Analysis**
Spectral representation, inference for the spectrum, multivariate time series, state space models and the Kalman Recursions.

***770 / Statistics Seminar / Staff**
A statistics seminar is held weekly during the fall and winter terms, with presentations by faculty, visitors and students. Students are to attend the seminar, participate in discussion, and submit short written critical reviews of 6 seminars delivered during the year.

<u>Chemical Engineering Course</u>

***762 / Time Series Analysis and Process Identification**
Methods for modelling the dynamic-stochastic behaviour of a process and its disturbances using data collected from the process. Traditional methods for impulse and frequency response identification. Discrete transfer function and ARIMA time series models. Statistical methods for structure determination, parameter estimation, model validation, design of experiments, and analysis of closed-loop data. Use of models for forecasting, analysis, and control.

<u>Economics Course</u>

****770 / Advanced Analysis of Survey Data***
(cross-listed as Psychology *770, HRM * 790, Geography*770, Sociology *770)
This course uses large-scale surveys to refine student skills in conducting secondary analysis and writing for publication in peer-reviewed journals. Students will develop a two-page research proposal on a topic of their choice. The proposal will identify a research question to be addressed using one or more population-based studies. The educational methods will be varied,

depending on group composition and include lectures, small group tutorials, student presentations and faculty mentorship. The objective is to produce a research report for submission to a peer-reviewed journal.

Electrical and Computer Engineering Courses

***723 / Information Theory and Coding**
Entropy and mutual information. Discrete memoryless channels and discrete memoryless sources, capacity-cost functions and rate distortion functions. The Gaussian channel and source. The source-channel coding theorem. Linear codes.BCH, Goppa, Reed-Solomon, and Golay codes.Convolutional codes.Variable-length source coding.

***760 / Stochastic Processes**
Concepts of probability, logical relations, conditional probability and expectation, Bayes theorem, Bayesian statistics, central limit theorem; continuous random variables, correlation and higher order statistics; theory of distributions: moments, heavy tailed distributions, Cauchy distribution, characteristic functions, stability / infinite divisibility; Markov property, principles of stationarity, ergodicity; power spectral density and auto-correlation; population dynamics, birth-death-immigration processes, the Poisson process; diffusion processes, the Fokker-Planck equation; Brownian motion and the Wiener process; introduction to stochastic differential equations.

***762 / Detection and Estimation**
Hypothesis testing decision criteria, detection of signals in noise; theory and parameter estimation, Bayes estimate, maximum likelihood estimate, Cramér-Rao bound, linear mean square estimation, Wiener filtering, Kalman filtering, applications to communication and radar systems.

Mathematics Courses

***771 / Mathematics of Finance**
A sequel to Statistics *6E03. Binomial model of stocks, stochastic calculus, martingales and arbitrage, Black-Scholes equation and pricing derivative securities, interest rate modeling, introduction to portfolio risk management.

***782 / Probability Theory**
Probability measures, conditional expectations, martingales, convergence of probability measures, stochastic processes.

Health Research Methodology Courses

***721 / Fundamentals of Health Research and EvaluationMethods**
The major components of research activities are covered, including concept of health, formulation of research questions, literature reviews, study designs, selection of study populations, choice of measuring instruments, and study interpretation issues such as determination of causality and the effectiveness of clinical and community interventions.

***730 / Introduction to Research Methods for RandomizedControlled Trials**
This course introduces students to the main elements of clinical trial design, execution, and analysis. Students' grasp of clinical trial methodology will allow students to prepare successful grant applications.

***731 / Advanced Linear Models for Health Data**
The course focuses on some advanced statistical techniques for the analysis of health studies that have continuous outcomes. Although these techniques are useful for many kinds of research, students interested in observational, repeated-measures, and longitudinal studies will find them especially helpful. The goal of the course is to give students the tools to develop multivariate linear models of health outcomes. The curriculum is divided into 3 modules: (1) fundamental topics in linear regression; (2) multilevel models and growth curve analysis for clustered and longitudinal data; and (3) structural equation modeling with latent variables. We take a conceptual, rather than mathematical, approach using a combination of lectures with problem-based discussion. Assignments emphasize computer analysis and interpretation of real data.

***733 / Statistical and Methodologic Issues in Randomized Clinical Trials**
This course will consider important statistical issues relating to design, analysis and interpretation of randomized clinical trials. Specific topics will include issues in sample size determination, sequential methods, repeated data evaluation, data monitoring, analysis of survivorship data and competing risks, crossover trials, large simple trials, factorial designs, economic evaluation in clinical trials, cluster randomization and meta analysis. This course will be taught in small group tutorials.

TECHNOLOGY ENTREPRENEURSHIP AND INNOVATION

The Xerox Centre for Engineering Entrepreneurship and Innovation (XCEEI) within the Walter G. Booth School of Engineering Practice offers complete facilities to students seeking the Master of Technology Entrepreneurship and Innovation (M.T.E.I.) degree.

Enquiries: 905-525-9140 Ext. 26566
Email: innovate@mcmaster.ca
Fax: 905-528-7901
Website: http://www.businessinnovation.ca/MTEI/index.html

Faculty / Fall 2012

PROFESSORS
Samir E. Chidiac, B.Eng., M.Eng., Ph.D. (McMaster), P.Eng. / Director, Walter G. Booth School of Engineering Practice, Chair in Effective Design of Structures
Rafik O. Loutfy, B.Sc., M.Sc. (Ain Shams), Ph.D. (Western), M.B.A. (Toronto) / Walter G. Booth Chair in Engineering Entrepreneurship and Innovation / Director, Xerox Centre for Engineering Entrepreneurship and Innovation

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Alan Barrell, B.Sc. (London), DBA (Bedforshire), F.R.S.A.M.C.
B.V. Phani, B.E.(Mech) (Osmania), Ph.D. (IIM, Calcutta)

The Master of Technology Entrepreneurship and Innovation program is a fast paced program aimed at highly motivated students.

While students in the Technology Entrepreneurship and Innovation program are not expected to have any engineering or scientific background, they are expected to embrace creativity and innovation. Some basic familiarity with technology is expected, but the required technological depth will depend on the project itself and will be evaluated on a case-by-case basis. Considerable emphasis will be placed on team-based experiential learning in which all members of the team will learn from each other as they complete the project.

Applications for admission will be made directly through the Walter G. Booth School of Engineering Practice. In addition to the general requirements for entry into a graduate program in Engineering, candidates applying to the Master of Technology Entrepreneurship and Innovation program must hold an Honours Bachelor's degree from any discipline, with at least a B- average (equivalent to a McMaster 7.0 GPA out of 12) in the final year in all courses in the discipline, or relating to the discipline, in which the applicant proposes to do graduate work.

Strong letters of recommendation are also required. The delivery of the program relies heavily on the synergy created between members of student teams, and successful operation of the program requires that each cohort have an appropriate blend of skills and experience. Therefore each applicant will be interviewed. A strong performance in the interview is a critical requirement for admission.

Bachelor Technology students are also required to take the Graduate Record Exam.

- Verbal >550
- Quantitative >550
- Verbal and Quantitative >1200
- Analytical Writing >3.5

The program will accept full- or part-time students. The full program is expected to take up to 20 months full-time study or 28 months part-time. A compressed program of 12 months may be possible. Candidates are admitted for September only.

Prospective applicants who did not attain the required standing in their undergraduate degree, but who have at least four (4) years of relevant work experience, should discuss their situation with the program director. If the experience is deemed sufficient, the directory may then recommend an interview. Evidence of ability to do graduate work will still be required (see sections *2.1.1 Admission Requirements for Master's Degree* and *2.1.3 Admission of Students with Related Work Experience or Course Work Beyond the Bachelor's Degree* in the Graduate Calendar.)

A candidate is required to complete successfully two one-term advanced graduate courses and the five compulsory Entrepreneurship and Innovation module courses. A faculty advisor will assist the student in selecting relevant graduate courses. Students will normally be required to complete two graduate level (700 –level) graduate courses in fulfillment of the requirements for Advanced Studies. Advanced studies are an integral component of the program and are offered by various departments in theFaculty of Engineering and beyond. The objective is to acquire leading-edge skills and apply them to the enterprise project.

Innovation and Entrepreneurial Skills Development

Five compulsory enterprise modules will focus on providing the Master's degree candidate basic skills to select an idea with goodpotential, manage the innovation process, then create and manage the business outcome. The skills will broadly cover all the business cycle from start, growth and sustainability. The modules will develop an understanding of both the innovation and the entrepreneurial processes through lectures, workshops and hands-on work, and will enable the student to fully exploit the potential of the engineering enterprise project. Each module is considered the equivalent of a half-course as defined by the School ofGraduate Studies, but will contain elements of lecture, group work, presentation and other activities as defined in the course outline.The module courses will be delivered in an intensive format; and it is expected that students will take the module courses in sequenced numerical order. The module courses are:

***6E03 /** Entrepreneurial Processes and Skills (Module 1) / R. Loutfy
***6EE3 /** Breakthrough Technology Venture Development (Module 2) / D. Potter
***722 /** Positioning and Shaping an Enterprise (Module 3) / L. Belkhir
***723 /** New Venture Business Strategy (Module 4) / Staff
***724 /** Taking a New Venture to Market (Module 5) / Staff

Enterprise Project

The Enterprise Project will run throughout the entire study period and will result in both a business and a technical plan for anengineering prototype product (ideally with an actual prototype device or software produced) with an identified customer base and aplan outlining the way to commercialization. The project will bring together complementary streams of activities to bring an idea tothe proof of concept phase. The core Entrepreneurial course stream, will guide the technological work performed in the researchlaboratory so that the concept becomes, by the end of the degree, the nucleus of a business proposition. The Enterprise projectdevelopment will be supported by two additional graduate level courses.

The Enterprise Project will have three phases, which will end with project gate assessments to determine the project's readiness toproceed to the next phase:

Phase 1 - Project Preparation: Market research to arrive at a proposed product or service with clear value proposition; define themarket for the intended product or service revealing competitive threat, opportunities, and margins and volumes projections; drawup development plans for the product or service indicating the required resources and estimated investment cost; seek theresources within the university and without; build a team of support that might include a partner.

Phase 2 - Technical Research and the Development of the Prototype: Develop a research plan, identifying key issues andopportunities (with the assistance of academic technical and business supervisors); conduct technical research and development;implement the engineering research plan within the research group in the host-engineering department; build a developmentnetwork within the engineering research community; ready the technology for transfer to market; conduct initial market engagement to get customer feedback and reactions.

Phase 3 - Technology Transfer to Market: Apply for IP protection; develop a path-to-market strategy; develop a business case;present to funding institutions and explore business arrangements; plan for business start-up. Each phase has two equally importantcomponents, one technical and the other business:

Phase I: Concept initiation proposal; Technology development plan presentation and documentation
Phase II: Technical Proof-of-concept; Draft financial plan presentation and documentation
Phase III: Business Strategy and Go-to-market plan or a Venture feasibility presentation and documentation

The Phase III evaluation will be a defence of your project in an oral examination to your board (technical mentor, enterprise advisor, business advisor and your business mentor). Candidates are required to complete and pass through each phase in order tograduate.

Peer Evaluation and the Enterprise Project

The ability to effectively work in a team environment is an important learning outcome of team-based project work on the Enterprise project. Candidates will be mentored on their progress in this aspect by their enterprise advisor based on input from their peers in the project team and from the observations of the enterprise advisor. Team member evaluations will be collected in confidence from team members by the enterprise advisor, or their designate, on a six-month basis. Every six months the Enterprise Advisor will review the performance of the individual candidate in the team with the candidate. The enterprise advisor will generate an assessment of performance. To successfully complete the program, the candidate must maintain an average rating of “Good” over the span of the enterprise project.

Enterprise Development Lab

The MTEI program is constructed in such a way as to allow students from different disciplines to work in a common learning environment–the Enterprise Development Lab. The Lab is equipped with state-of-the-art communications equipment designed to facilitate both internal and external collaboration with faculty, colleagues, mentors, technical supervisors and private sector representatives.

Courses

Courses identified with an asterisk (*) are half courses. Courses identified with a pound (#) sign are quarter courses.

*** 6E03/ Entrepreneurial Processes and Skills / R. Loutfy**
This module course will develop an understanding of the fundamentals of sustainable businesses. Students will develop an awareness of and skills in innovation and entrepreneurial behaviour. Emphasis will be placed on becoming a more effective team player, becoming more aware of one's own learning style and entrepreneurial orientation, and understanding the process of business idea generation, development and evaluation.

***6EE3 / Breakthrough Technology Venture Development / D. Potter**
This course will introduce students to the concepts of new venture creation, and will provide an understanding of the responsible use of capital, basic capability in the process and techniques of market research, and appreciation of intellectual property value and protection issues. Learning outcomes include understanding the process of business planning and valuation and understanding the main types of risk that affect the nascent entrepreneurial venture.

***722 / Positioning and Shaping an Enterprise (Module 3) / L. Belkhir**
Learning outcomes of this module course will include an understanding of the role of technology-based business in the economy; understanding the financial dimension of the venture; understanding the nature of capital investment and role of banks and VC industry; understanding business and managerial accounting;appreciating operational and resource issues; understanding project management and how theinnovation process may be managed; understanding how manufacturing units may be set up and managed; and developing the ability to formulate an exit strategy.

***723 / New Venture Business Strategy (Module 4) / Staff**
The focus of this course is understanding the new venture value proposition and how to market it, including understanding market dynamics and competitive forces facing new venture and strategies to create customer value, understanding the role of IT infrastructure in driving the enterprise productivity, and understanding e-business as a channel.

***724 / Taking a New Venture to Market (Module 5) / Staff**
The final module course in the program will address the skills and knowledge needed to launch and sustain the new venture. The module will provide an understanding of how to manage the new venture strategically for growth and sustainability; how to put together a high performance team; the role of value-chain management and timing; and the critical factors that contribute to business survival and longevity.

***725 / Practical Project Management for Today's Business Environment / Staff**

This course covers the basics of project management techniques and tools, as well as advanced, adaptive, and emerging approaches to improve project success. Students will learn how to apply effective project management to a variety of common business situations, including starting a company, bringing a product to market, doing primary research and development, constructing a physical facility, and developing a major piece of software, among others. Case studies, guest speakers, and hands-on exercises will be used to explore real-life examples of project management successes and failures.

***727 / Technology Entrepreneurship for Engineers and Scientists / Staff**

This is a general course taught by successful technological entrepreneurs for graduate scientists and engineers to increase their awareness of technology entrepreneurship. Entrepreneurship is a challenging career but can be rewarding and this course deals with the life experiences of successful entrepreneurs while providing a menu for how to start and run a successful small to medium sized technology-based enterprise. Lectures take the students through the step by step process of the start-up and operation of a business with a special focus on technology-based businesses. There is heavy emphasis on real-world examples and case studies. The course will be centred on a team project that consists of selecting a business, and developing a business plan to start and operate the business.

***728 / Legal Issues for the Technology-Based Enterprise**

This course provides students with an understanding of all of the relevant legal issues. In the case of IP, students will be provided with the basic tools that will allow them to identify intellectual property, protect that property by applying the necessary types of legal protection such as patents, trademarks and copyright registrations and to then transfer or permit the use of the IP by others. For enterprise formation, the course will provide practical legal tools for enterprise formation, incorporation, contracting and rules that affect its day -to-day business.

***748 / Development of Local Sustainable Communities / Staff**

Local economy as a basis for sustainable communities.Deciding on the role of the community (thinkers, makers, traders) and development of economic competitive advantage and the associated business clusters. Community corporations. Pro-community local governance. Regeneration of livable cities. Case studies on Ontario regional economies.

***770 / Total Sustainability Management / L. Belkhir**

This course introduces sustainability within a unified framework of Total Sustainability Management that will teach the student how to deeply embed sustainability into the enterprise through the use of Design principles, Bill-of-rights of the Planet and through public policy. This approach will apply to not only company products but also to its business strategy and business model. Furthermore, the course will teach the student a problem-solving approach that combines innovation, design and policy to emphasize the synergetic interplay between them. The student will learn how to think of sustainability as a "Way of Thinking." The course will make liberal use of appropriate case studies, and call on several internal and external speakers who are recognized subject-matter experts.

WORK AND SOCIETY

The M.A. Program in Work and Society offers a full-time one-year program (part-time is available - see below) leading to the degree Master of Arts in Work & Society. The prime objective of this unique graduate program is to introduce students to a variety of theoretical approaches and policy debates that relate to the question of working in modern societies - from working for wages in primary industrial and service settings, to the paid and unpaid work that goes on in the home and elsewhere. Regardless of the particular focus, work is to be studied as one component of a larger life experience that incorporates family life, community relations, gender and race relations, politics and state regulations.

The M.A. is also offered on a part-time basis. To facilitate this option, Work and Society core courses are held in the evening on a rotating basis. Nevertheless, it is likely that students wishing to pursue such a program may have to complete at least some of their courses during the day. There is a time limit of five years for completion of an M.A. part-time. Students who wish to change their status from part time to full time, must apply to the Graduate Studies Committee.

Enquiries: 905 525-9140 Ext. 24692
Email: molnars@mcmaster.ca
Website: http://www.labourstudies.mcmaster.ca/current-students/graduate

Faculty / Fall 2012

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Graham Knight (Communication Studies)
Robert O'Brien (Political Science)
Tony Porter (Political Science)
Joe Rose (DeGroote School of Business)
Sheila Sammon (Social Work)
Robert Wilton (Geography & Earth Sciences)

M.A. Degree

The M.A. offers students a truly interdisciplinary program of study in the area of Work and Society combining interdisciplinary courses in Work and Society offered by core faculty and related courses offered by other departments and schools at McMaster. Program of study outside of the core courses will be approved by a Graduate Studies Committee. The interdisciplinary nature of the program will be further enhanced by welcoming students enrolled in graduate programs offered by other departments into the core Work and Society courses.

Requirements

Students will have two options for completing their M.A.

A. Course Work and Research Paper Option

Students will be required to complete six (6) half courses, including:

(i) At least three half courses from the menu of Work and Society core courses.

(ii) Three additional courses, at least two of which must be from among those offered by other departments. Students could end up taking these three additional courses all from one department, an option likely to be attractive to students anticipating further graduate work, or they could select courses from more than one department. Programs of study will be subject to the approval of the Graduate Studies Committee.

(iii) A research paper (10,000-12,500 words, including endnotes and bibliography) supervised by a core or associate faculty member. The research paper will be read by the supervisor and another faculty member. (If the supervisor is an associate member, then the second reader must be a core faculty member selected by the supervisor in consultation with the student).

B. Course Work and Thesis Option

Students will be required to complete five (5) half courses, including:

(i) At least three half courses from the menu of Work and Society core courses.

(ii) Two additional courses, at least one of which must be from among those offered by other departments. Students could take both courses from one department, an option likely to be attractive to students anticipating further graduate work, or they could select courses from more than one department. Programs of study will be subject to the approval of the Graduate Studies Committee.

(iii) A thesis (15,000-20,000 words including endnotes and bibliography) supervised by a core faculty member. The thesis will be orally examined by a committee including the supervisor and two other faculty selected by the thesis supervisor in consultation with the student.

Introduction to Methods

During their studies, students are required to attend at least four faculty seminars and to prepare a short report on the research methods employed. These seminars can include faculty seminars in Work and Society, faculty seminars in other departments, or presentations at conferences attended by the students.

Core Courses in Work and Society

Core courses will be selected from the following menu:

***700 /** Work, Workers and Their Workplaces
***710 /** Class, Gender & Race: Theorizing Work, Home & Society
***720/** Labour Markets, the State and Inequality
***730 /** Work and Democracy in the Global Society
***740 /** Selected Topics in Work and Society
***750 /** Independent Study (by permission only)
***760 /** Social Justice, Work and Society

Courses

***700 / Work, Workers and Their Workplaces**

The focus of this course is the worker and the workplace. It will provide students with a comprehensive historical and contemporary understanding of the organization of production in all sectors of the economy, with particular emphasis on artisan production, Fordism, Lean Production and empowerment. In addition, we will examine questions and issues pertaining to the gendering of work, how work is valued, and the organization of work in the informal sector. The course will also be centrally concerned with alternative forms of organization such as industrial districts, cooperatives. In each set of discussions, we will be addressing the role of unions in changing the workplace experience.

***710 / Class, Gender & Race: Theorizing Work, Home & Society**

The intent of this course is to explore the major theoretical debates that centre on how class, gender and race, historically and in current times, shape the relationship between work, home and society. As such, this course will critique, build on, and move beyond the mainstream theories and boundaries of the sociology of work, organizations, labour markets, etc., to investigate how the nexus of class, gender and race fundamentally condition the structuring of labour processes in all sectors, has shaped the differing relationships between the sphere of paid employment and families, has impacted on the relationship between work, sexuality and the politics of identity, and facilitates and mitigates against collective organization and resistance.

***720 / Labour Markets, the State and Inequality**

This course is aimed to provide students with an in-depth understanding of labour market and employment policy in the public and private sectors and the formal and informal labour markets. Part of the course will involve evaluating the role played by governments in regulating employment from the post-World War II period to the present. Two enduring themes inform this course. First, the course will examine labour market segmentation and how different groups, especially women and people of colour, experience different employment conditions out of which arise diverse employment issues. The second theme underlying the course involves understanding how the state and government regulations since the early 1980s have affected employment issues and the capacities or willingness of governments and/or employers to regulate employment conditions. The course will focus on Canada but will periodically introduce comparisons with other countries.

730 / Work and Democracy in the Global Society *(cross-listed as Globalization *730)

This course centers on the transition from a postwar "golden age" of state-regulated labour regimes to a more disorganized capitalism of “flexible" labour regimes. The main dynamics of this transition include a new era of transnational corporate rivalry and collaboration, massive technological change, and a complex new global division of labour. Students will analyze this transition at the level of the workplace, community, nation-state, sub-national industrial districts and the supranational level, including regional trading blocs. Students will assess the impact on labour of key global institutions such as the International Monetary Fund, General

Agreement on Trade and Tariffs/World Trade Organization and the International Labour Organization. The course will focus on both "first" and "third world" labour regimes. Finally, the course will examine key labour responses to globalization, including the activities of transnational labour bodies, new alignments between labour and social movements, and emerging forms of transnational labour solidarity.

***740 / Selected Topics in Work and Society**
On occasion, Work and Society faculty will offer courses on topics in the area of Work and Society that are not covered either by the core courses or by courses available in other graduate programs. Potential special topics could include: working in the service economy; workplace health and safety; women, work and trade unionism; industrial relations in the global economy; and, international labour standards.

***750 / Independent Study**
This independent study course will be available to students who wish to pursue intellectual/research interests that are not matched in course offerings. Students will be limited to one independent study course.

***760 / Social Justice, Work and Society**
The goal of this course is an exploration of contemporary struggles for social justice in the context of work and society. Although working people and their organizations have traditionally focused their energies on workplace and legislative struggles for income equalization, unions and other social movements have been pressed to broaden their strategies and struggles to include new voices, structures, issues and tactics. Using present-day examples, this course will expose students to a range of theories and strategies for understanding and critically evaluating the concept of social justice, struggles for social justice, as well as the way that paid and unpaid work are and, at times, are not central to these struggles.

***770 / Special Topics (Labour and the Environment)**
Periodically, Work and Society faculty will offer an additional 'special interest' course, which is not covered by core courses or othergraduate programs.

Menu of Other Courses to Complete the M.A.

It is standard policy at McMaster to have all graduate courses open to suitably prepared students. Students taking the M.A. in Work and Society will have to take courses in at least one other department. The following list contains courses that are considered to be complementary to our core listings. Students are free, however, to take courses not listed below.

Anthropology Courses
***702 /** Contemporary Problems in Anthropology
***722 /** Research Design in Anthropology
***728 /** Applied Anthropology
***735 /** Power, Agency and Discourse

Economics Courses
***710 /** Population Economics I
***727 /** Microeconomic Theory for Public Policy
***731 /** Public Finance
***751 /** International Trade, Development and Investment
***773 /** Economic Policy Analysis I
***774 /** Economic Policy Analysis II
***781 /** Labour Economics I
***785 /** Economics of Human Resource Policies

Education
***750 /** Principles and Practice of University Teaching

Geography Courses
***726** / Feminist Geography
***727** / Disability and Space

Globalization Courses
***706 /** Social Welfare and Social Work in the Contextof Globalization and Restructuring
***710 /** Globalization: An Introduction
***711 /** Cosmopolitics: Community, Identity & Agency Beyond the State
***712 /** International Trade and Economic Development
****717 /** Global Sex (cross-listed as CSCT *717, Globalization *717 andEnglish *717)*

Political Science Courses
***742 /** Politics of Developing Areas
***747 /** Welfare States in Comparative Perspective
***760 /** Political Institutions of the Canadian State
***761 /** The Social, Cultural and Economic Foundations of Canadian Politics
***774 /** Global Political Economy
***783 /** Comparative Public Policy

Social Work Courses
***703 /** Policy Making Process
***721 /** Community Based Social Policy

Sociology Courses
***705 /** Sociology of Organizations
***713 /** Social Inequality
***714 /** Political Sociology
***718 /** Sociology of Occupations
***747 /** Welfare States in Comparative Perspective
***759 /** Sociology of Gender

11. COMMON PURPOSE/INTERDISCIPLINARY/COLLABORATIVE PROGRAMS

SGS #101 / Academic Research Integrity and Ethics
This course will introduce incoming graduate students to the standards of academic integrity expected at McMaster. It will provide examples of acceptable and unacceptable practices and will clarify the responsibility and expectations of graduate students with respect to academic integrity. Students will be exposed to the Academic Integrity Policy of McMaster and best practices will be described that will minimize the likelihood of incorrectly attributed work from appearing in their assignments and research records. Students may not graduate or register for subsequent years in a graduate program at McMaster unless they have received a passing grade in SGS #101.

SGS #201 / Accessibility for Ontarians with Disabilities Act (AODA)
All graduate students are required to complete appropriate training required to complete their research and studies (health and safety training, ethics training, biosafety training, etc.), as determined by their home Department or Program. All graduate students also are required to complete training on the Accessibility for Ontarians with Disabilities Act (AODA), which can be completed on-line [www.mcmaster.ca/accessiblity]. Having an understanding of how we can identify and reduce attitudinal, structural, information, technological, and systemic barriers to persons with disabilities is core to McMaster University's commitment to supporting an inclusive community in which all persons are treated with dignity and equality, and completion of AODA training is critical as McMaster's graduates move forward in their varied, chosen professions. Students may not graduate or register for subsequent years in their program until they have completed their required training.

SGS #301 / English as a Second Language Training
This is a mandatory course for all students within participating programs at McMaster University who have gained admission to a program, but have not yet satisfied the English proficiency requirement. This course is assigned at the time of admission and is only available to students admitted to approved partnership programs. Prior to admission into this course, potential students will be required to submit an IELTS or TOEFL within a minimum range specified by individual programs. Course duration ranges from four to 12 months, dependent on the capabilities of the individual student. This intensive course is intended to provide international students who speak English as a second language with the opportunity to develop their language skills to a university level. The focus is to develop necessary skills in the areas of research, writing, reporting, reading and oral communication, to help them succeed in the university environment. Independent learning, critical thinking,synthesizing information and problem solving skills are key components, with a further focus on the complex issues of culture and integration into differing academic and professionalenvironments. A pass in this course will be assigned to any student who receives 80% or higher in the coursework and who attends 90% of the classes. In order to continue with the graduate program, students must submit an IELTS within the normal range for their program within 4 months of successfully completing SGS #301.

SGS #302 / Visiting Student Research
This course is for out-of-province and international students who are coming to McMaster to conduct research as part of their degree studies at their home university. This course is not for credit. Enrollment in this course is by permission only. Course content will be determined by host program.

SGS #303 / Visiting Student Internship
This course is for out-of-province and international students who are coming to McMaster to conduct research as part of their degree studies at their home university with support of their government programs or other scholarship. McMaster currently recognizes two such programs (Saudi Bureau of Education and Science without Borders). Students from other scholarship programs are welcome to apply with supporting documentation. This course is not for credit. Enrollment in this course is by permission only. Course content will be determined by host program.

Chemical Physics

The Departments of Chemistry and Physics and Astronomy jointly provide facilities for students seeking the M.Sc. or Ph.D. degree in this area. Applications for admission will be considered from students holding an Honours degree or its equivalent in Chemistry and Physics and Astronomy jointly or in either one of these subjects.

A candidate will register for the M.Sc. or Ph.D. degree in either the Chemistry or Physics and Astronomy Department and, in addition to the special regulations summarized below, will be subject to the general regulations and course/thesis requirements which govern graduate work in the department in which he/she is registered. A candidate for the M.Sc. degree will be required to spend at least one calendar year in full-time graduate study at McMaster University.

Candidates for the Ph.D. degree must pass a Comprehensive Examination in their general areas of study. The Comprehensive Examination will be conducted jointly by the Departments of Physics and Astronomy and Chemistry, and will be attempted within 24 months after the student has entered the Ph.D. program at McMaster.

The Department of Chemistry presents graduate courses in the form of modules, which are the formal equivalent of one-quarter of a standard graduate course. The Department of Physics and Astronomy presents graduate courses as half courses. A candidate for the M.Sc. or Ph.D. degree must select certain required courses and modules from the following basic list.

Courses

Courses marked with a pound sign (#) are modules; those marked with an asterisk (*) are half courses. Courses marked with a plus sign (+) may be taken twice for credit either because their content varies from year to year or because "introductory" material presented as one module is a prerequisite for more advanced material. All of the courses may not be offered every year. Students should contact the Department concerned.

Chemistry Courses

#703 / Numerical Methods and Computational Chemistry
#725 / Group Theory
#727 / Symmetry and Properties of Solids
#730 / X-Ray Theory
#736 / X-Ray Structure Determination
#770 / Molecular Electronic Structure Theory
#776 / Spectroscopy
#778 / Solid State Surface Science
#784 / Physical Chemistry of Materials

Physics and Astronomy Courses

***729 /** Condensed Matter Physics I
***730 /** Condensed Matter Physics II
***739 /** Advanced Quantum Mechanics I
***740 /** Advanced Quantum Mechanics II
***750 /** Statistical Mechanics
***753 /** Advanced Statistical Mechanics

Research in Chemical Physics

Research in Chemical Physics currently includes: theoretical chemistry and electronic structure theory (P.W. Ayers); crystal chemistry of oxide and mineral compounds (J. Barbier); applications of neutron spectroscopy to problems in solids (B. Gaulin); quantum molecular dynamics and NMR spectrum simulation (R. Dumont); synchrotron radiation based spectromicroscopy of soft matter, environmental and biological samples; quasi-elastic and inelastic electron scattering of gases (A.P. Hitchcock); single and multiphoton laser-based studies of negative ions and selected solid state media (H.K. Haugen); surface science of electronic materials, scanning probe microscopy and dissipative nanopatterning (P. Kruse); magnetocaloric and thermoelectric inorganic solids (Y. Mozharivskyj); fundamental studies and applications in photonics (K. Saravanamuttu), nonlinear optical processes in solid materials (I. Vargas-Baca); surface electronic and magnetic structure using spin-polarized electron scattering and optical scattering (D. Venus). A student in this program may undertake research work under the supervision of any member of the Chemistry or Physics and Astronomy Departments.

Clinical Health Sciences

***719 / Foundations of Education in the Health Sciences/ L. Martin**
This course will explore the education literature through discussion and application to health sciences issues, including health professional education. Examination of early education literature and changes over time in the philosophy and practice of education will provide the framework of approaches to teaching and learning. Topics include: recurrent issues in health professional education; teacher and learner centred educational approaches; psychomotor learning; cognitive psychology and learning; instructional and evaluational methods.

Education

Education *750 - Principles and Practices of University Teaching is a graduate level credit course offered three times a year. The focus is on honing essential pedagogical and practical teaching skills. This includes sessions on curriculum design, teaching strategies (e.g., Inquiry and Problem-Based Learning), assessment strategies, developing a teaching dossier, and research on teaching and learning.

For more information, please visit the Centre for Leadership in Learning in Mills Library 504 or online at cll.mcmaster.ca/programs.

Register on SOLAR to ensure you receive a graduate credit on your transcript.

Website: http://www.mcmaster.ca/cll

Environmental Science and Environmental Studies

Environmental Science

Environmental science is concerned with the interactions between the physical and biological environment and human activity. It examines and models ecosystem dynamics involving the atmosphere, the biosphere and the hydrosphere, and the dynamic interrelations between the natural environment and human resource use and conservation. Because land and resource use places severe strain on ecosystems, much emphasis is directed towards developing knowledge, models and techniques to help ameliorate such strains, often through regulatory policies.

Environmental Studies

Environmental studies emphasize the human role in the management of the environment and is especially concerned with the economic, social and health problems which may arise from deterioration of ecosystems. Environmental studies focus on economic, political, regulatory, and sociological aspects of environmental management.

There is not a designated graduate degree for Environmental Science/ Studies at McMaster. However, many departments are involved in teaching and research in this area. Interested students are encouraged to pursue graduate degrees in one of these departments or programs and to take interdisciplinary groups of courses related to the environment. This will provide students with a strong background in a fundamental subject and a high level of interdisciplinary training.

Contact people for Departments/Programs involved in Environmental Science/Environmental Studies are as follows:

H. Feit (Anthropology)
V.S. Ananthanarayanan (Biochemistry)
J.S. Quinn (Biology)
J.L. Brash (Chemical Engineering)
B. McCarry (Chemistry)
B. Baetz (Civil Engineering)
D. Feeny (Economics)
P. Kanaroglou (School of Geography and Earth Sciences)
W-K. Lu (Materials Science)
R.J. Haslam (Medical Sciences)
G. Browman (Health Research Methodology)
E. Boetzkes (Philosophy)
D. Chettle (Physics and Astronomy)
M. Sproule-Jones (Political Science)
M. Daly (Psychology)

Courses

Courses marked with an asterisk (*) are half courses. The following environmental science course is offered for graduate credit:

***701 / Problems in Restoring and Sustaining Healthy Ecosystems / B. White, B. McCarry, D. Feeny, M. Sproule-Jones, M. Daly, M. Wilson, E. Boetzkes**

This course is designed to allow students from different disciplines to define problems in case studies of specific ecosystems. The background of the ecosystem situation will be presented by faculty and outside speakers. Students will define the problems they wish to discuss based on the presentation and literature provided. Each discussion will be led by students from different disciplines and the team will be responsible for preparing and submitting a report on the discussions.

Molecular Biology

Opportunities for graduate studies in Molecular Biology are available at McMaster University through M.Sc. and Ph.D. programs in Biochemistry, Biology, and Medical Sciences. Research interaction is fostered through the McMaster Institute for Molecular Biology and Biotechnology which maintains a Central Facility providing state-of-the-art equipment and reagents. More than 50 faculty members from 10 departments participate in the supervision of graduate students covering a broad range of research areas in molecular biology. McMaster's programs offer a flexible choice of graduate courses. Research interactions are facilitated through journal clubs, work-in-progress and formal seminars.

Enquiries should be addressed to the Graduate Programs in Biochemistry, Biology and Medical Sciences.

Courses

600-level courses are offered for graduate credit and are available to senior undergraduate students at the 400-level. 700-level courses are restricted to graduate students. Courses marked with an asterisk (*) are half courses. Not all courses are offered every year. Students should check with the Department concerned regarding course requirements.

***6H03 / Molecular Biology of Cancer / A. Bédard, P.F.M. Whyte**
(cross-listed as Biochemistry *6H03 and Biology *6H03)*
Cancer at the molecular and cellular level. Topics include: properties of cancer cells; activation of proto-oncogenes; function of oncoproteins; transgenic mouse models, and tumour viruses.

***6J03 / Biochemical Immunology / M. McDermott**
(cross-listed as Biochemistry *6J03 and Medical Sciences *6J03)*
This advanced course applies small group-based learning to immunological problems. Topics concern development of immunoassays, resistance to infection and immunity in health disease.

The following relevant courses are offered by other departments:

Biochemistry Courses

***6E03 /** Gene Regulation and Stem Cell Development
***6EE3 /** Advanced Topics in Gene Expression
***6H03 /** *Molecular Biology of Cancer*
*(cross-listed as Biology *6H03 and Molecular Biology *6H03)*
***6J03 /** *Biochemical Immunology*
*(cross-listed as Medical Sciences *6J03 and Molecular Biology *6J03)*
***6N03 /** Molecular Membrane Biology
***707 /** Mechanism of Enzyme Action

***709 /** Signal Transduction: Dynamic Mechanisms of Action ofGrowth Factors and Nuclear Receptors
***723 /** Topics in Molecular Biology
***725 /** Molecular Mechanisms of Membrane Functions
***726 /** Biophysical Chemistry of Membrane Structure
***727 /** Proteins

Biology Courses

***6B03 /** Plant Metabolism and Molecular Biology
****6H03 /*** *Molecular Biology of Cancer (cross-listed as Biochemistry *6H03 and Molecular Biology *6H03)*
***6P03 /** Medical Microbiology
***6T03 /** Neurobiology
***715 /** Topics in Evolutionary Genetics
***720 /** Bioinformatics
***721 /** Topics in Molecular Evolution
***723 /** Topics in Molecular Genetics
***724 /** Molecular Ecology
***762 /** Developmental Biology
***775 /** Molecular Microbiology and Microbial Genomics

Medical Sciences Courses

***701 /** Cell Biology I
***702 /** Cell Biology II
****708 /*** *Signal Transduction: Dynamic Mechanisms of Action GrowthFactors and Nuclear Receptors (cross-listed as Biochemistry *709)*
****711 /*** *Psychoneuroimmunology (cross-listed as Neuroscience *711)*
***713 /** Integrated Systems in Gastrointestinal Health and Disease I
***715 /** Advanced Immunobiology I
***716 /** Advanced Immunobiology II
***719 /** Electrophysiology of Excitable and Non-ExcitableMembranes
***732 /** Vascular Diseases, Haemostasis and Thrombosis I
***733 /** Vascular Diseases, Haemostasis and Thrombosis II
****740 /*** *Advanced Concepts of Drug-Receptor Interaction (cross-listed as Neuroscience *740)*
***749 /** Human Molecular Genetics
***750 /** Topics in Host Resistance
***758 /** Smooth Muscle Structure and Function I

Research in Molecular Biology

Cell biology and metabolism; developmental biology; DNA replication, mutation and repair; gene expression and regulation; gene targeting, transfer and therapy; hemostasis, thromboembolism and atherosclerosis; membranes and organelles; molecular biology, genetics and cancer; molecular evolution; molecular immunology; virology; molecular pharmacology and toxicology; neuroscience and behavioural sciences; oncogenesis and cancer therapy; plant biology; microbiology; protein engineering; x-ray crystallography.

Northern Studies

The Committee on Northern Studies (chaired by Dr. Susan Dudley of the Department of Biology) allocates grants received by the Department of Indian and Northern Affairs to graduate students for research in the north. These grants are intended to offset the high costs of travel and living in the north, and students from a broad range of disciplines are eligible. For grant allocation, “north” is designated as any area that is underlain by permafrost, but students who believe they may be eligible are encouraged to inquire. Though there is no degree program in Northern Studies, many departments and schools offer graduate work in this area, particularly:

Anthropology
Biology
School of Geography and Earth Sciences

Information and application forms can be obtained in the early fall from Dr. Susan Dudley of the Department of Biology, 905 525-9140 ext. 24004. The deadline for application is November 1.

Peace Studies

As there is no separate degree program, graduate work in Peace Studies at McMaster is discipline based. The Centre for Peace Studies offers interdisciplinary courses in some of its areas of specialization, and individual departments offer courses with some content relevant to different aspects of Peace Studies. These courses are listed below. The Departments of Anthropology, Economics, History, Philosophy, Religious Studies, and Sociology, offer M.A. or Ph.D. degree programs in which students can work on topics related to Peace Studies. Specific regulations concerning admissions and programs of study can be found under each department's listing.

The Centre for Peace Studies conducts peace research and peace education projects on a broad range of topics, but it has developed a primary focus in five areas: social movements against war; religious and philosophical approaches to peace and conflict; alternative security; human rights, and achieving peace through health initiatives.

Enquiries: 905 525-9140 Ext. 24729
Email: peace@mcmaster.ca
Website: http://www.humanities.mcmaster.ca/~peace

Courses

Courses marked with an asterisk (*) are half courses. The following courses are offered for graduate credit:

701 / Power, Agency and Discourse (cross-listed as Anthropology *735)
The focus is on the analytical tension between analyses of culture, power, agency and discourse, and what each can contribute to an understanding of emerging local and global processes and contexts. The course presents different viewpoints on these concepts and analytical tools by addressing current debates in areas like development, ethnicity, nationalism, gender, place and social movements.

The following courses are also relevant to Peace Studies. All courses may not be offered every year. Students should contact the Department.

Anthropology Courses
***725 /** Seminar in Political Anthropology
***734 /** Indigenous People Within Nation States

Economics Course
***751 /** International Trade, Development and Investment

History Courses
***705/** Political Culture in Europe, 1900-1956
***707 /** European International Relations, 1890-1956
***721/** Modern British History

Philosophy Courses
***759 /** Selected Topics in Applied Ethics
***764 /** Selected Topics in Social & Political Philosophy
***765 /** Selected Topics in Ethical Theory

Political Science Courses
***750 /** Issues in Political Theory
***751 /** Classic Theories of "Realpolitik"
***773 /** Selected Topics in International Politics *(Sometimes offered on Human Rights Issues)*

Sociology Course
***714 /** Political Sociology

Regional Science

Regional Science uses the concept of a region as a basis for analysing the spatial dimensions of human activities and their structure. It examines the theoretical bases of the activities, methods to analyse the diverse nature of those activities and the assessment of impacts of decisions and policies on those activities. Specific areas of research at McMaster University include: the dynamics of regional economies; resource allocation and management; regional impact analysis; theories of spatial processes; transportation; and public policy analysis.

Graduate work in Regional Science at McMaster is discipline oriented. Expertise is found in the Department of Economics, and in the School of Geography and Earth Sciences. M.A. and Ph.D. degrees obtained through these departments allow a specialization in Regional Science by incorporating some of the courses listed below. Students wishing to specialize in Regional Science are required to complete one course in methods of regional analysis and one other methods course pertaining to their specific research interest. In addition, students must fulfill the degree requirements of the department in which they are registered.

Enquiries should be directed to the Director (School of Geography and Earth Sciences) at 905 525-9140 Ext. 23535.

Courses

Available 600- and 700-level graduate courses appropriate for Regional Science include the following list. Courses marked with an asterisk (*) are half courses. All courses may not be offered every year. Students should contact the Department concerned.

Economics Courses
***721 /** Microeconomic Theory I
***723 /** Macroeconomic Theory I
***731 /** Public Finance
***784 /** Industrial Organization

School of Geography and Earth Sciences Courses
***733 /** Integrated Urban Models: Design, Structure and Applications
***735 /** Topics in Urban Geography
***739 /** Spatial Population Analysis
***746 /** Advanced Statistical Methods in Geography

Science and Religion

Science and religion are often thought to be necessarily in conflict, with mutually incompatible approaches to method and discordant meanings of truth. In fact, the relationships between science and religion can indeed be modeled in terms of conflict; however, they can also be seen as mutually independent or even offering fruitful engagement. In the first half of the last century A.N. Whitehead wrote, *"When we consider what religion is for [humanity] and what science is, it is no exaggeration to say that the future of history depends upon the decision of this generation as to the relation between them."* The generation that Whitehead was addressing has passed, but the relation between religion and science remains fluid and, in many respects, unresolved. The aim here is to draw together intellectual resources and traditions of understanding from different Faculties in order to explore if there are ways in which science and religion can work together constructively. At present one graduate seminar course is offered.

***760 / Science and Faith Interactions / J.C. Robertson, D.R. Chettle**
Do science and faith function in such different spheres as to make meaningful conversation impossible? Need they be in conflict in seeking to understand and in their pursuit of truth? Perspectives from both Religious Studies (JCR) and Science (DRC) are brought together firstly to explore whether analogies can be found in methods of enquiry and whether similarities can be identified between knowledge and underlying truth perceived to be the goals of these different disciplines. In the first part of the seminar course readings will be taken from Thomas S. Kuhn's "The Structure of Scientific Revolutions" and Ian G. Barbour's "Religion and Science: Historical and Contemporary Issues". The second part of the course consists of investigations of issues in the science-religion dialogue of special interest to individual members of the seminar. For example: Is personhood reducible to biological and chemical fundamentals? Can a single account of origins satisfy both scientific and religious quests?

Urban Studies

There are a number of departments at McMaster that offer graduate courses in Urban Studies, and in certain departments a research specialization in Urban Studies is possible at both the Master's and Ph.D. levels. A listing of some of the relevant courses is given below.

Enquiries should be directed to the Director (School of Geography and Earth Sciences) at 905 525-9140 Ext. 23535.
Website: http://www.science.mcmaster.ca/geo/

Courses

Courses marked with an asterisk (*) are half courses. Courses marked with a pound sign (#) are quarter courses or modules. Not all of the courses are offered every year. Students should contact the Department.

Civil Engineering Course
6L04 / Design of Water Resources Systems

Economics Course
***731 /** Public Finance

School of Geography and Earth Sciences Courses
***733 /** Integrated Urban Models: Design, Structure and Applications
***735 /** Topics in Urban Geography
***739 /** Spatial Population Analysis

Political Science Course
***792 /** Public Choice

12. DIPLOMA PROGRAMS

ADVANCED NEONATAL NURSING

The McMaster University Diploma Program in Advanced Neonatal Nursing is a graduate level advanced nursing practice specialty program offered within the Faculty of Health Sciences and sponsored by the Graduate Programs in Health Sciences. It is specifically designed to meet the requirements for the Neonatology exam approved by the College of Nursing of Ontario (CNO) Council for registration in the NP-Paediatrics specialty with respect to curriculum hours, hours of instruction and of clinical practice within an accredited educational institution and coordination of coursework by a doctorally prepared, certified nurse practitioner. Application for admission must be made through the office of the Graduate Programs in Health Sciences. Enrolment in limited.

Enquiries: 905-525-9140 Ext. 22983
Fax: 905-546-1129
E-mail: taym@mcmaster.ca
Website: http://fhs.mcmaster.ca/gradnursing

Admission

Acceptance to this program follows the established procedures and standards for admission to the Master of Science (Nursing) degreeprogram at McMaster University. Application materials and an explanation of procedures are provided in the Nursing brochure. The Diploma Program is available to both full- and part-time students admitted from the Nursing M.Sc. (Category 1) or Post-Master'sDegree students (Category 2). Pending approvals, effective September 2012, we will offer admission to selected applicants from approved sites using a combination of on-campus and distance delivery methods. Meeting clinical course requirements in a learner's region is dependent upon the availability of appropriate clinical sites and qualified preceptors. Check the Graduate Nursing Program Website (http://fhs.mcmaster.ca/gradnursing/dip-ann.html) for more information.

Category 1-Neonatal Nursing Stream M.Sc. Program
Nursing students must have completed at least 3/4 of their course work requirements for the McMaster M.Sc. degree prior to admission, since the Diploma requirements are additional to those requirements for the M.Sc. degree (see Nursing section of this Calendar). Students may apply and register in this Diploma Program while completing their M.Sc. thesis research. However, a separate application and tuition fee are required for enrolment in the Advanced Neonatal Nursing Diploma Program.

For the Graduate Diploma Program in Advanced Neonatal Nursing, at least two years' experience in neonatal critical care will be required in addition to specific requirements of the M.Sc. degree program in Nursing.

Category 2-Post-Master's Degree Students
The Diploma Program is also open to qualified applicants who have already completed or are currently enrolled in a relevant Master's degree, having successfully completed at least 3/4 of the course requirements, either at McMaster or at another University. In this case, admission to the Diploma program as a post-degree student does not guarantee subsequent admission to the M.Sc. or Ph.D. program in Nursing (see the General Regulations of the School of Graduate Studies, section 2.1.3 of this Calendar).

The following materials are required for enrolment in the Graduate Diploma in Advanced Neonatal Nursing Program:

- Completed or currently enrolled in a Master's degree in a clinical nursing specialty with at least a B+ standing
- Evidence of eligibility to be registered or licensed in her/his own province/country
- Minimum of two years' experience in neonatal clinical care
- Current curriculum vitae
- Two clinical letters of reference
- Two academic letters of reference
- Autobiographical letter
- Original post-secondary transcripts
- Foreign applicants whose native language is not English are required to supply evidence of their proficiency in the use of the English language [e.g., TOEFL score of 92 (iBT), 580 (paper test) or 237 (computer test)]
- Completed application form and $100.00 application fee (Canadian currency)

For both Category 1 and Category 2 students, the Ontario Public Hospitals Act requires that all persons working in a hospital setting meet certain criteria regarding surveillance for infectious diseases. In order for the requirement of the legislation to be met, once students have been enrolled in the Program, they must complete Pre-Clinical Communicable Disease Screening annually through the Student Health Services. More information will be sent to specific applicants prior to registration. Specific questions can be directed to the Office of the Associate Dean of Graduate Studies (Health Sciences).

Course Requirements

Students in the neonatal stream of the M.Sc. degree program in Nursing (category 1), must complete with at least a B- standing, the following required courses: NUR *701, *709, 720, 721, *722, or HRM *701 or *702, HRM *721, HRM/NUR *745 and one additional course selected by the student in conjunction with the supervisor or supervisory committee.

Students admitted as Master's post-degree students under Category 2 must complete, with at least a B- standing, the following required courses: NUR 720, 721, and *722.

Required Diploma Courses

720 / Advanced Nursing Care of High Risk Infants andFamilies / J. Wilson, Staff
This problem-based learning course allows students to apply advanced problem-solving skills using selected clinical problems relevant to neonatal critical care. Students will acquire advanced theoretical knowledge in the physiological, behavioural, medical, and nursing sciences required for solving neonatal-focused problems through the identification and analysis of literature reviews and research papers. Students will develop differential medical and nursing diagnoses and plans of care and critically analyze the health and illness management strategies and outcomes of each case study.

721 / Advanced Neonatal Nursing Clinical Practice I / J. Wilson, Staff
This course provides an opportunity for students to develop advanced skills and knowledge by progressive clinical experiences through exposure to patient and family situations in the neonatal intensive care unit. Students will develop and implement a plan of care for a selected patient(s), and families utilizing a variety of skills and knowledge applications. Students will provide health and illness management of neonates who require intensive medical and nursing.

***722 / Advanced Neonatal Nursing Clinical Practice II / J. Wilson, Staff**
Students will have the opportunity to consolidate their advanced skills and knowledge in an intensive clinical experience and to demonstrate increasing responsibility and independence in the care of patients and families with complex needs and problems. This experience will provide students the opportunity to refine their diagnostic and therapeutic clinical skills. Seminar discussions will cover issues relevant to the student's new role, including systems entry and clinical issues: parental support, premature infant feeding, long-term follow-up of ill neonates, pain management.

GENDER STUDIES AND FEMINIST RESEARCH

The Graduate Diploma (Ph.D.) in Gender Studies and Feminist Research aims to enhance the intellectual development and training of students already enrolled in doctoral programs by allowing them to combine disciplinary research with interdisciplinary scholarship from the fields of Gender and Feminist Studies.

The Graduate Diploma option is available to incoming and in-course Ph.D. students in McMaster's Departments of English and Cultural Studies, History, Philosophy, Religious Studies, Social Work, and Sociology.

Students completing the diploma will receive the notation ***Completed Graduate Diploma in Gender Studies and Feminist Research*** on their academic transcript in addition to the doctorate degree from their home graduate unit.

The primary requirement for admission to the Graduate Diploma program (beyond admission to the home department's stand-alone Ph.D. program) is distinction in a Master's degree with sufficient academic background and preparation (at the undergraduate and/or Master's level) in women's, gender, and/or feminist studies. The University requires that applicants' previous graduate work be equivalent to at least a McMaster B+ (77-79%), but higher standards may be set in practice by the diploma student's home department.

For a full description of application materials and procedures see the Gender Studies and Feminist Research website http://gsfr.mcmaster.ca.

Part-time Studies

Doctoral students who wish to pursue a doctorate in their home department together with the GSFR Graduate Diploma will normally be admitted full-time to both. In the occasional instance when the home department and the GSFR program admits, or converts a student, to part-time studies, the requirements for the diploma program (as for the home department) will remain the same but will be spread out over a longer time period.

Program Requirements

Program requirements for the Graduate Diploma (Ph.D.), in addition to those of the student's home department, are:

- one compulsory core course (GENDR ST 700) (3 units) (also required for Master's students)
- one additional elective course in gender studies and feminist research (3 units) (from an approved list)
- participation in the Program's Research Symposium, including
    - regular attendance at symposium events, and
    - an oral presentation based on the doctoral student's own research, normally in the third or fourth year of study; and
- a doctoral thesis on a topic related to Gender and/or Feminist Studies.

Students will normally complete the 6 units of diploma coursework during their second year. In order to ensure timely degree completion, diploma students will be encouraged to choose an elective course likely to directly enhance and move forward their thesis research.

Diploma students will normally give their Research Symposium presentation during their third or fourth year.

Language Requirements: To be determined by individual home departments.

Thesis Evaluation Procedures

Students in the Graduate Diploma program must have their thesis topics approved by both the home department and the program in Gender Studies and Feminist Research. The thesis must be on a topic related to the broad fields of Gender Studies and Feminist Research. Approval is granted by the program's Graduate Committee and occurs in conjunction with the home department's regular schedule for doctoral thesis proposal submission and approval. Members of the Gender Studies and Feminist Research program may sit on doctoral thesis supervisory committees, or serve as external examiners of doctoral theses. Such arrangements are at the discretion of the home department.

HEALTH SERVICES AND POLICY RESEARCH

(**Note**: No applications are currently being accepted.)

The Faculty of Health Sciences Graduate Program offers a *Graduate Diploma in Health Services and Policy Research*. Health services research is research that is intended to inform policy development and decision making regarding: a) the organization, funding, and delivery of health services, or b) the allocation of resources dedicated to improving health. Increasing the number of health services researchers to address critical issues in effective and efficient health care delivery has been identified as a high priority by national research funding agencies.

Students interested in applying for the Diploma Program must plan to: a) do a thesis or final project/paper related to health services research and b) be enrolled in one of the following research-focused thesis or course-based graduate degree programs at the Master's or Ph.D. level: Anthropology, Business Administration, Economics, Geography, Health Research Methodology, Kinesiology, Medical Sciences, Nursing, Rehabilitation Sciences, Mathematics, Social Work, Sociology, or Statistics.

Through the Ontario Training Centre in Health Services and Policy Research, students accepted into the Diploma Program may be eligible for stipends.

Unique features of this Diploma Program include: availability of courses addressing important issues in health services research at any of the 6 participating universities (Lakehead, Laurentian, McMaster, Ottawa, Toronto, and York); linkages with students and faculty across universities and disciplines; and field placement opportunities in policy and research settings to work with health services researchers and decision makers across the province.

The minimum requirement for the Diploma is 1.5 full course equivalents over and above graduate degree requirements. The Program will be open to both full- and part-time students. For students who undertake the diploma requirements full-time, the expected duration of the diploma program is 2 terms.

For further information contact Miguel A. Pérez, Ph.D. (OTC Program Coordinator) by phone at 905 525-9140 extension 26203 or by email at mperez@mcmaster.ca.
Website: http://www.fhs.mcmaster.ca/grad/hrm/otc/proginfo.htm
For an application package, contact Rose Vonau, OTC Administrative Assistant, by phone at 905 525-9140 extension 22408, by fax at 905 526-7949, or by email at vonau@mcmaster.ca.

MANAGEMENT OF INNOVATION AND NEW TECHNOLOGY

The DeGroote School of Business offers a **Graduate Diploma in the Management of Innovation and New Technology** .

The Management of Innovation and New Technology (MINT) is of interest because technology and innovation are two principal drivers of business success. Firms that have mastered general capabilities for innovation and/or use technology in innovative ways are revolutionizing how business is done. There is a growing consensus that firms who know how to create value with science and technology hold the key to wealth creation in such industries as pharma/biotech, aerospace, electronics and computing. Many firms have found that the most effective way to sustain profits is to maintain a competitive edge over their rivals through constant innovation in all aspects of their operations, including those involving technology. The graduate diploma provides an opportunity for managers and students to pursue these important themes at an advanced level that builds upon their already completed academic accomplishments in business. All the courses in the diploma are taken in classes with advanced level M.B.A. students.

Graduate Diploma in the Management of Innovation and New Technology

The graduate diploma provides an overview of MINT and an opportunity to study, in more depth, selected topics within the field. The program consists of one required course which provides the overview, and three elective courses which provide the opportunity to study selected topics.

Admission Criteria

1. Successful applicants must have completed a course of study equivalent to Year I of the DeGroote School of Business M.B.A. or must be admissible to the MGD M.B.A. with advanced credit for Year I.

   Applications from international students will be evaluated on a case-by-case basis to establish equivalencies.

2. Successful applicants must be proficient in English.

   If the applicant does not hold a post-secondary degree from a program whose language of instruction was English, a satisfactory TOEFL score (including TSE) will be required.

Other evidence of proficiency in English (such as letters from an employer and/or educator) will also be considered.

Course Requirements

All courses listed here are M.B.A. courses which are described in the M.B.A. calendar.

Required: ***B730 /** Strategic Management of Technologyor
***M724 /** Innovation and New Products

Electives: Three courses from the elective courses menu below.

Elective Courses Menu for the Graduate Diploma

***B730 /** Strategic Management of Technology (if not taken as the required course)
***C727 /** Pharma/Biotech Business Issues
***F724 /** Venture Capital
***K725 /** Business Process Reengineering
***K731 /** Project Management
***K735 /** Managing the Implementation of Enterprise Systems
***M724 /** Innovation and New Products (if not taken as the required course)
***P715 /** Entrepreneurship
***P727 /** Strategic Knowledge Management
***P734 /** Current Issues in the Management of Innovation andNew Technology
***P737 /** Profitting from Intellectual Property

In addition to these permanent electives a number of other courses on MINT related themes are offered from time to time by the School of Business and they can be taken for elective credit towards the graduate diploma. Please consult the M.B.A. calendar section of the DeGroote School web page for course descriptions of all of these courses. Not all of these elective courses are offered in all semesters but all are offered at least once in each academic year.

NUCLEAR TECHNOLOGY

The Department of Engineering Physics offers a Diploma Program in Nuclear Technology. The fundamentals of nuclear reactor physics, reactor thermal hydraulics, nuclear instrumentation, nuclear environmental quality, fusion engineering and radiation damage are important for nuclear power plant design, operation and safety, as well as in the technologies of many industries which use nuclear techniques. This diploma program provides an overview of the fundamentals in these allied areas and permits an in-depth study of topics to support the student’s interest in a particular industrial technology.

Admission

Applicants must hold a baccalaureate degree in the fields of engineering, science or mathematics with an acceptable grade point average, similar to that for entry into aM.Eng. degree program. Consideration will be given to work experience. In addition, applicants must be deemed to have satisfactory preparation, as a result of university education and work experience, to succeed in the program. The Department Chair, upon the recommendation of the departmental Graduate Admissions Committee, will make admission recommendations to the School of Graduate Studies.

Requirements

The student will be granted a Graduate Diploma in "Nuclear Technology" upon the completion of four half courses within a three year period with a minimum passing grade of B- for each course. The courses must be selected from the following list and at least two of the courses must be at the 700 level. With the approval of the Department Chair, one of the four half courses may be Engineering Physics 704, Selected Topics in Engineering Physics. Exceptions to these course requirements must be granted by special permission from the Faculty of Engineering Admissions and Study Committee acting on the recommendation of the Department Chair.

Courses

The courses listed below are also listed in the Engineering Physics section of the Graduate Calendar. From time to time some of these courses may be offered using distance education tools.

***6D03 / Nuclear Reactor Analysis / Staff**
Introduction to nuclear energy; nuclear physics and chain reactions; reactor statics and kinetics; multigroup analysis, core thermalhydraulics; reactor design.

***6L04 / Industrial Monitoring and Detection Techniques**
Single and two-phase flow diagnostics and monitoring techniques for industrial and power plant operations; radiation monitoring; pollutant monitoring and analysis; nuclear instrumentation for industrial processes.

***6NE3 / Advanced Nuclear EngIneering / J.C. Luxat**
Fission power generation and distribution in a nuclear reactor core.Design and performance of natural uranium, enriched uranium and mixed oxide nuclear fuels. Energy conversion, heat transfer and heat transport in a nuclear reactor core. Thermal margins and safety limits of nuclear fuel and reactor components.Irradiation, corrosion and aging of reactor structural materials. Structural integrity of nuclear components including properties of nuclear materials, stress in piping systems, material creep and fatigue behavior.

***6P03 / Nuclear Power Plant Systems and Operation / Staff**
Systems and overall unit operations relevant to nuclear power plants; includes all major reactor and process systems; nuclear power plant simulator; self-study using interactive CD-ROM.

***710 / Nuclear Reactor Dynamics and Control / J.C. Luxat**
Reactor kinetics: point kinetics model; modal model for space-time kinetics; reactivity feedback mechanisms; reactor transfer functions; the inhour equation; reactor stability; Xenon stability; bulk and spatial power control; load following; control systems for CANDU and LWR reactors.

***713 / Nuclear Safety Analysis and Reactor Accidents / J.C. Luxat**
Degraded fuel heat transfer; fuel failure mechanisms; fission product release and transport from nuclear fuel; leak-before-break and piping fracture mechanics; pipe ruptures; challenges to containment system integrity; severe accident progression and mitigation; off-site release of fission products; applications to CANDU and LWR reactors.

***714 / Nuclear Reactor Safety Design / Staff**
Risk based design and analysis of nuclear reactors based on deterministic and probabilistic assessments. Topics include: concepts of risk; probability tools and techniques; safety criteria; design basis accidents; risk assessment; safety analysis; safety system design; and general policy and principles.

***715 / Advanced Nuclear Reactor Thermalhydraulics / Staff**
Advanced topics of current interest in the area of fission and fusion nuclear reactor primary heat transport system, system safety and the transitional operations.

***716 / Nuclear Reactor Heat Transport System Design / Staff**
This course covers the fundamentals of nuclear reactor heat transport system design for key reactor types, with emphasis on the CANDU and Light Water Reactor (PWR and BWR) designs. Theoretical topics and their application include reactor thermodynamics, single-phase and two-phase flow, heat and mass transfer, critical heat flux, pressure drop prediction, flow stability, design of reactor core, reactor vessel, steam generators and primary heat transport pumps. The course also covers experimental techniques, facilities and results. Course assignments are analytical problems related to these topics.

***717 / Pollution Control Plasma Technology / Staff**
Combustion flue gas treatment by energetic electron processes (electron beam/plasma); toxic waste treatments by ionizing radiation; waste water treatment by electron beams and pulse electric discharges; neutron activation analyses; ICP plasma analyses; thermal plasma waste treatments.

***718 / Reactor Heat Transport System Simulation and Analysis / Staff**
The course covers two-fluid two-phase modeling of thermal-hydraulic phenomena in the reactor heat transport system including modeling and simulation of postulated accidents, simulation methodology and tools, and development and qualification of selected thermal-

hydraulics computer codes, including two-fluid modeling, nodalization schemes and numerical methods, computer code development, CATHENA computer code theory and numerical algorithm. This is a simulation-based course; it includes CATHENA training. Assignments include analytical problems, CATHENA code simulation and analysis, and preparing a CATHENA model and report.

***727 / Advanced Reactor Physics and Analysis / B. Buijs**
This course is to provide an in-depth understanding of the physics behind nuclear reactors and the techniques to analyse the neutronic behaviour of a reactor. The emphasis will be on CANDU reactors.

PRIMARY HEALTH CARE NURSE PRACTITIONER

The admission requirements for the Graduate Diploma as a Primary Health Care Nurse Practitioner (PHCNP) are a completed Master's degree with a minimum B+ average and at least two years in clinical practice out of the past five years. Those with a completed Master's degree in Nursing may enter the PHCNP Consortium course phase and be granted a Graduate Diploma upon completion of the seven NP courses. Since the PHCNP courses are offered every year, students can expect to complete the courses within 12 months of full-time study. Part-time students have two years to complete the PHCNP courses. Once the PHCNP courses have been completed successfully, students are eligible to write their RN (Extended Class) exams. For more information about the PHCNP courses, see http://np-education.ca or http://fhs.mcmaster.ca/gradnursing/phcnp.html

Enquiries: 905-525-9140 Ext. 22099
Fax: 905-546-1129
Email: kadic@mcmaster.ca or kadic.me@np-education.ca
Website: http://www.fhs.mcmaster.ca/gradnursing

or

Eric Staples (NP Site Coordinator)
905-525-9140 Ext. 22099
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SPATIAL ANALYSIS AND GIS

The School of Geography and Earth Sciences and the Centre for Spatial Analysis offer a Graduate Diploma in Spatial Analysis and GIS. The Graduate Diploma is designed to meet the needs of those with a degree in Geography, Earth & Environmental Sciences or related discipline who wish to complement their background with skills in GIS technology, spatial interaction modeling, locational analysis and spatial statistics. Emphasis is placed on critical thinking, hands-on problem-solving and communication skills.

This program is geared to suitable graduates with an interest in advanced studies in Spatial Analysis, but who do not wish to complete a Master's degree.

Enquiries: 905 525-9140 Ext. 22542
Fax: 905 546-0463
Email: maynard@mcmaster.ca
Website: http://www.science.mcmaster.ca/geo/

Admission

Acceptance to this program follows the established procedures and standards for admission to M.A. or M.Sc. degree graduate programs at McMaster University.

Applicants must hold a B.Sc. or B.A. in Geography, Earth & Environmental Sciences or related discipline and must have completed a course in GIS, spatial statistics or a combination of the two. Although the requirements are similar to those for a M.A. or M.Sc. candidate, additional consideration will be given to work experience. The general guidelines are outlined in sections 2.1.1 and 2.1.4 of the Graduate Calendar.

Course Requirements

A student will be granted a Graduate Diploma in Spatial Analysis upon the completion of four half courses with a minimum passing grade of B- within a three-year period. The courses must be from the following list, and students must take at least one at the 600-level and at least two at the 700-level. Exceptions to these course requirements must be granted by special permission of the Faculty of Science Graduate Curriculum, Policy, Admissions and Study Committee.

Graduate diploma students with at least a B+ average in their graduate course work may be eligible to transfer to a part-time Master's degree in Geography subject to the recommendation of the department and Faculty Graduate Admissions and Study Committee. See section 2.1.4 in the Graduate Calendar.

Courses

***6I03** / **Advanced GIS / Staff**
Advanced methods in GIS using ARC/INFO. Topics will include raster based analysis, working with linear features, surface modeling and AML programming.

***715 / Special Topics / Staff**
Individual reading course on an advanced level topic. A student may register only once in this course with the permission of The School of Geography and Earth Sciences.

***733 / Integrated Urban Models: Design, Structure and Applications / P.S. Kanaroglou**
A review of location and transportation models used in integrated urban models. The performance of known computer implementations of integrated urban models will be evaluated in this course.

***737 / Activity Analysis: Advanced Travel Behaviour Analysis and Modeling / D.M. Scott**
Theory, data and methods underlying the activity-based approach to travel behaviour analysis and modeling. The application of activity analysis to future models of urban travel demand is also emphasized.

***739 / Spatial Population Analysis / K.B. Newbold**
Theories and models of migration; characteristics of contemporary migration; movement in space and models of spatial interaction.

***746 / Advanced Statistical Methods in Geography / K.L. Liaw**
Applications of advanced multivariate statistical methods in geographic research, including analysis of contingency tables and regression, logistic and probit models.

***762 / Advanced Geophysical Mapping and Modeling / W.A. Morris**
Airborne geophysical and satellite imagery for geological mapping application to problems in oil, and mineral exploration and to environmental contaminant mapping.

WATER WITHOUT BORDERS

McMaster University and the United Nations University-Institute for Water, Environment & Health

Water Without Borders is a collaborative graduate diploma program between McMaster and theUnited Nations University-Institute for Water, Environment & Health (UNU-INWEH). The aimof the program is to provide an inter-disciplinary, research and policy oriented learning experience for students interested in the relationships between water,environment and health. Access to safe water and sanitation, the economics of water provision, the impact of climate change on water, environment and health, and the development of international policiesto ensure water access, environmental sustainability and human health are among the issues thatthe program addresses.

There is no tuition fee for the program, however, students must fund the cost of the field course (WWB*701, see below) themselves.

Admission

The program is open to any student who is enrolled in or has accepted an offer admission to agraduate program (at the Maters or Doctoral level) in any of the six Faculties at McMaster.Applicants will be evaluated on the basis of their grade transcripts, reference letters andstatement of interest. The evaluation will be made in terms of the applicant's qualifications and interests in relation to the research goals and program of UNU-INWEH, and the ability of UNUINWEHresearchers to provide co-supervision. Applications that have met the eligibilityrequirement will be assessed by the Water Without Borders program committee. Students canonly be admitted at the start of the academic year.

Requirements

Students who are admitted to the program are required to complete the three courses thatconstitute the core curriculum. In addition to these courses, Water Without Borders students must, in consultation with their home department supervisor, involve their UNU-INWEH co-supervisor in the principal research activity they are undertaking for their graduate degree (e.g., independent study course, majorresearch project, or thesis for Masters students; dissertation for Ph.D. students).

Courses

The curriculum consists of three courses, all of which are non-credit courses at McMaster and all of which are required to graduate from the program.

***701 / Field course**
One week field trip linked to a UNU-INWEH project in a marginalized community. The objective of which will be to ground the students in theresearch focus of the program and its core principles. Upon return from the field, a briefreflection assignment must be submitted by each student beforethe end of the second term.

***702 / Water Around the World**
The purpose of this course is to address the issues of bridging science to policy, developing capacity, and trans disciplinary research at the water-health nexus. The content is primarily delivered through problem-based learning, which will examine real issues currently faced by the four thematic areas at UNU-INWEH (dry land ecosystems, coastal ecosystems, freshwater ecosystems and water-health nexus). Several seminars and panel debates will also be held. This course involves several oral presentations, regular blogging, and a significant amount of group work.

***703 / Practicum**

This course will provide additional practical experience through the individual re-submission of findings from WWB *702 in the format required to share those findings with different stakeholders. The purpose of this course is to provide students with skills in writing pieces of scientific work for different audiences and developing skills for knowledge transfer and translation. Students will be requested to submit a single paper in the genre provided, which could be, for example, an op-ed piece, policy brief, ministerial briefing note or NGO proposal. The course is self-directed, and must be completed between the end of Term III (at which point the findings from the *702 questions will be complete) and the end of the Summer term.

Contact Information

More information about the Water Without Borders program can be found on the program website: http://www.inweh.unu.edu/WaterwithoutBorders_2011.htm
For additional information, please email wwbdir@mcmaster.ca

GENERAL INDEX

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