The information published in this Graduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2007-2008 academic years, including the Summer Semester 2007, the Fall Semester 2007 and the Winter Semester 2008. For your convenience the Graduate Calendar is available in PDF format. If you wish to link to the Graduate Calendar please refer to the Linking Guidelines.

The University is a full member of:
- The Association of Universities and Colleges of Canada

Contact Information:

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Disclaimer
The Office of Graduate Program Services has attempted to ensure the accuracy of this on-line Graduate Calendar. However, the publication of information in this document does not bind the university to the provision of courses, programs, schedules of studies, fees, or facilities as listed herein.

Limitations
The University of Guelph reserves the right to change without notice any information contained in this calendar, including any rule or regulation pertaining to the standards for admission to, the requirements for the continuation of study in, and the requirements for the granting of degrees or diplomas in any or all of its programs.
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.
The University of Guelph reaffirms section 1 of the Ontario Human Rights Code, 1981, which prohibits discrimination on the grounds of race, ancestry, place of origin, colour, ethnic origin, citizenship, creed, sex, sexual orientation, handicap, age, marital status or family status.
The university encourages applications from women, aboriginal peoples, visible minorities, persons with disabilities, and members of other under-represented groups.
Introduction

Collection, Use and Disclosure of Personal Information

Personal information is collected under the authority of the University of Guelph Act (1964), and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) http://www.e-laws.gov.on.ca/DLB/Laws/Statutes/English/90f31_e.htm. This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes. Certain personal information is disclosed to external agencies, including the Ontario Universities Application Centre, the Ministry of Training, Colleges and Universities, and Statistics Canada, for statistical and planning purposes, and is disclosed to other individuals or organizations in accordance with the Office of Registrarial Services Departmental Policy on the Release of Student Information. For details on the use and disclosure of this information call the Office of Registrarial Services at the University at (519) 824-4120 or see http://www.uoguelph.ca/registrar/registrar/index.cfm?index.

Statistics Canada - Notification of Disclosure

For further information, please see Statistics Canada's web site at http://www.statcan.ca and Section XIV Statistics Canada.

Address for University Communication

Depending on the nature and timing of the communication, the University may use one of these addresses to communicate with students. Students are, therefore, responsible for checking all of the following on a regular basis:

Email Address

The University issued email address is considered an official means of communication with the student and will be used for correspondence from the University. Students are responsible for monitoring their University-issued email account regularly.

Home Address

Students are responsible for maintaining a current mailing address with the University. Address changes can be made, in writing, through Graduate Program Services.

Name Changes

The University of Guelph is committed to the integrity of its student records, therefore, each student is required to provide either on application for admission or on personal data forms required for registration, his/her complete, legal name. Any requests to change a name, by means of alteration, deletion, substitution or addition, must be accompanied by appropriate supporting documentation.

Student Confidentiality and Release of Student Information Policy Excerpt

The University undertakes to protect the privacy of each student and the confidentiality of his or her record. To this end the University shall refuse to disclose personal information to any person other than the individual to whom the information relates where disclosure would constitute an unjustified invasion of the personal privacy of that person or of any other individual. All members of the University community must respect the confidential nature of the student information which they acquire in the course of their work.

Complete policy at http://www.uoguelph.ca/policies.
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Animal and Poultry Science

The Department of Animal and Poultry Science offers programs of study leading to MSc and PhD degrees. Animals of significance in food production are the department's major interest and research emphasis. The graduate program encompasses four fields: animal breeding and genetics (quantitative or molecular); animal nutrition (monogastric or ruminant); animal physiology (environmental, reproductive, or behavioural); and growth and metabolism (meat science). The latter field is offered in collaboration with the Department of Food Science and all fields are enriched through interaction with faculty members from other university departments.

The major expertise of individual faculty is as follows: animal breeding and genetics (Golovan, Karrow, Miller, McMillan, Robinson, Schaeffer, Schenkewil, Wilton), animal nutrition (Atkinson, Cant, de Lange, France, Leeson, McBride, Osborne, Smith, Swanson), animal physiology (Bedecarrats, Buhr, Fan, Li, Moccia, Squires, Walton), animal behaviour and ethology (Duncan, Mason, Widowski), and growth and metabolism (Mandell, Swatland).

General Admission Requirements

Research in animal science is enriched by the interaction of scientists from diverse academic disciplines. Accordingly, there are no specific prerequisite courses expected of applicants to the graduate programs in the department. Each applicant will be considered on an individual basis, taking into account the applicant's academic background and relevant experience.

Administrative Staff

Chair
Steve Leeson (146 ANNU, Ext. 53681)
sleeson@uoguelph.ca

Graduate Co-ordinator
Andy Robinson (127 ANNU, Ext. 53679)
andyr@uoguelph.ca

Graduate Secretary
Wendy McGratten (144 ANNU, Ext. 56215)
wmcgratt@uoguelph.ca

Graduate Faculty

*Please see the Department's webpage at www.aps.uoguelph.ca for a complete listing of faculty.

James L. Atkinson
BSc UMIST, Manchester, MSc London, PhD Guelph - Associate Professor

Shai Barbut
BS Hebrew University of Jerusalem, MS, PhD Wisconsin (Madison) - Professor

Gregory Bedecarrats
Licence de Biochimie, MSc, Dipl. Rennes (France), PhD McGill - Assistant Professor

Mary M. Buhr
BSc, MSc, PhD Waterloo - Professor

Dominique P. Bureau
BA, Sc, MSc Lalav, PhD Guelph - Assistant Professor

John P. Cant
BSc (Agr) Nova Scotia, MS, PhD California - Associate Professor

Cornelius F.M. de Lange
BSc, MSc Wageningen, PhD Alberta - Associate Professor

Ming Z. Fan
BS Xinjiang, MS Harbin, PhD Alberta - Associate Professor

James France
BSc Wales, MSc, PhD, DSc Hull (United Kingdom), CMath, FIMA - Professor and Canada Research Chair

Serguei P. Golovan
BSc St. Petersburg State, PhD Guelph - Assistant Professor

Niel A. Karrow
BSc Guelph, MSc, PhD Waterloo - Assistant Professor

Steven Leeson
MPhil, PhD Nottingham - Professor and Chair

Julang Li
MSc Changchun Veterinary College (China), PhD Ottawa - Assistant Professor

Ira B. Mandell
BS, MS Ohio State, PhD Saskatchewan - Assistant Professor

Georgia Mason
BA, PhD Cambridge - Associate Professor

Brian W. McBride
BSc, MSc Guelph, PhD Alberta - Professor

Ian McMillan
BSc, MSc, PhD Toronto - Professor

Stephen P. Miller
BSc (Agr), PhD Guelph - Associate Professor

Richard D. Moccia
BSc, MSc Guelph - Associate Professor

Vern R. Osborne
BSc, MSc, PhD Guelph - Assistant Professor

J. Andrew B. Robinson
BSc (Agr), MSc Guelph, PhD Cornell - Assistant Professor

Larry R. Schaeffer
BS Purdue, MS, PhD Cornell - Professor

Trevor K. Smith
BSc British Columbia, MSc Manitoba, PhD Cornell - Professor

E. James Squires
BSc, MSc, PhD Memorial - Professor

Kendall C. Swanson
BS, MS North Dakota State, PhD Kentucky - Assistant Professor

Howard J. Swatland
BSc London, MSc, PhD Wisconsin - Professor

John S. Walton
BSc, PhD Reading - Professor

Tina M. Widowski
BS, MS, PhD Illinois - Associate Professor

James W. Wilton
BSA Manitoba, MSc Toronto, PhD Cornell - Professor

MSc Program

The MSc program involves advanced courses and the completion of a research project. These are means of developing the skills and intellectual curiosity that may further qualify the student for a leadership role within the animal industry or serve as a prerequisite for doctoral studies. The MSc degree may be completed via two routes: by thesis or by course work and major paper. The MSc by course work and major paper is offered in two areas of specialization: animal breeding & genetics and animal nutrition & metabolism.

Admission Requirements

An honours baccalaureate, with a minimum average grade of 'B' during the last four semesters of study, will normally be required.

Degree Requirements

MSc by Thesis

Candidates for the thesis-based MSc degree must successfully complete a prescribed series of courses, conduct a research project, prepare a thesis based on their results and defend this in a final examination. The number of course credits required in this option will be decided by the student's advisory committee in consultation with the student, and may exceed the minimum 1.5 credits required by the Faculty of Graduate Studies. Generally, 4 or 5 courses (1.5-2.0 credits) will be taken, including the mandatory Seminar course, ANSC*6600 (0.0 credit).

MSc by Course Work and Major Paper

Candidates for the MSc degree by course work and major paper option must complete a minimum of 4.0 credits (9 courses). Of these courses, one will be the departmental Seminar course, ANSC*6600 (0.0 credit), and another will be Major Paper in Animal and Poultry Science, ANSC*6900 (1.0 credit). The major paper will be a detailed, critical review of an area of study related to the specialization chosen by the student and should include analyses and interpretations of relevant data. The content of the major paper will be presented to the department in the Seminar course.

At the beginning of the program, the student and student's advisory committee will design the course-work program according to the program guidelines and the aspirations and background of the student. Students will normally choose a minimum of 4 courses in the area of specialization, one of which will be ANSC*6900, Major Paper in Animal and Poultry Science, and a minimum of two courses outside the area of specialization. These latter courses can be offered by departments other than Animal and Poultry Science.

A maximum of one approved senior-level undergraduate course can be included in the list of prescribed courses. Recommended graduate courses in the two areas of specialization are as follows: Animal Breeding & Genetics (ANSC*6900, ANSC*6210, ANSC*6240, ANSC*6370, ANSC*6380, ANSC*6390, ANSC*6450); Animal Nutrition & Metabolism (ANSC*6900, ANSC*6010, ANSC*6020, ANSC*6030, ANSC*6250, ANSC*6260, ANSC*6360, ANSC*6450).

The MSc by course work and major paper degree will require a minimum of three semesters of full-time study (or the equivalent).

PhD Program

The PhD program is research oriented and provides instruction and experiences that develop the student's ability to independently formulate hypotheses and design and execute experiments or conduct observational studies to reach definitive conclusions.
Admission Requirements
Students entering a PhD program should show potential for independent, productive, and original research. A PhD program can be entered by three routes: following completion of an MSc program; following transfer prior to completion of an MSc program; and directly from a bachelor degree. In general, a minimum average grade of ‘B’ for a completed MSc program plus strong letters of reference are required. Students wishing to be considered for transfer to a PhD program prior to completion of the MSc program must request the transfer before the end of the fourth semester and have an excellent academic record as well as a strong aptitude for research. Direct admission to the PhD program may be permitted for applicants who hold a bachelor's degree and have an excellent academic history and strong indications of research potential.

Degree Requirements
Satisfactory completion of a PhD program requires a comprehensive Knowledge of the area of emphasis and the ability to conduct original research in this area, plus a sound general background in two related areas of study. This competence is demonstrated in a qualifying examination and through the design and execution of a substantial and original research project. Based on this research, a thesis is prepared and defended in a final examination. The number of courses required for a PhD program will be decided by the student's advisory committee in consultation with the student. The minimum requirement is the Seminar course, ANSC*6600.

Interdepartmental Programs
MSc (Aquaculture) Interdepartmental Program
The Department of Animal and Poultry Science participates in the master of science in aquaculture program. Professors Atkinson, Cho, McMillan and Mocca are members of the Aquaculture Interdepartmental Group. These faculty members' expertise includes aspects of aquaculture; they may serve as advisors for MSc (Aquaculture) students. Please consult the Aquaculture listing for a detailed description of the MSc (Aquaculture) interdepartmental program.

Toxicology MSc/PhD Collaborative Program
The Department of Animal and Poultry Science participates in the MSc/PhD program in toxicology. Professor Karrow, Smith, and Squires are members of the Toxicology Interdepartmental Group. The research and teaching expertise of these faculty include aspects of toxicology; they may serve as advisors for MSc and PhD students in Toxicology. Students choosing this option must meet the requirements of the Toxicology Collaborative Program, as well as those of their home department. Please consult the Toxicology listing for a detailed description of the MSc/PhD collaborative program. Toxicology MSc, PhD.

Courses
Although the courses offered are listed by field, several are relevant to more than one field. Some courses are only offered when there is a certain minimum enrolment.

Animal Breeding and Genetics
ANSC*6210 Principles of Selection in Animal Breeding W [0.50]
Definition of selection goals, prediction of genetic progress and breeding values, and the comparison of selection programs.

ANSC*6240 Topics in Quantitative Genetics and Animal Breeding F [0.50]
Current literature and classical papers pertaining to quantitative genetics and breeding are reviewed in detail.

ANSC*6370 Quantitative Genetics and Animal Models F [0.50]
The course covers quantitative genetics theory associated with animal models; linear models applied to genetic evaluation of animals; estimation of genetic parameters for animal models; and computing algorithms for large datasets.

ANSC*6380 Estimation of Genetic Parameters W [0.50]
The course covers Bayesian approaches to analysis of data; categorical data analysis; accounting for selection bias; major gene analyses; models for handling marker genes; and recent developments in statistical methodology related to animal breeding applications.

ANSC*6390 QTL’s and Markers (offered all years pending demand) W [0.50]
Advanced training in the mathematical aspects of quantitative genetic theory as applied to animal breeding.

ANSC*6450 Topics in Animal Biotechnology W [0.50]
The impact of recombinant DNA techniques on present and future research in animal science and on the livestock industry is critically appraised.

Animal Nutrition
ANSC*6010 Topics in Comparative Animal Nutrition F [0.50]
Current topics in the feeding and nutrition of agricultural, companion and captive animal species. Emphasis is placed on the influence of nutrients on metabolic integration at tissue, organ and whole-animal levels.

ANSC*6202 Poultry and Swine Nutrition W [0.50]
A discussion of current topics in the feeding and nutrition of domestic fowl and swine based on the critical appraisal of selected journal readings.

ANSC*6300 Modelling Metabolic Processes F [0.50]
Building and testing of mathematical models of metabolic processes using continuous simulation software to assist in weekly assignments. Choice of model based on students' research interests (e.g. protein synthesis, nutrient uptake, rumen fermentation). Term project to reproduce model from scientific knowledge.

ANSC*6360 Techniques in Animal Nutrition Research (even years only) F [0.50]
Theory and/or practices of techniques to evaluate feedstuffs and determine nutrient utilization in poultry, swine and ruminants is covered through lectures, short laboratories and a major project.

ANSC*6470 Advanced Animal Nutrition and Metabolism I F [0.50]
A systematic review of key aspects of energy, protein, amino acid and carbohydrate utilization and metabolism in farm animals.

ANSC*6480 Advanced Animal Nutrition and Metabolism II W [0.50]
A systematic review of key aspects of lipid, vitamin and mineral utilization and metabolism in farm animals.

Prerequisite(s): ANSC*6470

Animal Physiology
ANSC*6400 Mammalian Reproduction (odd years only) W [0.50]
Discussions and applications of methodology for collection and examination of gametes and embryos and for measurements of hormones in biological fluids.

ANSC*6440 Advanced Concepts and Methods in Applied Ethology W [0.50]
An in-depth review of classic papers and current topics in applied ethology. Discussions will include applications of methodologies and analyses used to conduct animal behaviour research.

ANSC*6460 Lactation Biology F [0.50]
An in-depth systems analysis of lactation, comparing the cow, pig, rat, human and seal. Mammary development from conception through to lactogenesis, lactation and involution will be covered. Hypotheses of regulation of the biochemical pathways of milk synthesis will be tested in relation to experimental observations.

Growth and Metabolism
ANSC*6250 Growth and Metabolism W [0.50]
Animal growth and metabolism are considered at the cellular level in a manner that extends beyond the basic disciplines of biometrics and biochemistry with attention focused on the main carcass components — muscle, fat and bone.

General
ANSC*6100 Special Project F,W,S [0.50]
Supervised program of study in some aspect of animal and poultry science that can involve an experimental project and/or detailed analysis of the literature.

ANSC*6600 Seminar F,W [0.00]
This course is required for successful completion of MSc and PhD programs. The major findings of the thesis or major paper are presented to the department.

ANSC*6900 Major Paper in Animal and Poultry Science F,W,S [1.00]
A detailed, critical review of an area of study related to the specialization of students in the MSc by course work and major paper option that includes analysis and interpretation of relevant data.
Aquatculature

The university offers an interdepartmental program of study leading to the degree of master of science in aquaculture (MSc (Aquaculture)). The participating units are the Departments of Food, Agricultural and Resource Economics, Animal and Poultry Science, Biomedical Sciences, Food Science, Human Health and Nutritional Sciences, Integrative Biology, Marketing and Consumer Studies, Molecular and Cellular Biology, Pathobiology, Philosophy, and Population Medicine.

Admission Requirements

Students may be admitted to the MSc (Aquaculture) program from a variety of applied fish-production systems. In addition, the admissions committee will look for relevant work experience or recognized educational training in agrifood systems and aquatic or fisheries science.

Applications must be accompanied by a letter of intent expressing the student's reasons for wanting to enter the program. Prior completion of introductory basic science courses will be expected. All applicants will require an academic program advisor prior to an offer of admission.

Degree Requirements

The program requires the completion of a minimum of 6.5 course credits. Students will be permitted to take additional, elective course credits if desired. At least 4.5 of the course credits will be at the graduate level and all undergraduate courses must be eligible for graduate credit. The selection of the courses will be dependent, in part, on the courses completed in the student's undergraduate program. The total duration of the program is expected to be 3-4 full-time semesters, or longer if part-time study is undertaken. Detailed schedules of studies are available from the program coordinator or from any member of the graduate faculty in the program. The student's advisor will provide leadership in making arrangements for, and providing advice on, the student's overall program, including the special project. Students in the program will be under the guidance of the Aquaculture Interdepartmental Group, and will register both in the interdepartmental program and in the department of their advisor. The Aquaculture Interdepartmental Group consists of members of the graduate faculty whose teaching or research interests are wholly or partly related to aquaculture.

Courses

**AQUA*6000 Special Project in Aquaculture F,S,W [1.00]**

An intensive learning opportunity focusing on an applied problem in the aquaculture industry. Completion of a literature review and project, in concert with hands-on experience with live animals, either in a research or commercial setting, form the basis of a final report and oral presentation to be made to a committee of the Aquaculture Interdepartmental Group. Practical experience is also gained through on-site training at the Alma Aquaculture Research Station.

**AQUA*6100 Science and Technology in Aquaculture F [0.50]**

A formal lecture, seminar and essay course designed to examine the role of science and technology in the aquaculture industry. Recent advances in the scientific community are explored, with special attention to those developments having promise for commercialization and technology transfer to the private sector. The course will explore the relationships between basic and applied science, and the development of new technology for the industry.

**AQUA*6200 Practicum in Aquaculture: Culture of Salmonids S [0.50]**

Using a problem-solving approach, students will complete a series of modules at the Alma Aquaculture Research Station covering topics in water management, hatchery operations, propagation techniques, feeding and nutrition, health and disease, economics and regulatory issues. Students will solve practical problems from both a theoretical and applied perspective.

Graduate Courses Eligible for Credit in the MSc (Aquaculture) Program:

**Animal Science**

- ANSC*3050 0.50 Aquaculture: Advanced Issues
- ANSC*6450 [0.50] Topics in Animal Biotechnology

**Capacity Development and Extension**

- CDE*6190 [0.50] Fundamentals of Interpersonal and Intercultural Communication
- CDE*6311 [0.50] Extension Theory and Methods

**Economics**

- ECON*6750 [0.50] Managerial Economics
- ECON*6770 [0.50] Financial Management

**Food, Agricultural and Resource Economics**

- AGEC*6120 [0.50] Marketing Management
- AGEC*6130 [0.50] Special Topics in Financial Management
- AGEC*6430 [0.50] Case Studies in Farm Management

**Food Safety and Quality Assurance**

- FSQA*6600 [0.50] Principles of Food Safety and Quality Assurance

**Geography**

- GEOG*6281 [0.50] Environmental Resource Evaluation

**Hospitality and Tourism Management**

- HTM*6110 [0.50] Foundations of Leadership

**Marketing and Consumer Studies**

- MCS*6010 0.5 Product Development and Management Systems
- MCS*6150 [0.50] Quality Assurance Management

**Rural Planning and Development**

- RPD*6310 [0.50] Environmental Impact Assessment

**Undergraduate Courses Eligible for Graduate Credit**

(Students must not have received credit for these courses as part of their undergraduate programs):
### Agricultural Economics
- AGEC*4220 0.5 Advanced Farm Management

### Animal Science
- ANSC*3120 0.5 Introduction to Animal Nutrition
- ANSC*3170 0.5 Nutrition of Fish and Crustacea
- ANSC*3210 0.5 Principles of Animal Care and Welfare
- ANSC*4050 0.5 Biotechnology in Animal Science

### Biology
- BIOL*3450 0.5 Introduction to Aquatic Environments

### Environmental Biology
- ENVB*4020 0.5 Water Quality and Environmental Management

### Food Science
- FOOD*4700 0.5 Food Product Development

### Marketing and Consumer Studies
- MCS*3010 0.5 Quality Management

### Pathology
- PATH*3610 0.5 Principles of Disease
- PATH*4100 0.5 Diseases of Aquatic Animals

### Zoology
- ZOO*4020 0.5 Ichthyology
- ZOO*4110 0.5 Principles of Fish and Wildlife Management
- ZOO*4330 0.5 Environmental Biology of Fishes
- ZOO*4350 0.5 Biology of Polluted Waters

### Note
Other relevant graduate and undergraduate courses may be taken for credit subject to the approval of the student's advisory committee.
Biomedical Sciences

The Department specializes in scientific disciplines which are basic to human and veterinary medicine. Within this context, the research activities of the faculty are focused under the general umbrella of biomedical science and biotechnology. The MSc and PhD programs provide emphasis in one of the department's three major fields: Reproductive Biology, Developmental, Cell and Tissue Morphology, and Biomedical Toxicology/Pharmacology. The department also participates in the Doctor of Veterinary Science (DVSc) program, co-ordinated by an interdepartmental committee chaired by the assistant dean (graduate studies and research) of the Ontario Veterinary College.

Administrative Staff

Chair
Neil MacLusky (2633 Ontario Veterinary College, Ext. 54700)
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Graduate Coordinators:
Pawel Bartlewski (incoming), ext. 53330, and Roger Moorehead (in-course), ext. 54950 (. Ext.)

Graduate Secretary
Wendy Arthur (2633 OVC, Ext. 54900)
warthur@ovc.uoguelph.ca

Graduate Faculty

Carol L. Armstrong
BSc, Calgary, MSc Dalhousie, PhD Calgary - Assistant Professor

Pawel M. Bartlewski
DVM Poland and UK, MSc, PhD Saskatchewan - Assistant Professor

Dean H. Betts
BSc, MSc Western Ontario, PhD Guelph - Assistant Professor

Herman J. Boermans
DVM, MSc, PhD Guelph - Associate Professor

Peter D. Conlon
BSc (Agr), MSc McGill, DVM, PhD Guelph - Associate Professor

Brenda L. Coomber
BSc, MSc Guelph, PhD Toronto - Associate Professor

W. Larry Grovum
BSA Saskatchewan, PhD New England - Professor

Ann C. Hahnel
BA, BSc, PhD Washington - Associate Professor

W. J. Brad Hanna
BSc, DVM, MSc, PhD Guelph - Assistant Professor

Ronald Johnson
BSc, DVM Guelph, PhD Michigan State, ACVCP - Associate Professor

Bettina E. Kalisch
BSc, MSc, PhD Queen's - Associate Professor

W. Allan King
BSc, MSc Guelph, PhD Uppsala - Professor

Gordon Kirby
DVM Guelph, MSc Surrey, PhD Guelph - Associate Professor

Jonathan LaMarre
DVM, PhD Guelph - Associate Professor

John F. Leatherland
BSc Sheffield, PhD Leeds, DSc Sheffield - Professor

Neil J. MacLusky
BSc Leeds, PhD London - Professor and Chair

Roger A. Moorehead
BSc, PhD McMaster - Assistant Professor

James J. Petrik
BA, MA, PhD Western Ontario - Assistant Professor

W. Glen Pyle
BSc Guelph, PhD Tennessee - Assistant Professor

Alastair J.S. Summerlee
BSc, BVSc, PhD Bristol, MRCVS - University President

Jeffrey J. Thomason
BA Cambridge, MSc, PhD Toronto - Professor

Shigeto Yamashiro
DVM Kagoshima, MVSc Hokkaido, MSc Guelph, PhD Hokkaido - Associate Professor

MSc Program

Students may take an MSc degree in Reproductive Biology, Developmental, Cell and Tissue Morphology, and Biomedical Toxicology/Pharmacology. The thesis research project may involve: molecular, cellular or developmental aspects of tissue or animal differentiation and growth, physiological, morphological or biomechanical investigations of normal function or disease processes in a variety of organs and tissues, or pharmacological mechanisms related to therapy and drug toxicity.

Admission Requirements

Applicants should have an honours baccalaureate degree in the biological sciences or a doctor of veterinary medicine degree (or the equivalent) with a minimum ‘B+’ standing in the final two years of study. Letters of reference from two of the applicant’s professors must be provided with the application. In addition, a short statement of the applicant’s research interests and career goals, is required to assist in the selection of faculty advisors. Students may be admitted into the fall, winter or spring semester. Students who do not meet this ‘B+’ standard may be admitted into a provisional category if there is additional evidence that the applicant is capable of successfully completing the graduate program (e.g., outstanding letters of recommendation, or evidence of prior relevant work or research experience). Transfer to regular category will normally be recommended when the student obtains a minimum ‘B’ in two courses that have been approved by the department's graduate program committee in consultation with the student's advisory committee and displays current research ability to his/her advisory committee. These courses will be credited to the degree program.

Degree Requirements

Students must obtain at least an overall weighted average of ‘B’ in prescribed courses. The number of course credits prescribed will not be fewer than 1.5 credits. The student must also prepare and defend an acceptable thesis. Prescribed and additional courses are selected by the student in consultation with the student’s advisory committee. The courses selected will depend on the student's prior experience and the nature of the research project. All students are required to present two departmental seminars during their program. The thesis research proposal, developed by the student in consultation with the advisor, must receive approval from the advisory committee no later than the end of the second semester of the program. The program is completed by the successful oral defence of a written thesis.

PhD Program

Students may undertake a PhD degree in aspects of Reproductive Biology, Developmental Cell and Tissue Morphology or Biomedical Toxicology/Pharmacology. Wherever appropriate, students are encouraged to incorporate the methodologies of more than one of these fields into their research project. The PhD program is research oriented and provides instructional opportunities and experiences that are intended to develop the student's ability to formulate hypotheses and design and execute experiments or to conduct observational studies.

Admission Requirements

Students entering the PhD program must show evidence of the potential for independent, productive and original research. Admission to the PhD program generally requires completion of a research-based MSc program, a minimum ‘B+’ average in the prescribed courses taken during the master's degree program, and strong recommendations from referees who have a sound knowledge of the student's strengths and weaknesses. In addition, a short statement of the applicant's research interests and career goals is required. In exceptional cases, where a candidate has demonstrated excellence in academic work and extraordinary ability to plan and initiate original research, transfer to the PhD program without completion of the MSc program may be recommended. This transfer must take place before the end of the fourth semester in accordance with university regulations. In all cases, students who do not hold an approved research-based MSc degree must register as MSc students regardless of their ultimate goals. Students may be admitted into the fall, winter or spring semester. In those cases where the student is continuing her or his MSc research program into the PhD program, the student must clearly explain how the PhD research program represents a significant advance over that of the MSc.

Degree Requirements

The PhD program offers opportunities for students to become investigators in veterinary and human-health-related sciences. Students will be expected to demonstrate the originality and skill needed to contribute to the knowledge base in a manner that transcends the mere acquisition of data. All students are required to present departmental seminars. Preparation and defence of an acceptable thesis based on research data and hypotheses generated during the duration of the study are the main criteria used to assess the satisfactory completion of the PhD program. However, the student’s advisory committee may require the student to successfully complete specified graduate courses before she or he undertakes the qualifying examination. The qualifying examination, which includes written and oral components, must be completed before the end of the PhD program, or before the end of the fifth semester for those students who transfer directly from the MSc program. Successful completion of the qualifying examination is a prerequisite for continuation in the PhD program. The advisory committee is required to evaluate the student's research productivity periodically and to report on the student's progress to the department graduate program committee each semester in which the student is registered. The PhD program culminates in the preparation, presentation and defence of the thesis, which contains a substantial component of original research.
Interdepartmental Programs

Biophysics MSc/PhD Collaborative Program
The Department of Biomedical Sciences participates in the MSc/PhD program in biophysics. Professor Thomason is a member of this group. He may serve as an advisor for MSc and PhD students. Please consult the Biophysics listing for a detailed description of the MSc/PhD collaborative program.

Toxicology MSc/PhD Collaborative Program
The Department of Biomedical Sciences participates in the MSc/PhD program in toxicology. The research and teaching expertise of these faculty include aspects of toxicology; they may serve as advisors for MSc and PhD students. Please consult the Toxicology listing for a detailed description of the MSc/PhD collaborative program.

DVSc Program
The Department of Biomedical Sciences participates in the DVSc program offering specialization in clinical science. This program provides a balance between advanced training in the discipline, in-service training and a thesis-research project.

Courses

<table>
<thead>
<tr>
<th>Course Code</th>
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<tr>
<td>BIOM*6060</td>
<td>Functional Neuroanatomy</td>
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<tr>
<td>BIOM*6070</td>
<td>Pregnancy, Birth and Perinatal Adaptations S</td>
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<td>BIOM*6110</td>
<td>Advanced Microscopy for Biomedical Sciences</td>
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<td>BIOM*6130</td>
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<td>BIOM*6160</td>
<td>Cellular Biology</td>
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<td>BIOM*6190</td>
<td>Tissue Culture Techniques in Biomedical Sciences</td>
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<tr>
<td>BIOM*6440</td>
<td>Biomedical Toxicology</td>
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<tr>
<td>BIOM*6480</td>
<td>Pharmacodynamics and Pharmacokinetics</td>
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<tr>
<td>BIOM*6570</td>
<td>Biochemical Regulation of Physiological Processes</td>
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<tr>
<td>BIOM*6601</td>
<td>Special Topics in Reproductive Biology and Biotechnology</td>
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<tr>
<td>BIOM*6602</td>
<td>Special Topics in Reproductive Biology and Biotechnology</td>
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<tr>
<td>BIOM*6610</td>
<td>Vascular Biology</td>
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<tr>
<td>BIOM*6701</td>
<td>Special Topics in Development, Cell and Tissue Morphology</td>
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<td>BIOM*6702</td>
<td>Special Topics in Development, Cell and Tissue Morphology</td>
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<tr>
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<td>Special Topics in Physiology &amp; Biochemistry</td>
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<td>Special Topics in Physiology &amp; Biochemistry</td>
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<td>BIOM*6721</td>
<td>Special Topics in Pharmacology-Toxicology</td>
<td>0.25</td>
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<tr>
<td>BIOM*6722</td>
<td>Special Topics in Biomedical Pharmacology-Toxicology</td>
<td>0.50</td>
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- **BIOM*6060 Functional Neuroanatomy U [0.50]**
  A course emphasizing the structure and function of the mammalian nervous system and organs of special sense.

- **BIOM*6070 Pregnancy, Birth and Perinatal Adaptations S [0.50]**
  This course promotes understanding of the physiology of the placenta, and its role in fetal, perinatal and adult health. It is offered through videoconference involving University of Guelph, Queen's University and University of Waterloo. Parts are customized to student's interests within pregnancy physiology.

- **BIOM*6110 Advanced Microscopy for Biomedical Sciences U [0.50]**
  Routine and specialized procedures for light microscopy, and transmission and scanning electron microscopy are examined through lectures, discussions and practical exercises. Interpretation of micrographs is included.

- **BIOM*6130 Vertebrate Developmental Biology U [0.50]**
  The principles of vertebrate development are examined through lectures, discussions and practical exercises. Topics include aspects of gametogenesis, fertilization, implantation, embryonic and fetal development and experimental manipulation of embryos. Emphasis is on mammalian development and topics may vary depending on student needs and interests.

- **BIOM*6160 Cellular Biology U [0.50]**
  An integrative course that examines aspects of cell biology in the context of recent research advancements. Topics are chosen based on student interest and faculty expertise and are explored through a combination of lectures, student seminars and group discussions.

- **BIOM*6190 Tissue Culture Techniques in Biomedical Sciences U [0.50]**
  An introduction to in vitro techniques examining aspects and principles of the culture environment, isolation methods, propagation, characterization and storage of cultured cells, gametes and embryos. Practical exercises and student assignments complement material presented in lecture and seminar format.

- **BIOM*6440 Biomedical Toxicology U [0.50]**
  The course examines chemical compounds injurious to animals and man, toxicity testing, teratogens, carcinogens, factors influencing toxicity, and toxic drug interactions. The mechanism of action, metabolism, and principles of antidotal treatment are also studied.

- **BIOM*6480 Pharmacodynamics and Pharmacokinetics U [0.50]**
  This course describes drug absorption, distribution, biotransformation and elimination in animals and human beings, and emphasizes factors which modify drug behaviour. It integrates molecular mechanisms with physiological processes and highlights the importance of receptors and second messengers in cellular responses to pharmacologic agents.

- **BIOM*6570 Biochemical Regulation of Physiological Processes U [0.50]**
  This course focuses on the regulation of vertebrate physiological processes, such as electrolyte and water balance, temperature regulation, growth and energy metabolism, by hormones and other biological regulators that act through cellular receptors and intracellular biochemical-control pathways.

- **BIOM*6601 Special Topics in Reproductive Biology and Biotechnology U [0.25]**
  Permits in-depth exploration of interdisciplinary aspects of biomedical research. Topics such as inflammation, reproductive immunology and neoplasia have been offered.

- **BIOM*6602 Special Topics in Reproductive Biology and Biotechnology U [0.50]**
  See BIOM*6601 above.
Biophysics

The organization and administration of the graduate program in biophysics are the responsibility of the Biophysics Interdepartmental Group (BIG). The group consists of those members of the graduate faculty whose research interests lie wholly or partly in biophysics. Biophysics spans all areas of the life sciences from molecular structure to human biology and uses the ideas and techniques of the physical sciences to solve biological problems. The specific sub-disciplines of BIG are molecular, cellular, structural, and computational biophysics.

Administrative Staff

Director and Graduate Co-ordinator
Frances J. Sharom (Molecular and Cellular Biology, Ext. 52247)

Graduate Faculty

Madhur Anand
Associate Professor, Environmental Biology

France-Isabelle Auzanneau
Associate Professor, Chemistry

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Assistant Professor, Mathematics and Statistics

Terry Beveridge
Professor, Molecular and Cellular Biology

Manfred Brauer
Associate Professor, Molecular and Cellular Biology

Leonid Brown
Associate Professor, Physics

David Chiu
Professor, Computing and Information Science

Marc Coppolino
Assistant Professor, Molecular and Cellular Biology

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Assistant Professor, Molecular and Cellular Biology

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George Harauz
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Professor, Clinical Studies

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Stefan W. Kyria
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Vladimir Ladizhansky
Assistant Professor, Physics

Joseph Lam
Professor, Molecular and Cellular Biology

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Professor Emeritus, Mathematics and Statistics

Anna T. Lawnczak
Professor, Mathematics and Statistics

Michael I. Lindinger
Associate Professor, Human Health and Nutritional Sciences

Jacek Lipkowski

Professor, Chemistry

Dev Mangroo
Associate Professor, Molecular and Cellular Biology

A. Rodney Merrill
Professor, Molecular and Cellular Biology

Michele Oliver
Associate Professor, Engineering

K. Peter Pauls
Professor, Plant Agriculture

Peter Purslow
Professor, Food Science

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Professor, Biomedical Sciences

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Alan Willms
Assistant Professor, Mathematics and Statistics

Janet M. Wood
Professor, Molecular and Cellular Biology

Rickey Y. Yada
Professor, Food Science

Simon Yang
Professor, Engineering

Graduate Faculty from Brandon University

Bruno Tomberli
Assistant Professor, Physics and Astronomy

Graduate Faculty from Brock University

Alan Bow
Professor, Biological Sciences

Douglas Bruce
Professor, Biological Sciences

David Gabriel
Associate Professor, Physical Education and Kinesiology

A. Joffre Mercier
Professor, Biological Sciences

Sandra Peters
Assistant Professor, Physical Education and Kinesiology

Edward Sternin
Associate Professor, Physics

Graduate Faculty from the University of Toronto at Mississauga

Scott Prosser
Assistant Professor, Chemical and Physical Sciences

Graduate Faculty from McMaster University

Richard Epand
Professor, Biochemistry and Biomedical Sciences

Graduate Faculty from University of Waterloo

Elizabeth Meiering
Professor, Chemistry

Graduate Faculty from Wilfrid Laurier University

Ross E. Cressman
Professor, Mathematics

Masoud Jelokhani-Niaraki
Associate Professor, Chemistry

Matthew Smith
Assistant Professor, Biology

Additional Members of the Program

John Katsaras
National Research Council of Canada, Chalk River ON

Martine Monette

February 7, 2008
Biophysics.

Students may be admitted to the MSc program in biophysics from a range of undergraduate programs, including physics, biology, biochemistry, microbiology, chemistry, mathematics, engineering, or computing science. To be considered for admission, applicants should meet the minimum requirements of a four-year honours degree with a 73% (B) average during the final two years of study. Applicants should briefly indicate their research interests and, if possible, their preferred advisors.

Degree Requirements

Students in the MSc program will be under the guidance of an interdepartmental advisory committee. A total of 1.5 credits are required, one of which is usually BIOP*6000. In addition, all students are required to complete the seminar course BIOP*6010. The advisory committee may require additional courses. An average of 70% (B-) or better must be obtained in the prescribed courses. Further information may be obtained from the chair of the group. When the course work is satisfactorily completed, the submission and successful defense of an appropriate thesis on an approved topic completes the requirements for the MSc in Biophysics.

PhD Program

Admission Requirements

Applicants for the PhD program should have a recognized master's degree in an appropriate field, with a 77% (B+) average in their postgraduate studies. Applicants should briefly indicate their area of research interest and preferred advisor(s). It is often beneficial for applicants to talk with potential advisors before submitting an application.

Direct admission to the PhD program may be permitted for applicants holding a bachelor's degree with high academic standing. Students enrolled in the master's degree program who achieve a superior academic record and show a particular aptitude for research may be permitted to transfer to the PhD program. The application to transfer should be made to the chair of the biophysics program between the end of the second semester and the end of the fourth semester of work towards the master's degree.

Degree Requirements

Students in the PhD program will be under the guidance of an interdepartmental advisory committee. For students who completed the MSc degree in a program other than Biophysics at the University of Guelph, a total of 1.0 graduate course credits are required, one of which is usually BIOP*6000. For students who transfer directly into the PhD program at the University of Guelph, no additional course credits are required. In the case of students who enter the PhD program from the BSc degree, 1.5 graduate course credits are required, one of which is BIOP*6000. In addition, all students are required to complete the non-credit seminar course, BIOP*6010. The advisory committee may require additional courses for any student. An average of 70% (B-) or better must be obtained in the prescribed courses. As early as feasible, but no later than the final semester of the minimum duration, a PhD student is required to complete a qualifying examination to assess her or his knowledge of the subject. This examination should normally be taken within the first five semesters of registration as a PhD student. When the qualifying examination and the course work are satisfactorily completed, the submission and successful defense of an acceptable thesis on an approved topic completes the requirements for the PhD in Biophysics.

Courses

| BIOP*6000 Concepts in Biophysics W [0.50] | This course will emphasis basic concepts in molecular, cellular and structural biophysics arising from key journal publications and their impact on present day research trends. |
| BIOP*6010 Biophysics Seminar U [0.00] | Public research seminar presented by all the students in the biophysics program. MSc students are required to present a seminar within 4 semesters after entering the program. PhD students are required to present a seminar within 4 semesters after entering the program, and at yearly intervals thereafter. Students are required to attend all seminars presented during the semester in which they are registered for the course. |
| BIOP*6050 Advanced Topics in Biophysics U [0.50] | This course provides opportunities for graduate students to study special topics in contemporary biophysical research under the guidance of graduate faculty members with pertinent expertise. Proposed course descriptions are considered by the Director of the Biophysics program on an ad hoc basis, and the course will be offered according to demand. |
| PHYS*7510 Cellular Biophysics U [0.50] | The physics of cellular structure and function; membrane theories, diffusion and active transport, bioelectric phenomena; intracellular motion, thermodynamics; selected topics of current interest and seminar. |
Botany

The Botany Graduate Program offers MSc and PhD degrees. The two areas of emphasis and the faculty associated with these areas are:

- **Ecology, Evolution and Systematics** -- Ackerman, Caruso, HUB, Klironomos, Larson, MacDougall, Maherali, Newmaster, Posluszny
- **Physiology, Cellular and Molecular Biology** -- Emes, Greenwood, Mullen, Nassuth

This program involves faculty from two different departments: Integrative Biology and Molecular and Cellular Biology. A graduate student's department would be the same as their faculty advisor.

**Administrative Staff**

**Integrative Biology Chair**
Moira Ferguson (359 Axelrod, moving to Science Complex effective August 1, 2007, Ext. 53593) mmfergus@uoguelph.ca

**Integrative Biology Graduate Coordinator**
Tom Nudds (ZOO2, Rm. 104, Ext. 56307) tnudds@uoguelph.ca

**Integrative Biology Graduate Secretary**
Mary Anne Davis (255 Axelrod, moving to Science Complex effective August 1, 2007, Ext. 56094) mdavis@uoguelph.ca

**Molecular and Cellular Biology Chair**
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**Molecular and Cellular Biology Graduate Co-ordinator**
Reggie Lo (3250 Science Complex, Ext. 53363) rlo@uoguelph.ca

**Molecular and Cellular Biology Graduate Secretary**
Carol Schlalt (1250 Science Complex, Ext. 53815) csschlaht@uoguelph.ca

**Graduate Faculty**

**Integrative Biology Faculty**

- **Josef D. Ackerman**
  BSc Toronto, MA State Univ. of New York (Stony Brook), PhD Cornell - Associate Professor

- **Christina M. Caruso**
  BA Oberlin College, PhD Illinois - Assistant Professor

- **Brian C. Husbands**
  BSc, MSc Alberta, PhD Toronto - Associate Professor

- **John N. Klironomos**
  BSc Concordia, PhD Waterloo - Associate Professor

- **Douglas W. Larson**
  BSc, PhD McMaster - Professor

- **Andrew MacDougall**
  BA Dalhousie, MSc York, PhD British Columbia - Assistant Professor

- **Hafiz Maherali**
  BSc McGill, MSc, PhD Illinois - Assistant Professor

- **Steven G. Newmaster**
  BSc Guelph, PhD Alberta - Assistant Professor

**Molecular and Cellular Biology Faculty**

- **Michael J. Emes**
  BSc, PhD Sheffield - Professor and Dean of the College of Biological Sciences

- **John S. Greenwood**
  BSc, MSc McMaster, PhD Calgary - Associate Professor

- **Robert T. Mullen**
  BSc, PhD Alberta - Associate Professor

- **Annette Nassuth**
  BSc, MSc Free University, Amsterdam, PhD Leiden - Assistant Professor

- **Usher Poslusnzy**
  BSc, PhD McGill - Professor

**MSc Program**

This program is primarily a learning experience for students to acquire the knowledge and skills necessary to complete high-quality research.

**Admission Requirements**

To be considered for admission, applicants should hold or obtain a baccalaureate degree in an honors program or equivalent from a recognized university or college and have an average academic standing of at least second-class honours (73% or 'B') during the last four semesters or two years of study.

**PhD Program**

This program is more rigorous than the MSc degree and more research oriented. The research completed must have elements of originality and be publishable in a recognized peer-review journal.

**Degree Requirements**

Students in the PhD degree program are required to take courses, prepare and defend an acceptable research proposal, and prepare and defend an acceptable thesis.

**Plant Physiology**

- **BOT*6403 Seed Development and Germination U [0.50]**
  Physiological, biochemical and molecular aspects of seed development and germination and establishment of the seedling will be discussed in lectures and discussions of recent advances in the literature.
Physiological and biochemical aspects of the mechanism whereby plants sustain themselves. Emphasis will be placed on the interactions between different processes. Offered in conjunction with BOT*4380. Extra work is required of graduate students.

**Cellular and Molecular Biology**

**BOT*6030 Plant Cell Biology U [0.50]**

An examination and discussion of structure-function relationships at the subcellular level during plant growth and development. Organelles and their roles in biosynthetic, bioenergetic, and physiological processes that are unique to plants will be examined.

**IBIO*6100 Molecular Evolution U [0.50]**

This course is designed to provide students with an appreciation for the uses of molecular data in the study of evolutionary processes. An overview of the principles of molecular data analysis using a phylogenetic approach will be given. In addition, the importance of incorporating evolutionary history into biodiversity research and other applied topics will be emphasized. Laboratory sessions will be devoted to practical training in analytical tools using specialized computer software, and for student presentation of independent research projects. The course will involve practical training in molecular data analysis using a phylogenetic approach and discussion of current topics from the primary literature.

**BOT*6601 Molecular Basis of Plant-Microbe Interactions U [0.50]**

A lecture and seminar course on recent advances in the study of plant-microbe interactions. Topics include the biochemical, physiological and genetic aspects of plant defenses and the interaction of plants with pathogenic and mutualistic bacteria, fungi and viruses. Offered in conjunction with PBIO*4000. Extra work is required of graduate students. Also offered as ENVB*6040.

**BOT*6605 Modern Approaches to Plant Ultrastructure U [0.50]**

An introduction to some of the recent advances in electron microscopy and laser scanning confocal microscopy and their application to ultrastructural studies of plant systems.

**Evolutionary Biology**

**IBIO*6020 Advances in Evolutionary Biology U [0.50]**

This modular course reviews books and/or other publications in the field of evolutionary biology, providing knowledge of progress in this area of biology. Topics may include epigenetics, phylogenetics, developmental basis of evolutionary change, and molecular evolution. The course includes lectures and seminars in which the students participate. Offered annually.

**IBIO*6060 Special Topics in Evolution U [0.50]**

Students will explore aspects of evolution not otherwise covered in existing graduate courses. A program of study will be developed with a faculty advisor according to the student's requirements. Research papers, laboratory work and/or written and oral presentations may be required.

**Physiology**

**IBIO*6010 Advances in Physiology U [0.50]**

A modular course format in which several faculty members lecture and/or lead discussion groups in tutorials on advances in their areas, or related areas, of physiology. Topics may include metabolic adaptation to extreme environments, behavioural and molecular endocrinology, and exercise and muscle physiology. The course includes lectures and seminars in which the students participate. Offered annually.

**IBIO*6090 Special Topics in Physiology U [0.50]**

Students will explore aspects of physiology not otherwise covered in existing graduate courses. A program of study will be developed with a faculty advisor according to the student's requirements. Research papers, laboratory work and/or written and oral presentations may be required.

**Ecology and Behaviour**

**IBIO*6000 Advances in Ecology and Behaviour U [0.50]**

This is a modular course in which several faculty lecture and/or lead discussion groups in tutorials about advances in their broad areas, or related areas, of ecology and behaviour. Topics may include animal communication, optimal foraging, life-history evolution, mating systems, population dynamics, niche theory and food-web dynamics. The course includes lectures and seminars in which the students participate. Offered annually.

**IBIO*6040 Special Topics in Ecology U [0.50]**

Students will explore aspects of ecology not otherwise covered in existing graduate courses. A program of study will be developed with a faculty advisor according to the student's requirements. Research papers, laboratory work and/or written and oral presentations may be required.

**IBIO*6070 Topics in Advanced Integrative Biology I U [0.50]**

This course provides graduate students, either individually or in groups, the opportunity to pursue topics in specialized fields of botany and zoology under the guidance of graduate faculty. Course topics will normally be advertised by faculty one semester prior to their offering. Courses may be offered in any of lecture, reading/seminar, or individual project formats. A minimum enrolment may be required for some course offerings.

**IBIO*6080 Topics in Advanced Integrative Biology II U [0.50]**

This course provides graduate students, either individually or in groups, the opportunity to pursue topics in specialized fields of botany and zoology under the guidance of graduate faculty. Course topics will normally be advertised by faculty one semester prior to their offering. Courses may be offered in any of lecture, reading/seminar, or individual project formats. A minimum enrolment may be required for some course offerings.

**ZOO*6550 Aquaculture U [0.50]**

Examination of the history, practice and future of aquaculture with special reference to the application of biological principles and knowledge to the production of aquatic organisms for food and other uses.

**IBIO*6630 Scientific Communication I U [0.75]**

The development and refinement of the skills of scientific communication, emphasizing writing skills, in the context of developing a thesis proposal. This course is mandatory for MSc students in the Department of Integrative Biology.

**IBIO*6640 Scientific Communication II U [0.25]**

The development and refinement of the skills of scientific communication, emphasizing oral skills, and culminating in the defence of the thesis proposal. This course is mandatory for MSc students in the Department of Integrative Biology.

Additional courses within the Department of Molecular and Cellular Biology can be found under the course descriptions for the Molecular Biology and Genetics graduate program and the Microbiology graduate program.
## Business Administration

### Administrative Staff

If you have any enquiry pertaining to the MBA Program at the University of Guelph, please contact:

**Manager, Executive Programs**
Fatti Lago (150 Research Lane, #205, Ext. 56607)  
plago@uoguelph.ca

**Assistant Dean, Executive Programs**
Geoff Smith (150 Research Lane, #205, Ext. 58855)  
gwsmith@uoguelph.ca

**Graduate Program Co-ordinator, MBA On-Line Food and Agribusiness Management**
Maury Bredahl (204A MCLN, Ext. 53532)  
mbredahl@uoguelph.ca

**Graduate Faculty**

The MBA program is administered and managed by the College of Management and Economics (CME), through the College’s Graduate Office. The MBA currently has two fields which are offered in partnership with academic units: the Department of Food, Agricultural and Resource Economics (in the Ontario Agricultural College), the School of Hospitality and Tourism Management (in CME), and the Department of Business (in CME).

### Food and Agribusiness Management Field

**From the Department of Food, Agricultural and Resource Economics (OAC):**

- **Andreas Boecker**  
  MSc, PhD Kiel - Assistant Professor

- **Maury E. Bredahl**  
  BS, MS North Dakota State, PhD Minnesota - Professor and Chair

- **John A.L. Cranfield**  
  BSc, MSc Guelph, PhD Purdue - Associate Professor

- **Brady J. Deaton**  
  BS Missouri, MS Virginia Tech, PhD Michigan State - Assistant Professor

- **Glenn C. Fox**  
  BSc(Agr), MSc Guelph, PhD Minnesota - Professor

- **Getu Hailu**  
  BSc, MSc Alemany, PhD Alberta - Assistant Professor

- **Spencer Henson**  
  BSc, PhD Reading - Professor

- **Karl D. Meilke**  
  BS Washington State, PhD Minnesota - Professor

- **Wayne C. Pfeiffer**  
  BS, PhD Nebraska - Associate Professor

- **Donna T. Ramirez**  
  BS Philippines, PhD Illinois - Assistant Professor

- **Rakhal C. Sarker**  
  BSc, MSc Bangladesh, PhD Guelph - Assistant Professor

- **David H. Sparling**  
  BSc Queen’s, MBA Wilfrid Laurier, PhD McMaster - Associate Professor

- **Alfons J. Weersink**  
  BSc Guelph, MSc Montana State, PhD Cornell - Professor

**From the Department of Business (CME):**

- **Rick Bates**  
  BA Guelph, CA Canadian Institute of Chartered Accountants, MBA York - Associate Professor

- **Francesco Braga**  
  DOTT Agr Catholic University, Milan, PhD Guelph - Associate Professor

- **Michael Cox**  
  CD Naval Officer Program, MA Western Washington, PhD Union (Ohio), MCIM Chartered Institute of Marketing Management - Associate Professor and Director of the Centre for Studies in Leadership

- **Elliott Currie**  
  BA, MBA McMaster, CMA Canadian Society of Management Accountants - Assistant Professor

- **Erna van Duren**  
  BA Waterloo, MSc, PhD Guelph - Associate Professor

- **Geoffrey W. Smith**  
  MBA Guelph - Associate Professor

- **John Walsh**  
  BA Thames Polytechnic, MBA, PhD Western Ontario - Professor

**Hospitality and Tourism Management Field**

**From the School of Hospitality and Tourism Management (CME):**

- **J.E. (Joe) Barth**  
  BSc Guelph, MBA Wilfrid Laurier, MPS, PhD Cornell - Assistant Professor

- **Hwan-Suk (Chris) Choi**  
  BA Chung-Ang (Seoul, Korea); MTA George Washington; PhD Texas A&M - Assistant Professor

- **Julia Christensen Hughes**  
  BComm Guelph, MBA, PhD York - Associate Professor

- **Michael Cox**  
  CD Naval Officer Program, MA Western Washington, PhD Union (Ohio), MCIM Chartered Institute of Marketing Management - Associate Professor

- **Joan Flaherty**  
  BA, MA, MSc, Guelph - Assistant Professor

- **Jamie A. Gruman**  
  BA Concordia, MA Lakehead, PhD Windsor - Assistant Professor

- **Robert J. Harrington**  
  BBA Boise State, MBA, PhD Washington State - Associate Professor

- **Marion Joppe**  
  BA Waterloo, MA, PhD Univ. d’Aix-Marseille III (France) - Professor and Director

- **Stephen Lynch**  
  BA, BEd Toronto, MA Duquesne, MSc California American, PhD Bradford (England) - Assistant Professor

- **Donald J. MacLaurin**  
  BS Florida International, MS Nevada (Las Vegas), PhD Kansas State - Associate Professor

- **Tanya MacLaurin**  
  BS, MS, PhD Kansas State - Associate Professor

- **Iain Murray**  
  BComm, MSc Guelph, PhD Kansas State - Associate Professor

- **Michael Ottenbacher**  
  BS, MS Florida International, PhD Otago (New Zealand) - Assistant Professor

- **Catherine E. Ralston**  
  BASc Guelph, MBA Western Ontario, PhD Wisconsin (Madison) - Assistant Professor

- **Margaret Shaw**  
  BS, MBA, PhD Cornell - Professor

- **Geoffrey W. Smith**  
  MBA Guelph - Associate Professor

**From the Department of Economics (CME):**

- **Francis Tapon**  
  DES Paris, MBA Columbia, MA, PhD Duke - Professor

**MBA Program**

### Admission Requirements

1. A four-year undergraduate degree or its equivalent (from a recognized university or college) with an average of at least a B-(70-72%) in the last two years of study AND at least three years of industry related experience including supervisory and managerial responsibility. OR

2. A general (three-year) degree and/or A diploma and/or An acceptable professional designation AND at least five years of industry related experience showing progressive increases in supervisory and managerial responsibility

In some cases the admissions committee may ask for a Graduate Management Admissions Test (GMAT).

### Program Overview

The MBA course of study is based on the application of contemporary management concepts and strategies to industries where the University of Guelph has distinctive capabilities. Upon admission, participants choose an industry focus for their program. Currently, the industry concentrations available to students include Hospitality and Tourism Management, and Food and Agribusiness Management. Other industry concentrations are being discussed for future development. The Guelph program involves a core group of courses that build and develop key managerial skills, courses that allow students to apply concepts and skills to management situations in their chosen industry, and course work is followed by industry-related research culminating in a major project or thesis. Case studies are widely used. Program prerequisites include relevant experience in the participant’s chosen industry.

### Core Courses

Participants complete seven core courses, which provide a foundation for graduate management education. These courses build and develop key managerial skills applicable in the private and public sectors of the economy. The core program is specifically geared to today’s manager-leader, team player, decision maker and coach.

- **AGBU*6180 [0.50]** Financial and Managerial Accounting
- **AGBU*6200 [0.50]** Financial Management
- **HTM*6140 [0.50]** Foundations of Human Resource Management
- **HTM*6110 [0.50]** Foundations of Leadership
- **HTM*6050 [0.50]** Management Communications
On Campus MBA: Equipment Requirements

It is recommended that all On Campus MBA participants have access to a laptop computer equipped with Microsoft Office software.

Courses

Food and Agribusiness Management

AGBU*6070 Research Methods for Managers W [0.50]

The objective of the course is to provide students with a working knowledge of quantitative and qualitative techniques used in the analysis of management problems. The emphasis is on the application and interpretation of quantitative and qualitative methods rather than on theoretical background.

Restriction(s): Distance MBA students only.

AGBU*6100 Food and Agribusiness Economics and Policy U [0.50]

An analysis of economic and policy issues relevant for food and agribusiness managers in affluent economies, with emphasis on the economic and policy environment that exists within North America.

Restriction(s): Distance MBA students only.

AGBU*6120 Marketing Management W [0.50]

A study of marketing decision-making in food and agribusiness firms, with emphasis on the formulation of strategic marketing plans.

Restriction(s): Distance MBA students only.

AGBU*6180 Financial and Managerial Accounting U [0.50]

This course emphasizes the gathering and use of financial information to facilitate effective financial and management decisions. Cases are used to approach the subject from the perspective of the user of accounting information rather than that of the supplier.

Restriction(s): Distance MBA students only.

AGBU*6200 Financial Management U [0.50]

This course takes the viewpoint of the senior financial officer of a commercial enterprise. The focus is on the management of cash, accounts receivable, inventories and capital assets, as well as on the sourcing of funds through short-term liabilities, long-term debt and owners' equity.

Prerequisite(s): AGBU*6180

Restriction(s): Distance MBA students only.

AGBU*6300 Problems in Agribusiness - Summer Residency S [0.50]

A seven-day intensive session delivered at the University of Guelph, that focuses on the development of a management plan for an agribusiness organization through the use of case studies, seminars and speakers.

AGBU*6400 Food and Agribusiness Strategic Management U [0.50]

An advanced course requiring the application of conceptual, analytical, problem identification, and problem solving skills to develop organizational strategy. Food, agribusiness and other cases are used to explore the development and implementation of strategy and to assess the dynamic relationship between strategy and competition.

Restriction(s): Distance MBA students only.

AGBU*6510 Managing Price Risk W [0.50]

The course deals with the use of futures, options and other instruments for marketing, risk management and investment purposes. Emphasis is placed on the development and implementation of strategy and to assess the dynamic relationship between strategy and competition.

Restriction(s): Distance MBA students only.

AGBU*6520 Marketing Research and Analysis F [0.50]

Students will learn the fundamentals of marketing research and analysis as they apply to decision-making. The key focus of the course will be on developing a marketing plan for a real product/service. Input into the marketing plan will come from actual marketing research information collected, analyzed and interpreted by participants. Students will develop and implement background-marketing research that can be used at the conclusion of the course to build the marketing plan. In addition to developing general research skills, special topics such as perceptual mapping for positioning, conjoint analysis for pricing and clustering for segmentation will be examined.

AGBU*6530 Management Issues in Agriculture W [0.50]

This course discusses the application of general management concepts and practices to agricultural production. Topics include strategies farm managers can use to assess performance, set direction, build capabilities and implement change. All readings and cases are taken from the viewpoint of an owner-operator of a commercial farming operation.
AGBU*6610 Dairy Production Management W [0.50]
This course deals with the specifics of applying business management strategies to farm operations. Trends facing the North American dairy industries and challenges faced by individual producers are examined. Relevant and practical operating decision-making and management skills are considered with the intent of maximizing the profitability and reducing the risk of the individual firm.

AGBU*6620 Swine Production Management W [0.25]
This course deals with the specifics of applying business management strategies to farm operations. Trends facing the North American swine industries and challenges faced by individual producers are examined. Relevant and practical operating decision-making and management skills are considered with the intent of maximizing the profitability and reducing the risk of the individual firm.

AGBU*6700 Special Topics in Agribusiness Management U [0.50]
A special topic course focusing on relevant business issues or problems allowing students to enhance and further develop expertise in specific areas of management. May be offered to students in any semester.

AGBU*6800 Directed Research Project U [0.50]
A management research project leading to a referenced report focusing on selected topics of interest in agricultural business.

Hospitality and Tourism Management

HTM*6050 Management Communications F [0.50]
Examination of the theory, function and practice of managerial communications with particular emphasis on developing communication strategies and skills.

HTM*6110 Foundations of Leadership F [0.50]
This course will enhance students' interpersonal skills, as well as their knowledge and understanding of the theory and research underlying effective team management and collaboration on an organization. Experiential approaches are used to enhance managerial skills.

HTM*6120 Special Topics in Hospitality Organizational Behaviour F,W,S [0.50]
Advanced course for those specializing in organizational behaviour. Deals with in-depth analysis of industry organizational behaviour, management of current and future problems, reorganizations, corporate cultures, multi-cultural organizations, and ethics.

HTM*6130 Special Topics in Hospitality Organizational Behaviour F,W,S [0.50]
Advanced course for those specializing in organizational behaviour. Deals with in-depth analysis of industry organizational behaviour, management of current and future problems, reorganizations, corporate cultures, multi-cultural organizations, and ethics.

HTM*6140 Foundations of Human Resource Management W [0.50]
This course examines the essential human resource management functions of planning, staffing, employee development, compensation, health and safety, labour relations, and legal compliance, in a variety of organizational settings.

HTM*6150 Research Methods for Managers F [0.50]
Students learn to formulate a research problem, undertake a literature review, and to select and use appropriate quantitative and qualitative techniques for the collection and analysis of relevant data. The course also promotes the use of the World Wide Web as an information resource.

HTM*6170 Hospitality and Tourism Economics and Policy U [0.50]
The course introduces participants to economic and government policy issues that impact the hospitality and tourism industry. The course provides a strategic framework for understanding the macroeconomic and policy environment that is shaped by multilateral institutions, government and the hospitality and tourism industry.

HTM*6190 Hospitality and Tourism Marketing F [0.50]
Analysis and application of marketing foundations through integration of marketing variables with real-world situations and in-depth analysis of strategic marketing issues.

AGBU*6320 Special Topics in Hospitality Marketing F,W,S [0.50]
An advanced course for those specializing in marketing. Deals with marketing theories, models, and specific subsets of marketing such as pricing, consumer and industrial-buyer behaviour, distribution, services, and service-delivery concepts.

HTM*6330 Special Topics in Hospitality Marketing F,W,S [0.50]
An advanced course for those specializing in marketing. Deals with marketing theories, models, and specific subsets of marketing such as pricing, consumer and industrial-buyer behaviour, distribution, services, and service-delivery concepts.

HTM*6510 Hospitality and Tourism Revenue Management U [0.50]
This course discusses revenue maximization strategies and tactics that improve the profitability of businesses that work in fixed capacity environments, face time-varied demand, their product is homogeneous and their cost structure reflects a high proportion of fixed and a low proportion of variable cost items.

HTM*6530 Safety, Security and Risk Assessment in HTU U [0.50]
This course profiles legal and managerial strategies, principles and operational procedures to minimize safety and security risks faced by the hospitality and tourism industries. Risk analysis and management, crisis management, liability management, and industry specific law provide the foundation for this course.

HTM*6550 Managing Service Quality U [0.50]
A holistic and interdisciplinary approach is used to explore the principles of service management. The course will enhance participants' understanding of what actually constitutes quality, the nature of service, and strategies for improving it.

HTM*6590 Organizational Theory and Design U [0.50]
Core concepts in organizational theory and their interrelationships as well as concepts such as group decision making and intragroup and intergroup dynamics are explored.

HTM*6600 International Tourism and Tourism Marketing F [0.50]
Analyzes the social, political and economic impacts of tourism on the world scene, as well as the global integration of tourism in today's society.

HTM*6620 Special Topics in Tourism F,W,S [0.50]
Advanced course for those specializing in tourism. Deals with theories of tourism generators, multi-markets, tourism multipliers, current and future trends, regulatory environments, and distributions systems.

HTM*6630 Special Topics in Tourism F,W,S [0.50]
Advanced course for those specializing in tourism. Deals with theories of tourism generators, multi-markets, tourism multipliers, current and future trends, regulatory environments, and distributions systems.

HTM*6700 Hospitality and Tourism Strategic Management U [0.50]
An integrative course which draws together the conceptual theories and models of the graduate program core. Utilizes conceptual, analytical, problem identification, and problem solving skills.

HTM*6750 Hospitality and Tourism Revenue Management U [0.50]
This course applies operations research theory and practices to management problem solving and decision-making. The focus is on modelling service and product delivery systems and major emphasis is placed on managerial problems in hospitality, tourism, and food and agribusiness organizations.

HTM*6900 Major Paper F,W,S [0.50]
A detailed critical review of an area of study specific to the specialization of students in the MBA by course work and major paper option.
Capacity Development and Extension

The Capacity Development and Extension Program offers courses of study leading to the MSC degree. Faculty strengths and academic resources support the field of Capacity Development and Extension.

Administrative Staff

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James P. Mahone
BSc U.S. Coast Guard Academy (Connecticut), PhD Michigan State - Professor

MSc Program

Capacity Development and Extension offers a professionally oriented program leading to the MSC degree in capacity development and extension. The program covers a broad range of topics including capacity development, interpersonal communication, communication technologies and international extension programs. A variety of learning formats are offered by the program including independent study, distance education, seminars, international courses and research colloquia.

Graduate students focus on Capacity Development and Extension. The Program offers three core courses and nine restricted electives. Other courses of interest are available in other academic units including Rural Planning and Development, and the Departments of Food, Agricultural and Resource Economics, Geography, History and Sociology and Anthropology.

Admission Requirements

The program is open to qualified graduates from a wide variety of disciplines including agriculture, home economics, sociology, communication, education, health and medicine, history, and economics. A four-year honours degree is considered as the normal and basic admission requirement. All incoming students are expected to have completed at least one third- or fourth-year-level undergraduate statistics course. Work experience in a rural area or non-urban community is considered especially useful in applying theory to practice and in identifying research needs and topics.

Students in the Capacity Development and Extension program have employment backgrounds in areas such as agricultural extension, rural and volunteer organizations, community development, education, family and consumer studies, social work, communication technology, health, international project management, and technology transfer.

Degree Requirements

A minimum of two full-time semesters of course work, or equivalent, must be completed. Thesis and Major Paper options are available.

All students enrolled in this field are required to complete a Thesis or a Major Research Paper, and a set of core courses that provide a foundation for capacity development and extension research and practice.

For the Major Paper option, these consist of:

- **CDE*6900 [1.00]** Major Research Paper
- **CDE*6070 [0.50]** Foundations of Capacity Building and Extension
- **CDE*6260 [0.50]** Research Design
- **EDRD*6000 [0.50]** Qualitative Analysis in Rural Development

**OR**

- **RPD*6380 [0.50]** Application of Quantitative Techniques in Rural Planning and Development

In addition, for the Major Paper option, students are required to complete a minimum of four (4) restricted elective courses.

For the Thesis option, these consist of:

- **CDE*6070 [0.50]** Foundations of Capacity Building and Extension
- **CDE*6260 [0.50]** Research Design
- **EDRD*6000 [0.50]** Qualitative Analysis in Rural Development

**OR**

- **RPD*6380 [0.50]** Application of Quantitative Techniques in Rural Planning and Development

In addition, for the Thesis option, students are required to complete a minimum of two (2) restricted elective courses.

Students select an advisor and a research committee who will assist them in course selection, research and thesis development.

Interdepartmental Programs

International Development Studies Collaborative Program

Capacity Development and Extension participates in the collaborative international development studies (CIDS) program. Students take a minimum of 2.5 course credits in the school and a minimum of 2.5 credits in international development studies. The MSc degree for students in this program will have the specialist designation rural extension studies: international development studies. Please consult the International Development Studies listing for a detailed description of the collaborative program including the special additional requirements for each of the participating departments.

Rural Studies PhD Program

Capacity Development and Extension participates in the PhD program in rural studies in the field of sustainable rural communities. Those faculty whose research and teaching expertise includes aspects of rural studies may serve as advisors for PhD students. For further information consult the Rural Studies listing in this calendar.

Courses

Core Courses

- **CDE*6070 Foundations of Capacity Building and Extension U [0.50]**
  - Contemporary issues and changes in rural communities and the implications for building community capacity. Students will be introduced to and examine dominant paradigms of community capacity building for meeting rural needs: Human Resources Development and Participatory Development.

- **CDE*6260 Research Design U [0.50]**
  - Provides students with abilities and knowledge to undertake, formulate and implement research in their chosen area of development. Students are expected to acquire the ability to identify research question and the appropriate designs to answer such questions.

- **CDE*6900 Major Research Paper U [1.00]**
  - Students select a topic and write a paper that does not necessarily include original data but is an analysis and synthesis of materials dealing with the topic selected.

- **EDRD*6000 Qualitative Analysis in Rural Development U [0.50]**
  - Nature and use of qualitative data collection and analysis techniques by practitioners in the planning, implementation and evaluation of rural planning and development activities in both domestic and international settings.

OR

- **RPD*6380 Application of Quantitative Techniques in Rural Planning and Development U [0.50]**
  - Analysis and application of standard quantitative, statistical and computer-based techniques utilized in rural planning and development. Problems of data collection, analysis and interpretation.

E elective Courses

- **CDE*6060 Adult Learning and Development U [0.50]**
  - Adult development through life stages; profile of adult learners; learning abilities and difficulties; learning theory as applied to adults; sociological contexts for adult learning; participation levels and barriers to participation. Various perspectives on adult learning (modernist to postmodern).

- **CDE*6190 Fundamentals of Interpersonal and Intercultural Communication U [0.50]**
  - The role of communication in interpersonal and intercultural relations in both formal and non-formal organizations. It specifically focuses on the theories and competencies that are required for communication between individuals and those within and between different cultures.

- **CDE*6290 Special Topics in Capacity Building and Extension U [0.50]**
  - Selected study topics which may be pursued in accordance with the special needs of students in the program.

- **CDE*6311 Extension Theory and Methods U [0.50]**
  - Theories, principles and practices associated with effective instruction in extension are taught. Emphasis is given to non-formal teaching-learning situations; importance of socio-economic and cultural environment; communication skills using creative and appropriate technology in the transfer of information.


<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDE*6320</td>
<td>Capacity Building for Sustainable Development U [0.50]</td>
<td>0.50</td>
<td>Learning processes enhancing human capital in civil society and the organizational and managerial capabilities that can empower communities to meet their economic, social, cultural and environmental needs. Examines development and underdevelopment and the role of non-formal education and administration in facilitation social change in peripheral regions from an interdisciplinary perspective.</td>
</tr>
<tr>
<td>CDE*6330</td>
<td>Facilitation and Conflict Management U [0.50]</td>
<td>0.50</td>
<td>Explore the theories of leadership, practice leadership skills and activities, and develop an understanding of the role facilitation and conflict management play in organizational success. Emphasizes personal individual development through practice, lecture and group discussion. Service learning through facilitation of community meetings will be part of the course.</td>
</tr>
<tr>
<td>CDE*6410</td>
<td>Readings in Capacity Building and Extension U [0.50]</td>
<td>0.50</td>
<td>A program of supervised independent study related to the student's area of concentration.</td>
</tr>
<tr>
<td>CDE*6420</td>
<td>Development Communication U [0.50]</td>
<td>0.50</td>
<td>Form of community development that utilizes communication technology in a participatory format with a political commitment to democracy and equity. Students introduced to range of technologies that are utilized in development communication (radio, video, Internet, etc.) and principles of development communication.</td>
</tr>
<tr>
<td>CDE*6690</td>
<td>Decision Making and Conflict U [0.50]</td>
<td>0.50</td>
<td>A systemic, comparative and interdisciplinary perspective, the linkage between decision processes, and conflict, both at the micro (community and interpersonal) level and at the broader macro level of structural change and globalization. Examines the theory and practice of socio-economic, cultural and political conflict in social systems and the modalities for its resolution from an interdisciplinary standpoint.</td>
</tr>
</tbody>
</table>
Chemistry

The Guelph-Waterloo Centre for Graduate Work in Chemistry and Biochemistry combines the Department of Chemistry at the University of Waterloo and the Department of Chemistry at the University of Guelph into a comprehensive and all-inclusive school of graduate chemistry and biochemistry. The members of the centre conduct research in virtually all areas of modern chemistry and biochemistry.

Professional personnel in the centre comprise those faculty members of the two departments who have been appointed as PhD advisors and have a record of recent research achievement. The centre is administered by the director and its affairs are guided by the co-ordinating committee, which consists of the director, the two departmental chairs, the two departmental graduate coordinators, two elected centre members from each campus, and one elected representative of the graduate student body from each campus. The regulations applying to graduate study in the centre meet the requirements of the graduate councils and the Senates of the two universities.

The fields of research in which theses can be written normally fall within the categories of analytical, inorganic, organic, physical, theoretical (also chemical physics) and polymer chemistry, and biochemistry. The category chosen will normally be referred to as the candidate's major. However, if a suitable topic is chosen, a candidate may pursue research which involves more than one of the categories listed above. Certain course requirements must be fulfilled both for the MSc and for the PhD. These courses are chosen in consultation with the candidate's advisory committee and the graduate officers of the centre.

Administrative Staff

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Abdelaziz Houamou
Maitrise Casablanca I, DEA, PhD Paris 7 - Associate Professor

Jacek Lipkowski
MSc, PhD, DSc Warsaw - Professor

Richard A. Manderville
BSc, PhD Queen's - Associate Professor

Mario A. Monteiro
BSc, PhD York University - Assistant Professor

Glenn H. Penner
BSc, MSc, PhD Manitoba - Associate Professor

Kathryn E. Preuss
BSc Lethbridge, PhD Waterloo - Assistant Professor

Paul A. Rowntree
BSc, MSc Waterloo, PhD, MA Princeton - Professor and Director of the Electrochemical Centre

Marcel Schlaf
Diplom (Bayerische Julius-Maximilian Universitat), PhD (Toronto) - Associate Professor

Adrian L. Schwann
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W.W.L. Tam
BSc (Hong Kong), PhD (Toronto) - Associate Professor

Daniel F. Thomas
BSc Alberta, PhD Toronto - Associate Professor

Peter Tremaine
BSc Waterloo, PhD Alberta - Professor

Nicholas P.C. Westwood
BSc, PhD Southampton - Professor and Graduate Co-ordinator

Janet M. Wood
BSc Victoria, PhD Edinburgh - Professor

Graduate Faculty from University of Waterloo

Monica Barra
BSc, PhD National Univ. of Cordoba (Argentina) - Associate Professor and Graduate Officer

Peter F. Bernath
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Jeff Z. Chen
BSc Fudan, PhD Maryland - Professor

J. Michael Chong
BSc, PhD British Columbia - Professor and Director

Thorsten Dieckmann
Dipl., Dr. rer. nat. Braunschweig - Associate Professor

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Mario Gauthier
BSc, PhD McGill - Professor

Tadeusz Gorecki
MSc, PhD (Technical University of Gdansk) - Professor

Bruce M. Greenberg
BSc California (Berkeley), PhD Colorado (Boulder) - Professor

J. Guy Guillemette
BSc, PhD Toronto - Associate Professor

John F. Holek
BSc, PhD McGill - Professor

Vassili Karanassios
BSc Thessaloniki, PhD Alberta - Professor

Holger Kleinke
BSc, MSc Westfalisiche-Universitat Munster, PhD Johannes-Gutenberg Universitat Mainz - Professor

Sonny C. Lee
BS California Institute of Technology, PhD Harvard - Associate Professor

Robert J. LeRoy
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K. Tong Leung
BSc, PhD British Columbia - Professor

Wing-Ki Liu
BSc, MSc, PhD Illinois - Professor

Qing-Bin Lu
BS Fuzhou, MS Chinese Academy of Sciences, PhD Newcastle - Assistant Professor

Frederick R.W. McCourt
BSc, PhD British Columbia - Professor

Terrance B. McMahon
BSc Alberta, PhD California Institute of Technology - Professor and Department Chair

Elizabeth M. Meiering
BSc Waterloo, PhD Cambridge - Associate Professor

Susan R. Mikkelsen
BSc (British Columbia), PhD (McGill) - Professor

Linda F. Nazar
BSc British Columbia, PhD Toronto - Professor
Admission Requirements

Applicants whose first language is not English are required to submit evidence of proficiency in the English language or pass the Test of English as a Foreign Language (TOEFL).

MSc Program

An applicant is encouraged to apply for admission to the MSc program if he/she has an honours bachelor of science degree, or the equivalent, with a minimum standing of 75% in the last two years.

MSc Co-operative Option

An applicant is encouraged to apply for admission to the MSc co-operative option if he/she has an honours bachelor of science degree, or the equivalent, with a minimum standing of 75% in the last two years from an accredited university. The co-op MSc option is not available to students who have completed a co-op program as undergraduates. These students are, however, eligible for admission to the co-op PhD program.

Degree Requirements

MSc Program

Students must successfully complete at least four semester-long graduate courses, one of which is MSc Seminar, CHEM*7940, and submit and defend an acceptable thesis.

MSc Co-operative Option

The academic requirements are the same as in the regular MSc program, but at least two of the required four semester-long courses (including CHEM*7940) must be completed during the first two semesters of study. The student will spend the following two semesters (eight months) working in an industrial or government laboratory, upon completion of which he/she must present an acceptable work report. After returning to campus, the student will complete his/her course work and research and prepare the MSc thesis.

Part-Time Course-Based MSc Program

Students who elect this option must successfully complete eight semester-long courses, including MSc Seminar, CHEM*7940, and MSc Research Project, CHEM*7970. This option is designed for students whose employment or family responsibilities allow free time for study only in the evenings.

PhD Program

Admission Requirements

Applicants whose first language is not English are required to submit evidence of proficiency in the English language or pass the Test of English as a Foreign Language (TOEFL).

PhD Program

An applicant is eligible for admission to the PhD program at the discretion of the director. In general, an applicant must possess the qualifications listed for the MSc program, together with a master of science degree comparable to those awarded by North American universities and suitable references from the institution at which the MSc degree was awarded. However, direct admission to the PhD program is available to applicants with an overall A standing in an Honours BSc degree.

A student who is registered in (GW/C)2 as a master's candidate may be permitted under certain circumstances to transfer to a PhD degree without writing an MSc thesis. The following guidelines are used in deciding whether a student will be recommended to the appropriate university authorities to transfer directly to the PhD program.

- The request must be initiated by the student no later than the end of the third semester in the MSc program. Transfers will be made no later than the fourth semester.
- The applicant should have a superior academic record at both the undergraduate and graduate level, with a first class standing and above average performance in a minimum of two graduate courses and MSc Seminar, CHEM*7940.
- The applicant must have demonstrated an oral and written communication ability appropriate for a PhD-level student, and there must be clear evidence of research productivity and promise.
- The request for direct transfer should be accompanied by supporting documentation from the advisor, the advisory committee, and another faculty member familiar with the student's research record.

PhD Co-operative Option

A student is encouraged to apply to the PhD co-operative option if he/she has an honours bachelor of science degree, or the equivalent, with a minimum overall A standing.

Degree Requirements

PhD Program

Students in the PhD program must successfully complete three semester-long courses beyond those required for the master of science degree. One of these courses will be PhD Seminar, CHEM*7950. Students must also pass an oral qualifying examination, CHEM*7960, in their major field, and submit and defend an acceptable thesis.

Students admitted directly to the PhD program from a BSc must successfully complete one semester-long course beyond those required for the master of science degree. In addition, students must also complete CHEM*7950 (Ph.D. Seminar), pass an oral qualifying examination, CHEM*7960, in their major field, and submit and defend an acceptable thesis.

PhD Co-operative Option

Students registered in the PhD program may proceed to that degree under the co-operative option. Under this option four of the six required semester-long courses (including CHEM*7950) must be completed within the first two academic semesters of study in the centre. After successful completion of these two semesters of course work, the candidate will spend three semesters (one year) working in an industrial or government laboratory. On completion of the work year, a student will be required to submit a work report which will be evaluated by the centre and the career services unit at the student's home campus. Following successful completion of the work year, the student will return to the centre to continue work on a PhD research project and complete the regular PhD requirements.

Interdepartmental Programs

Toxicology MSc/PhD Collaborative Program

The Department of Chemistry participates in the MSc/PhD program in toxicology. Professor Bunc is a member of the Toxicology Interdepartmental Group. His research and teaching expertise includes aspects of toxicology. Please consult the Toxicology listing for a detailed description of the MSc/PhD collaborative program. Students choosing this option must meet the requirements of the toxicology collaborative program, as well as those of (GW/C)2 for their particular degree program. Three toxicology courses must be completed including Advanced Topics in Toxicology, TOX*6200, and a research project must be conducted with a participating faculty member at the University of Guelph.

Courses

Except where specified, courses in the following list may be offered in any semester subject to student demand and the availability of an instructor. All courses are given an eight character code with the fifth having the following significance: 1 (inorganic), 2 (analytical), 3 (biochemistry), 4 (theoretical), 5 (physical), 6 (organic), and 7 (polymer).

Inorganic

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>CHEM*7100 Selected Topics in Inorganic Chemistry I U [0.50]</td>
<td>Discussion of specialized topics related to the research interests of members of the centre. Special topics could include, for example: bioinorganic chemistry; inorganic reaction mechanisms; synthetic methods in inorganic and organometallic chemistry; homogeneous and heterogeneous catalysis; chemistry of polynuclear compounds.</td>
</tr>
<tr>
<td>CHEM*7110 Selected Topics in Inorganic Chemistry II U [0.50]</td>
<td>Discussion of specialized topics related to the research interests of members of the centre. Special topics could include, for example: bioinorganic chemistry; inorganic reaction mechanisms; synthetic methods in inorganic and organometallic chemistry; homogeneous and heterogeneous catalysis; chemistry of polynuclear compounds.</td>
</tr>
</tbody>
</table>
Analytical

CHEM*7200 Selected Topics in Analytical Chemistry I U [0.50]
Special topics could include, for example: trace analysis using modern instrumental and spectroscopic methods; advanced mass spectrometry (instrumentation and interpretation of spectra); analytical aspects of gas and liquid chromatography.

CHEM*7210 Selected Topics in Analytical Chemistry II U [0.50]
Special topics could include, for example: trace analysis using modern instrumental and spectroscopic methods; advanced mass spectrometry (instrumentation and interpretation of spectra); analytical aspects of gas and liquid chromatography.

CHEM*7220 Selected Topics in Analytical Chemistry III U [0.50]
Special topics could include, for example: trace analysis using modern instrumental and spectroscopic methods; advanced mass spectrometry (instrumentation and interpretation of spectra); analytical aspects of gas and liquid chromatography.

CHEM*7230 Selected Topics in Analytical Chemistry IV U [0.50]
Special topics could include, for example: trace analysis using modern instrumental and spectroscopic methods; advanced mass spectrometry (instrumentation and interpretation of spectra); analytical aspects of gas and liquid chromatography.

CHEM*7240 Chemical Instrumentation U [0.50]
Instrumental components and optimum application; rudiments of design; electrical, spectral, migrational and other methods.

CHEM*7260 Topics in Analytical Spectroscopy U [0.50]
Atomic emission and absorption spectroscopy; methods of excitation and detection; quantitative applications. Molecular electronic spectroscopy; UV, visible and Raman spectroscopic methods; applications to quantitative determinations, speciation, measurements of equilibrium, etc. Sources and control of errors and interferences. Determination and description of colour.

CHEM*7270 Separations U [0.50]
Material to be covered is drawn from the following topics: diffusion; isolation of organic material from the matrix; chromatographic techniques - principles of chromatographic separation, gas (GLC, GSC), liquid (HLC, LSC, GPC, HEC), supercritical fluid (SFC) chromatographies; GC-MS, CG-FTR; electrophoresis, flow field fractionation. Prerequisites: undergraduate level course in instrumental analysis.

CHEM*7280 Electroanalytical Chemistry U [0.50]
A study of electroanalytical techniques and their role in modern analytical chemistry. The underlying principles are developed. Techniques include chromamperometry, chronocoulometry, polarography, voltammetry, chronopotentiometry, coulometric titrations, flow techniques, electrochemical sensors and chemically modified electrodes,titrations, flow techniques, electrochemical sensors and chemically modified electrodes.

Biochemistry

CHEM*7300 Proteins and Nucleic Acids U [0.50]
Determination of protein sequence and 3-dimensional structure; protein anatomy; prediction of protein structure; intermolecular interactions and protein-protein association; effects of mutation. Nucleic acid structure and anatomy; DNA and chromatin structure; RNA structure; snRNPs and ribozymes; protein-nucleic acid interactions.

CHEM*7310 Selected Topics in Biochemistry I U [0.50]
Discussion of specialized topics related to the research interests of members of the centre: for example, recent offerings have included peptide and protein chemistry, biochemical toxicology, medical aspects of biochemistry, glycolipids and glycoproteins, redox enzymes, biological applications of magnetic resonance, etc. Department of Chemistry

CHEM*7320 Selected Topics in Biochemistry II U [0.50]
Discussion of specialized topics related to the research interests of members of the centre: for example, recent offerings have included peptide and protein chemistry, biochemical toxicology, medical aspects of biochemistry, glycolipids and glycoproteins, redox enzymes, biological applications of magnetic resonance, etc. Department of Chemistry

CHEM*7330 Selected Topics in Biochemistry III U [0.50]
Discussion of specialized topics related to the research interests of members of the centre: for example, recent offerings have included peptide and protein chemistry, biochemical toxicology, medical aspects of biochemistry, glycolipids and glycoproteins, redox enzymes, biological applications of magnetic resonance, etc. Department of Chemistry

CHEM*7360 Regulation in Biological Systems U [0.50]

CHEM*7370 Enzymes U [0.50]

CHEM*7380 Cell Membranes and Cell Surfaces U [0.50]
Membrane proteins and lipids - structure and function; dynamics; techniques for their study; model membrane systems. Membrane transport. The cytoskeleton. Membrane protein biogenesis, sorting and targeting. Signal transduction across membranes. The cell surface in immune responses.

Physical/Theoretical

CHEM*7400 Selected Topics in Theoretical Chemistry I U [0.50]
Discussion of specialized topics related to the research interests of the members of the centre. Special topics could include for example: theory of intermolecular forces; density matrices; configuration interaction; correlation energies of open and closed shell systems; kinetic theory and gas transport properties; theory of the chemical bond.

CHEM*7410 Selected Topics in Theoretical Chemistry II U [0.50]
Discussion of specialized topics related to the research interests of the members of the centre. Special topics could include for example: theory of intermolecular forces; density matrices; configuration interaction; correlation energies of open and closed shell systems; kinetic theory and gas transport properties; theory of the chemical bond.

CHEM*7420 Selected Topics in Theoretical Chemistry III U [0.50]
Discussion of specialized topics related to the research interests of the members of the centre. Special topics could include for example: theory of intermolecular forces; density matrices; configuration interaction; correlation energies of open and closed shell systems; kinetic theory and gas transport properties; theory of the chemical bond.

CHEM*7430 Selected Topics in Theoretical Chemistry IV U [0.50]
Discussion of specialized topics related to the research interests of the members of the centre. Special topics could include for example: theory of intermolecular forces; density matrices; configuration interaction; correlation energies of open and closed shell systems; kinetic theory and gas transport properties; theory of the chemical bond.

CHEM*7450 Statistical Mechanics U [0.50]
Review of classical and quantum mechanics; principles of statistical mechanics; applications to systems of interacting molecules; imperfect gases, liquids, solids, surfaces and solutions.

CHEM*7460 Quantum Chemistry U [0.50]
Approximate solutions of the Schrödinger equation and calculations of atomic and molecular properties.
## CHEM*7500 Selected Topics in Physical Chemistry I U [0.50]
Discussion of specialized topics related to the research interests of the members of the centre. Special topics could include for example: principles of magnetic resonance in biological systems; collisions, spectroscopy and intermolecular forces, surface chemistry; catalysis; electroleute theory; non-electrolyte solution theory, thermodynamics of biological systems; thermodynamics.

## CHEM*7510 Selected Topics in Physical Chemistry II U [0.50]
Discussion of specialized topics related to the research interests of the members of the centre. Special topics could include for example: principles of magnetic resonance in biological systems; collisions, spectroscopy and intermolecular forces, surface chemistry; catalysis; electroleute theory; non-electrolyte solution theory, thermodynamics of biological systems; thermodynamics.

## CHEM*7520 Selected Topics in Physical Chemistry III U [0.50]
Discussion of specialized topics related to the research interests of the members of the centre. Special topics could include for example: principles of magnetic resonance in biological systems; collisions, spectroscopy and intermolecular forces, surface chemistry; catalysis; electroleute theory; non-electrolyte solution theory, thermodynamics of biological systems; thermodynamics.

## CHEM*7550 Kinetics - Dynamics U [0.50]

## CHEM*7560 Spectroscopy U [0.50]
Aspects of electronic vibrational and rotational spectroscopy of atoms, molecules, and the solid state. Relevant aspects of quantum mechanics, Dirac notation, and angular momentum will be discussed. Group Theory will be presented and its implications for spectroscopy introduced. Prerequisites: one semester-long undergraduate course in quantum mechanics or the approval of the instructor.

### Organic

## CHEM*7600 Selected Topics in Organic Chemistry I U [0.50]
Two or three topics from a range including: bio-organic chemistry; environmental organic chemistry; free radicals; heterocyclic molecules; molecular rearrangements; organometallic chemistry; photochemistry; natural products. Department of Chemistry

## CHEM*7610 Selected Topics in Organic Chemistry II U [0.50]
Two or three topics from a range including: bio-organic chemistry; environmental organic chemistry; free radicals; heterocyclic molecules; molecular rearrangements; organometallic chemistry; photochemistry; natural products. Department of Chemistry

## CHEM*7620 Selected Topics in Organic Chemistry III U [0.50]
Two or three topics from a range including: bio-organic chemistry; environmental organic chemistry; free radicals; heterocyclic molecules; molecular rearrangements; organometallic chemistry; photochemistry; natural products. Department of Chemistry

## CHEM*7630 Selected Topics in Organic Chemistry IV U [0.50]
Two or three topics from a range including: bio-organic chemistry; environmental organic chemistry; free radicals; heterocyclic molecules; molecular rearrangements; organometallic chemistry; photochemistry; natural products. Department of Chemistry

## CHEM*7640 Synthetic Organic Reactions U [0.50]
Named organic reactions and other synthetically useful reactions are discussed. The mechanism, stereochemical implications and use in organic synthesis of these reactions will be presented. Examples from the organic literature will be used to illustrate these aspects.

## CHEM*7650 Strategies in Organic Synthesis U [0.50]
The synthesis of organic compounds is discussed and emphasis is placed on the design of synthetic routes. Examples drawn from the literature are used to illustrate this synthetic planning. 
Prerequisite(s): CHEM*7640

## CHEM*7660 Organic Spectroscopy U [0.50]
Ultraviolet, infrared, resonance spectroscopy and mass spectrometry, with emphasis on applications to studies of organic molecules.

### Polymer

## CHEM*7690 Physical Organic Chemistry U [0.50]
Linear free energy relationships; substituent effects and reactive intermediates.

## CHEM*7700 Principles of Polymer Science U [0.50]
Introduction to the physical chemistry of high polymers, principles of polymer synthesis, mechanisms and kinetics of polymerization reactions, copolymerization theory, polymerization in homogeneous and heterogeneous systems, chemical reactions of polymers. Theory and experimental methods for the molecular characterization of polymers.

## CHEM*7710 Physical Properties of Polymers U [0.50]
The physical properties of polymers are considered in depth from a molecular viewpoint. Rubber elasticity, mechanical properties, rheology and solution behaviour are quantitatively treated. 
Prerequisite(s): CHEM*7700 or equivalent

## CHEM*7720 Polymerization and Polymer Reactions U [0.50]
The reactions leading to the production of polymers are considered with emphasis on emulsion and suspension polymerization and polymerization reaction engineering. Polymer degradation, stabilization and modification reactions are also considered in depth. 
Prerequisite(s): CHEM*7700 or equivalent

## CHEM*7730 Selected Topics in Polymer Chemistry I U [0.50]
Discussion of specialized topics of polymer chemistry related to the research interests of the faculty or prominent scientific visitors. Special topics could include, for example: polymer stabilization and degradation; mechanical properties; polymer principles in surface coatings; organic chemistry of synthetic high polymers; estimation of polymer properties; reactions of polymers; polymerization kinetics.

## CHEM*7740 Selected Topics in Polymer Chemistry II U [0.50]
Discussion of specialized topics of polymer chemistry related to the research interests of the faculty or prominent scientific visitors. Special topics could include, for example: polymer stabilization and degradation; mechanical properties; polymer principles in surface coatings; organic chemistry of synthetic high polymers; estimation of polymer properties; reactions of polymers; polymerization kinetics.

## CHEM*7750 Selected Topics in Polymer Chemistry III U [0.50]
Discussion of specialized topics of polymer chemistry related to the research interests of the faculty or prominent scientific visitors. Special topics could include, for example: polymer stabilization and degradation; mechanical properties; polymer principles in surface coatings; organic chemistry of synthetic high polymers; estimation of polymer properties; reactions of polymers; polymerization kinetics.

## CHEM*7760 Selected Topics in Polymer Chemistry IV U [0.50]
Discussion of specialized topics of polymer chemistry related to the research interests of the faculty or prominent scientific visitors. Special topics could include, for example: polymer stabilization and degradation; mechanical properties; polymer principles in surface coatings; organic chemistry of synthetic high polymers; estimation of polymer properties; reactions of polymers; polymerization kinetics.

## CHEM*7770 Selected Topics in Polymer Chemistry V U [0.50]
Discussion of specialized topics of polymer chemistry related to the research interests of the faculty or prominent scientific visitors. Special topics could include, for example: polymer stabilization and degradation; mechanical properties; polymer principles in surface coatings; organic chemistry of synthetic high polymers; estimation of polymer properties; reactions of polymers; polymerization kinetics.

## CHEM*7780 Selected Topics in Polymer Chemistry VI U [0.50]
Discussion of specialized topics of polymer chemistry related to the research interests of the faculty or prominent scientific visitors. Special topics could include, for example: polymer stabilization and degradation; mechanical properties; polymer principles in surface coatings; organic chemistry of synthetic high polymers; estimation of polymer properties; reactions of polymers; polymerization kinetics.

## CHEM*7790 Selected Topics in Polymer Chemistry VII U [0.50]
Discussion of specialized topics of polymer chemistry related to the research interests of the faculty or prominent scientific visitors. Special topics could include, for example: polymer stabilization and degradation; mechanical properties; polymer principles in surface coatings; organic chemistry of synthetic high polymers; estimation of polymer properties; reactions of polymers; polymerization kinetics.

## CHEM*7800 Selected Topics in Polymer Chemistry VIII U [0.50]
Discussion of specialized topics of polymer chemistry related to the research interests of the faculty or prominent scientific visitors. Special topics could include, for example: polymer stabilization and degradation; mechanical properties; polymer principles in surface coatings; organic chemistry of synthetic high polymers; estimation of polymer properties; reactions of polymers; polymerization kinetics.
### CHEM*7810 Selected Topics in Polymer Chemistry IX U [0.50]
Discussion of specialized topics of polymer chemistry related to the research interests of the faculty or prominent scientific visitors. Special topics could include, for example: polymer stabilization and degradation; mechanical properties; polymer principles in surface coatings; organic chemistry of synthetic high polymers; estimation of polymer properties; reactions of polymers; polymerization kinetics.

### CHEM*7820 Selected Topics in Polymer Chemistry X U [0.50]
Discussion of specialized topics of polymer chemistry related to the research interests of the faculty or prominent scientific visitors. Special topics could include, for example: polymer stabilization and degradation; mechanical properties; polymer principles in surface coatings; organic chemistry of synthetic high polymers; estimation of polymer properties; reactions of polymers; polymerization kinetics.

### Research

#### CHEM*7940 MSc Seminar U [0.50]
A written literature review and research proposal on the research topic will be presented and defended in a 30-minute public seminar. This requirement is to be completed by all thesis-option MSc students within two semesters of entering the program.

#### CHEM*7950 PhD Seminar U [0.00]

#### CHEM*7960 Comprehensive Examination U [0.00]
PhD students are required to take an oral examination in their major field. The specific content and format are specified by a centre examining committee. The examination must be first attempted no later than eight months after entering the regular PhD program. For co-op PhD students, the examination must be first attempted no later than four months after their return from the work year.

#### CHEM*7970 Research Project (MSc) U [0.50]
An experimental project normally based on the CHEM*7940 research proposal, supervised by the advisor, taking three to four months to complete. This project may be completed at any time during the student's program, but it must follow CHEM*7940. A written report is required, and a seminar based on the content of the report will be presented. The report must be completed as per the project/thesis guidelines of the University campus on which the student is registered. This course normally will follow the course CHEM*7940 MSc Seminar.

#### CHEM*7980 MSc Thesis U [0.00]

#### CHEM*7990 PhD Thesis U [0.00]
Clinical Studies

The Department of Clinical Studies offers graduate programs leading to MSc and DVSc degrees and the graduate diploma.

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J. Paul Woods
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Anthony Yu
BSc, DVM Guelph, MS Auburn, Dipl. ACVD - Associate Professor

MSc Program

The MSc program provides focused research training in areas related to veterinary medicine. Research projects may examine aspects of clinical practice or concepts but are not considered discipline or specialty training. Candidates are accepted based on adequate background preparation and availability of an advisor in the area of interest. Applicants should contact potential faculty advisors with established research programs listed in the department website.

Admission Requirements

Candidates must have either an honours baccalaureate degree or a DVM degree; licensure to practice veterinary medicine in Ontario is not required.

Degree Requirements

Candidates are required to carry out an independent experimental study and produce a thesis. Three graduate level courses are required.

DVSc Program

The DVSc degree is offered in large animal surgery, small animal surgery, large animal medicine, small animal medicine, anaesthesiology, cardiology, neurology, ophthalmology, and radiology, depending upon availability. The program provides advanced academic preparation in both clinical training and research and is a unique post-professional doctoral-level degree. The DVSc differs from PhD training by emphasizing the development of both research and applied skills in the various areas of clinical specialization, leading to specialty Board certification.

The DVSc is currently an interdepartmental program and receives input from all academic departments in the Ontario Veterinary College (OVC): Biomedical Sciences, Clinical Studies, Pathobiology and Population Medicine.

Admission Requirements

A doctor of veterinary medicine (DVM) or equivalent which would allow the applicant to be eligible for licensure to practice veterinary medicine in Ontario; or a doctor of veterinary medicine (DVM) or equivalent degree plus either an acceptable graduate diploma or an acceptable MSc or PhD degree with a high 'B' academic average. Students so admitted may be granted residency credit for up to two semesters in the DVSc program.

Degree Requirements

Candidates are required to develop investigative skills in their chosen area of specialization by carrying out an original study, generally related to animal health. The results of the research must make a significant contribution to the candidate's area of specialization and be written up as a thesis. Five graduate level courses are required.

Graduate Diploma Program

The diploma program in clinical studies was introduced to provide appropriate postgraduate discipline training for veterinarians who wish to improve their expertise in a specific area. It entails a full-time three-semester program for candidates who are veterinarians with limited time for graduate study but who desire to upgrade their knowledge and skills. The program requires the completion of formal graduate courses and extensive participation in the care of animals admitted to the Veterinary Teaching Hospital.

Clinical instruction is done using a service team concept, wherein a graduate diploma student interacts with DVSc students and faculty advisors. It is expected that graduates will return to private practice with enhanced clinical skills, or progress into MSc or internship programs.

This program provides the knowledge base so that foreign graduate students are able to, as appropriate, progress to the MSc or DVSc programs on an equal footing with North American graduate students who have completed a formal internship or equivalent clinical training.
Candidates are accepted based on adequate background preparation and availability of an advisor in the area of interest. Applicants should contact potential faculty advisors listed in the department website. This program is not intended to upgrade general knowledge to North American standards nor is this program intended to prepare foreign graduates for national board exams.

**Admission Requirements**

Admission to a postgraduate diploma program as a regular student may be granted, on recommendation of the department, to the holder of a recognized DVM degree (or equivalent) with at least ’B-’ standing during the final two years of study.

**Diploma Requirements**

The student is assigned an advisor who is responsible for the planning and regular review of the program of the candidate. A thesis is not required. Both undergraduate and graduate courses may be taken and, when appropriate for the student, a review manuscript suitable for publication in a refereed scientific journal is prepared. For some students, a heavier course load is substituted for the manuscript requirement.

**Courses**

**Medicine**

**CLIN*6010 Clinical Medicine F [0.50]**

These are in-service clinical training courses based on case material presented to the student in the Veterinary Teaching Hospital. Under supervision, the student is expected to take primary responsibility for case management including decisions related to diagnosis, therapy and client/referring veterinarian communications. Case material studied in each course reflects a different clinical subspecialty commonly occurring in the fall (F), winter (W), and summer (S) semesters respectively.

**CLIN*6030 Clinical Medicine W [0.50]**

These are in-service clinical training courses based on case material presented to the student in the Veterinary Teaching Hospital. Under supervision, the student is expected to take primary responsibility for case management including decisions related to diagnosis, therapy and client/referring veterinarian communications. Case material studied in each course reflects a different clinical subspecialty commonly occurring in the fall (F), winter (W), and summer (S) semesters respectively.

**CLIN*6031 Clinical Medicine S [0.50]**

These are in-service clinical training courses based on case material presented to the student in the Veterinary Teaching Hospital. Under supervision, the student is expected to take primary responsibility for case management including decisions related to diagnosis, therapy and client/referring veterinarian communications. Case material studied in each course reflects a different clinical subspecialty commonly occurring in the fall (F), winter (W), and summer (S) semesters respectively.

**CLIN*6190 Neurology F [0.50]**

Basic principles of lesion localization in the domestic species with discussions of diagnostic problems in veterinary neurology. Offered alternate years.

**CLIN*6200 Concepts and Application of Infection Control U [0.50]**

This course will involve principles of infection control in veterinary hospitals, drawing heavily from information from human medicine and evaluating human information in a veterinary context.

**CLIN*6380 Electrocardiography in Domestic Animals F,W,S [0.50]**

This course will deal with the study of the electrocardiography of the cat, dog, cow and horse. Students will review the mechanisms of arrhythmogenesis and the role of anti-arrhythmic agents in the control of arrhythmogenesis.

**CLIN*6550 Small Animal Internal Medicine I F [0.50]**

This is a graduate course designed for DVSs students and residents pursuing further study in the area. The basis of the course is the acquisition and application of knowledge of the pathophysiologic mechanisms of disease. Subject areas to be addressed may include: cardiovascular disease, respiratory disease and acid-base-electrolyte abnormalities.

**CLIN*6560 Small Animal Internal Medicine II W [0.50]**

A continuation of Small Animal Internal Medicine I. Subject areas to be addressed may include: endocrine diseases, pharmacodynamics, renal disease and neurologic disease.

**CLIN*6570 Large Animal Internal Medicine I S [0.50]**

Advanced study in general medicine and the pathophysiologic principles of disorders of the gastrointestinal and urinary systems in ruminants, swine and horses. Offered every third year.

**CLIN*6580 Large Animal Internal Medicine II S [0.50]**

Advanced study in general medicine and the pathophysiologic principles of disorders of the cardiovascular, respiratory and musculo-skeletal systems of ruminants and horses. Offered every third year.

**CLIN*6590 Large Animal Internal Medicine III S [0.50]**

Advanced study in general medicine and the pathophysiologic principles of neonatal disorders and disorders of the nervous system, skin and general systemic disorders. Offered every third year.

**CLIN*6680 Readings in Cardiology I F,W,S [0.50]**

Original articles, review articles and textbook chapters dealing with the most recent concepts of pathophysiology, diagnostic procedures and therapeutic advancements will be reviewed, analyzed and discussed.

**CLIN*6690 Readings in Cardiology II F,W,S [0.50]**

Readings in Cardiology II will be a continuation of the format of Readings in Cardiology I with further readings in clinical cardiology.

**Surgery**

**CLIN*6170 Clinical Surgery F [0.50]**

These are in-service clinical training courses based on case material presented to the student in the Veterinary Teaching Hospital. Under supervision, the student is expected to take primary responsibility for case management including decisions related to diagnosis, therapy and client/referring veterinarian communications. Case material studied in each course reflects a different clinical subspecialty occurring in fall (F), winter (W) and summer (S) semesters respectively. The student is required to prepare a paper for publication in a refereed peer review journal based on clinical case material presented to the teaching hospital. As an alternative, the paper can be an in-depth review article on a clinically relevant topic.

**CLIN*6180 Clinical Surgery W [0.50]**

These are in-service clinical training courses based on case material presented to the student in the Veterinary Teaching Hospital. Under supervision, the student is expected to take primary responsibility for case management including decisions related to diagnosis, therapy and client/referring veterinarian communications. Case material studied in each course reflects a different clinical subspecialty occurring in fall (F), winter (W) and summer (S) semesters respectively. The student is required to prepare a paper for publication in a refereed peer review journal based on clinical case material presented to the teaching hospital. As an alternative, the paper can be an in-depth review article on a clinically relevant topic.

**CLIN*6181 Clinical Surgery S [0.50]**

These are in-service clinical training courses based on case material presented to the student in the Veterinary Teaching Hospital. Under supervision, the student is expected to take primary responsibility for case management including decisions related to diagnosis, therapy and client/referring veterinarian communications. Case material studied in each course reflects a different clinical subspecialty occurring in fall (F), winter (W) and summer (S) semesters respectively. The student is required to prepare a paper for publication in a refereed peer review journal based on clinical case material presented to the teaching hospital. As an alternative, the paper can be an in-depth review article on a clinically relevant topic.

**CLIN*6270 Applied Surgical Principles U [0.25]**

General surgical principles associated with surgical and related treatment of various body systems. This is an applied course with laboratory and written components. Prerequisite: must have prior surgical training.

**CLIN*6310 Advanced Equine Veterinary Orthopaedics U [0.50]**

This course will provide the student with an in-depth understanding of orthopaedic practice and will facilitate revision of materials to prepare board certification. 

Prerequisite(s): DVM or BSc.

**CLIN*6600 Equine Soft Tissue Surgery I F,W,S [0.50]**

Based on required reference reading, every other week discussion will cover advanced soft tissue procedures performed in equine surgery. Guest lectures on selected topics will be presented. Laboratory will be given.

**CLIN*6610 Equine Soft Tissue Surgery II F,W,S [0.50]**

Based on required reference reading, every other week discussion will cover advanced soft tissue procedures performed in equine surgery. Guest lectures on selected topics will be presented. Laboratory will be given.

**CLIN*6620 Ruminant Surgery W [0.50]**

Through lectures/seminars, medical and surgical laboratories, and detailed case discussions, this course provides practical experience in ruminant medical, radiological and surgical procedures and in problem-solving related to ruminant practice.

**CLIN*6700 Pathophysiology in Small Animal Surgery I F,W,S [0.50]**

Based on required reference reading, weekly discussions will cover the disease mechanisms involved in medical problems commonly encountered in small animal surgical practice. Guest lectures on selected topics will be presented.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLIN*6710</td>
<td>Pathophysiology in Small Animal Surgery II</td>
<td>F,W,S [0.50]</td>
<td>Based on required reference reading, weekly discussions will cover the disease mechanisms involved in medical problems commonly encountered in small animal surgical practice. Guest lectures on selected topics will be presented.</td>
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<tr>
<td>Anesthesiology</td>
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<tr>
<td>CLIN*6420</td>
<td>Anesthesiology I S [0.50]</td>
<td></td>
<td>A course in advanced veterinary anesthesia and allied topics such as fluid, acid-base, and electrolyte balance, shock therapy, and cardio pulmonary resuscitation.</td>
</tr>
<tr>
<td>CLIN*6440</td>
<td>Anesthesiology II F,W,S [0.50]</td>
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<td>A discussion, reading and investigative course on research methods in comparative anesthesiology.</td>
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<tr>
<td></td>
<td>Prerequisite(s): CLIN*6420 is normally a prerequisite</td>
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<tr>
<td>Radiology</td>
<td></td>
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<tr>
<td>CLIN*6330</td>
<td>Advanced Principles of Diagnostic Imaging U</td>
<td>U [0.50]</td>
<td>This course is intended for students pursuing a career in veterinary radiology. Using a lecture-discussion format, the science of x-ray production and the fundamentals of other diagnostic imaging modalities will be presented. The specific applications of these techniques to research and clinical situations will be investigated.</td>
</tr>
<tr>
<td>CLIN*6350</td>
<td>Advanced Radiology I W [0.50]</td>
<td></td>
<td>Radiographic changes seen in diseases of the thorax and abdomen are demonstrated by using radiographs. Contrast and special studies are included where applicable.</td>
</tr>
<tr>
<td>CLIN*6370</td>
<td>Advanced Radiology II F [0.50]</td>
<td></td>
<td>A continuation of CLIN*6350, covering radiographic abnormalities of the neurological and skeletal systems.</td>
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<tr>
<td>General</td>
<td></td>
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<tr>
<td>CLIN*6900</td>
<td>Clinical &quot;Grand Rounds&quot; Seminar F-W [0.25]</td>
<td></td>
<td>This course allows each participant the opportunity to present a clinical case to colleagues in the veterinary school. The topic must be approved by the course co-ordinator. The oral presentation will be evaluated, as will the written presentation, which should be in a form suitable for submission to a veterinary journal.</td>
</tr>
<tr>
<td>CLIN*6920</td>
<td>Veterinary Clinical Practice I F [0.50]</td>
<td></td>
<td>These are in-service clinical training courses for intern/graduate-diploma students based on case material presented to the Veterinary Teaching Hospital. Under supervision, the intern/graduate-diploma student, as part of a service team with a faculty clinician, is expected to hone his/her diagnostic, therapeutic and surgical skills, and gain experience with animal restraint and nursing care. They will also develop a problem-oriented approach to health management and disease. Case material studied in each course reflects the clinical problems commonly occurring in the fall, winter and summer semesters respectively.</td>
</tr>
<tr>
<td>CLIN*6930</td>
<td>Veterinary Clinical Practice II W [0.50]</td>
<td></td>
<td>These are in-service clinical training courses for intern/graduate-diploma students based on case material presented to the Veterinary Teaching Hospital. Under supervision, the intern/graduate-diploma student, as part of a service team with a faculty clinician, is expected to hone his/her diagnostic, therapeutic and surgical skills, and gain experience with animal restraint and nursing care. They will also develop a problem-oriented approach to health management and disease. Case material studied in each course reflects the clinical problems commonly occurring in the fall, winter and summer semesters respectively.</td>
</tr>
<tr>
<td>CLIN*6940</td>
<td>Veterinary Clinical Practice III S [0.50]</td>
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<td>These are in-service clinical training courses for intern/graduate-diploma students based on case material presented to the Veterinary Teaching Hospital. Under supervision, the intern/graduate-diploma student, as part of a service team with a faculty clinician, is expected to hone his/her diagnostic, therapeutic and surgical skills, and gain experience with animal restraint and nursing care. They will also develop a problem-oriented approach to health management and disease. Case material studied in each course reflects the clinical problems commonly occurring in the fall, winter and summer semesters respectively.</td>
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<tr>
<td>CLIN*6950</td>
<td>Special Topics in Clinical Studies F,W,S [0.50]</td>
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</tbody>
</table>
Computing and Information Science

The Department of Computing and Information Science offers a program of study leading to the MSc in Applied Computer Science and PhD in Computer Science degrees.

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Stefan C. Kremer
BSc. Hons. Guelph, Ph.D. Alberta - Associate Professor

Xining Li
BSc, MSc Nanjing, PhD Calgary - Professor

Qusay H. Mahmoud
BSc, MSc New Brunswick, PhD Middlesex - Assistant Professor

Jay C. Majithia
BSc London, MEng, PhD McMaster - Professor Emeritus

Pascal Matsakis
BSc, MSc, PhD Paul Sabatier (France) - Associate Professor

Judith R. McCuaig
BEd, BSc, MS, PhD Saskatchewan - Assistant Professor

Blair Nonnecke
BSc, MSc Guelph, PhD South Bank - Assistant Professor

Charlie F. Obimbo
MSc Kiev, PhD New Brunswick - Assistant Professor

Joseph Sawada
BSc, PhD Victoria (British Columbia) - Assistant Professor

Fei Song
BSc Jinlin (China), MSc Academia Sinica (China), PhD Waterloo - Associate Professor

Deborah A. Stacey
BSc Guelph, MA, MSc, PhD Waterloo - Associate Professor and Chair

David A. Swayne
BSc Waterloo, MA York, PhD Waterloo - Professor

Fangju Wang
BE Changsha, MSc Peking, PhD Waterloo - Professor

Mark Wineberg
BSc Toronto, MSc, PhD Carleton - Assistant Professor

Michael A. Wirth
BSc New England (Aust.), MSc Manitoba, PhD RMIT Melbourne - Assistant Professor

Yang Xiang
BSs, MSc BUAA (Beijing), PhD UBC - Professor

MSc in Applied Computer Science Program

The MSc program emphasizes research that can potentially contribute to industry and government. Interaction with other disciplines is encouraged. The fields of study offered by the program are: (1) parallel and distributed computing, (2) interactive software environments, and (3) artificial intelligence. Research in distributed systems includes distributed databases, VLSI design automation, computer architecture and networks, and parallel processing. Research in interactive software environments includes human-computer interaction, user-interface software and hypertext. Research in artificial intelligence includes uncertainty management, knowledge acquisition, expert systems, image processing, neural networks and pattern recognition. Applied research is carried out in areas such as information management, including geographical information systems, statistical databases, and office information systems.

Admission Requirements

Most available spaces are filled in March for entry the following September. A limited number of applicants are accepted in October for entry the following January. Prospective students should check the department website http://www.cis.uoguelph.ca/ for admission procedures and deadlines.

General Requirements

To be considered for admission, applicants must have a four-year honours degree in computer science, or a four-year honours degree in another discipline with a minor in computer science. Applicants must meet the minimum admission requirements of both the university and the department, including at least a 75% average during the previous two years of full-time university study for a degree.

Course Requirement

Entrants who do not have a four-year honours degree in computer science from a recognized university are expected to have previously taken 12 relevant courses from University of Guelph (or equivalent courses from other recognized universities):

(A) Seven prescribed courses:
- An introductory programming course (like CIS*1500).
- An intermediate programming course (like CIS*2500).
- An object-oriented programming course (like CIS*2430).
- A software systems development course (like CIS*2750).
- A course on data structures (like CIS*2520).
- A course on discrete structures (like CIS*1910 or CIS*2910).
- A mathematics course.

(B) Three core courses at the second-year or higher level selected from the following:
- A course on hardware and/or assembly language (like CIS*2030).
- A course on digital systems (like CIS*3120).
- A course on simulation and/or modelling (like CIS*2460).
- A database course (like CIS*3530).
- An operating systems course (like CIS*3110).
- A computer algorithms course (like CIS*3490).
- A course on automata theory (like CIS*3620).
- A statistics course.

(C) Two elective courses at the third-year or higher level:
These courses should be related to the applicant's proposed research area. They can be from a discipline other than computing and information science if deemed relevant by the proposed supervisor.

Applicants who meet requirements (A) and (C) but who do not meet requirement (B) may be granted provisional admission, i.e., they may be granted admission with the provision that they take specified courses within a specified time and achieve grades above a specified threshold.

English Proficiency

The TOEFL is required of all applicants whose first language is not English. For the Internet-Based TOEFL the applicant's overall score should be at least 89, with no individual component less than 21. For the Computer-Based TOEFL the score should be at least 250, and for the Paper-Based TOEFL it should be at least 600. The TOEFL requirement may be waived in exceptional circumstances only (e.g., applicants who have studied full-time for two years in a country where English is the native language AND in a university where English is the language of instruction).

Degree Requirements

Degree requirements include a technical communication and research methodology course (CIS*6890), at least four other graduate-level courses, a research seminar and a master's thesis. There is no qualifying exam or second-language requirement. As a complement to the information below, the CIS Departmental Handbook for Graduate Students and other documents are available on the department website http://www.cis.uoguelph.ca

Duration of the Program

Heavy emphasis is placed on the thesis, which usually requires at least two semesters. Students should plan on spending at least four full-time semesters in the program assuming adequate preparation for graduate work. Normally, students are expected to fulfill all the requirements in six semesters.

Advisory Committee

Each MSc candidate conducts thesis research by working closely with a thesis advisor. The advisor is a member of the CIS graduate faculty who provides academic guidance and interacts regularly with the student. Moreover, the student is required to have an Advisory Committee consisting of at least two graduate faculty members. The student's advisor chairs the committee. Graduate faculty members from other academic units can sit in the committee.

Course Requirement
An MSc student is required to take CIS*6890 and at least four other graduate courses. Of these four courses, at least two should be outside of the student's thesis topic area. This area and the courses which fall outside of this area are identified by the student's advisor and Advisory Committee. In exceptional cases, one graduate course requirement may be met by an approved 0.5-credit graduate course from another department or by two approved 400-level 0.5-credit courses which have not already been taken for credit. At most one reading course (CIS*6660) can count towards the course requirement.

Seminar Requirement

An MSc student must give one publicly announced research seminar on his/her MSc thesis research. The student will be allocated times and dates for the seminar. It should be attended by the student's advisor and at least one other CIS faculty member of the student's Advisory Committee. The quality of the presentation is graded on a pass/fail basis. The MSc seminar requirement is intended for candidates to practice presentation and communication skills and to participate in the process of knowledge dissemination as part of the academic life.

Thesis Defence

Arrangements for the MSc thesis defence should be made at least 5 weeks prior to the anticipated date of the defence, and the student must submit his/her MSc thesis to the Advisory Committee at least 3 weeks prior to it (see the CIS Departmental Handbook for Graduate Students). The examination consists of an oral presentation by the candidate followed by questions from the Examination Committee.

PhD in Computer Science Program

The Department of Computing and Information Science offers the PhD degree in Computer Science in the fields of applied modelling, data and knowledge management, distributed computing, and natural computation as detailed below:

1. **Applied Modelling (AM):** Students working in this field will engage in research on topics such as environmental modelling, optimization algorithms, performance analysis, and simulation.

2. **Data and Knowledge Management (DKM):** Students working in this field will engage in research on topics such as bioinformatics and biocomputing, data mining and machine learning, geographic information systems, image analysis, information retrieval, relational and deductive database systems, uncertain inference and decision support systems.

3. **Distributed Computing (DC):** Students working in this field will engage in research on topics such as distributed database systems, distributed systems, embedded systems, multi-agent systems, mobile computing, wireless networks, and ad hoc networks.

4. **Natural Computation (NC):** Students working in this field will engage in research on topics such as genetic algorithms and neural networks.

Admission Requirements

Most spaces are filled in March for entry the following September, and in October for entry the following January. Prospective students should check the department website http://www.cis.uoguelph.ca/ for admission procedures and deadlines.

General Requirements

Admission to the PhD program in CIS will normally require a recognized master's degree in Computer Science or a closely related discipline obtained with high academic standing. Students are expected to have previously studied the following areas in Computer Science:

- Advanced Programming
- Computer Architecture
- Data Structures
- Operating Systems
- Databases
- Software Engineering
- Discrete Mathematics
- Algorithms
- Computer Networks

and the following areas in Mathematics and Statistics:

- Calculus
- Linear Algebra
- Probability and Statistics
- Numerical Analysis

Students who lack sufficient breadth may be required to complete specific courses as a condition of admission. Students entering the program are expected to have demonstrated good research potential, an ability to critically evaluate experimental or theoretical results, and strong communication skills. Evidence for these are normally provided by scholarly publications during and immediately following the master's degree.

English Proficiency

The TOEFL is required of all applicants whose first language is not English. For the Internet-Based TOEFL, the applicant's overall score should be at least 89, with no individual component less than 21. For the Computer-Based TOEFL the score should be at least 250, and for the Paper-Based TOEFL it should be at least 600. The TOEFL requirement may be waived in exceptional circumstances only (e.g., applicants who have studied full-time for two years in a country where English is the native language AND in a university where English is the language of instruction).

GRE Tests

Students who have obtained a Masters degree from a university outside of Canada are required to supply GRE scores (GRE General and/or GRE Subject in CS). Applicants with high GRE scores will be considered favourably in the admission process.

Admission without an MSc Degree

A student who has achieved excellent standing in an honours Computer Science degree (or an equivalent 4-year CS degree) and who wishes to proceed to doctoral study may enrol, in the first instance, in the MSc program. If the student achieves a superior academic record and shows a particular aptitude for research, the student may be transferred into the PhD program without completing the MSc degree. The application for transfer must be made between the end of the second semester and the end of the fourth semester. A student who has completed an honours Computer Science degree (or an equivalent 4-year CS degree) may apply for direct admission to the PhD program. The successful applicant must have an outstanding academic record, breadth of knowledge in Computer Science, demonstration of research promise, and strong letters of recommendation.

Transfer From Another PhD Program

A student who wishes to transfer from another closely related PhD program at the University of Guelph into the CIS PhD program should submit:

- a program transfer application form
- transcripts from all past programs
- a written description of the progress in the previous program including copies of qualifying examination documents or thesis proposal where available.

Part-Time Study

Students may not enter the CIS PhD program as part-time. A full-time PhD student may apply for part-time studies only after the minimum duration for the degree has been completed. The application will not be granted unless the candidate has completed the course requirements and the thesis research is well established.

Degree Requirements

Once a student has been admitted to the PhD program, the following components are required for the successful completion of the PhD degree:

- Completing the minimum specified duration of the program.
- Completing the Technical Communication and Research Methodology course CIS*6890 (unless the student has taken an equivalent course in the MSc program) and at least four other graduate courses, with an overall average of at least 70%.
- Students who are admitted without an appropriate MSc are required to take CIS*6890 and at least eight other graduate courses.
- Satisfying the breadth requirement.
- Completing the seminar requirement.
- A successfully completed Qualifying Examination.
- An accepted thesis and the successful completion of a final oral examination.

As a complement to the information below, the CIS Departmental Handbook for Graduate Students and other documents are available on the department website http://www.cis.uoguelph.ca/?=graduate#forms

Duration of the Program

At least 5 semesters of full-time study must be completed in the doctoral program following completion of a recognized master's degree in Computer Science or a related discipline. At least 7 semesters are required for those who are permitted to proceed from the honours baccalaureate without completing a master's degree. The actual length of the program depends on the academic preparation of the student and the choice of research topic. A typical PhD student (after an MSc) is expected to complete the program in 12 semesters.

Advisory Committee

Each PhD candidate conducts thesis research by working closely with a thesis advisor. The advisor is a member of the CIS graduate faculty who provides academic guidance and interacts regularly with the student. Moreover, the student is required to have an Advisory Committee containing no fewer than three members of the graduate faculty (in the selection of whom the student normally participates). The student's advisor chairs the committee. At least one of the committee members must be from another department.

Course Requirement

A PhD student, following the completion of a recognized master's degree in Computer Science or related discipline, is required to take CIS*6890 (unless the student has taken an equivalent course in the MSc program) and at least four other graduate courses. Of these four courses, at most one may be co-listed (that is, a combined graduate/undergraduate course), at most one may be a reading course CIS*6660 and at most one may be taken from departments other than CIS.
A PhD student admitted without an appropriate MSc is required to take CIS*6890 and at least eight graduate courses. Out of these eight courses, at most two may be co-listed, at most two may be reading courses CIS*6660, and at most two may be taken from departments other than CIS.

**Breadth Requirement**

For breadth requirement purposes, the subject matter of computer science is divided into three broad categories, and each category is subdivided into two to three areas:

**Systems (category S)**
- Software Engineering (area S1)
- Programming Languages (area S2)
- Computer Architecture and System Software (area S3)

**Mathematics of Computation (category M)**
- Algorithms and Complexity (area M1)
- Scientific and Symbolic Computing (area M2)

**Applications (category A)**
- Artificial Intelligence (area A1)
- Databases (area A2)
- Graphics, Imaging and User Interfaces (area A3)

Each CIS graduate courses falls into one of the eight areas (see http://www.cis.uoguelph.ca/?q=graduate#forms). A student must have sufficient background in five of these areas, including at least one from each category. A student has gained sufficient background in an area if the student:  
- has taken a CIS graduate course in the area (with grade of at least 70%), or  
- has taken an equivalent course in the MSc program, or  
- has extensive industrial experience in the area, or  
- has written an MSc thesis in the area.

A student must satisfy the breadth requirement no later than the fourth semester after entering the program, otherwise the student may be required to withdraw from the program. The student, therefore, should develop a plan of study no later than the end of the second semester, and seek approval from the Graduate Coordinator (see the CIS Departmental Handbook for Graduate Students).

**Seminar Requirement**

A PhD student should give two publicly announced research seminars on his/her PhD thesis research. The first seminar must be presented prior to the Qualifying Examination. The second seminar must be presented prior to the thesis defence. Students will be allocated times and dates for seminars. Each seminar should be attended by the student’s advisor and at least one other CIS faculty member of the student’s Advisory Committee. The quality of the presentation is graded on a pass/fail basis. The PhD seminar requirement is intended for candidates to practice presentation and communication skills and to participate in the process of knowledge dissemination as part of the academic life.

**Qualifying Examination**

The student must satisfy the breadth requirement before the Qualifying Examination (QE). The QE must be completed no later than the final semester of the minimum duration for the degree (either 5 or 7 semesters). The focus of the examination is to assess the candidate's ability and promise in the selected research area. Arrangements for the QE should be made at least 6 weeks prior to the anticipated date of the QE oral presentation, and the student must submit a research proposal to the Advisory Committee at least 3 weeks prior to it (see the CIS Departmental Handbook for Graduate Students). The research proposal should contain the following items:

- A survey of appropriate background literature.
- A description of the proposed area of research.
- A statement describing the merits and scholarly value of the proposed research.
- A schedule of the research program that the candidate will follow, including a sequence of milestones and objectives.

The examination consists of an oral presentation by the candidate followed by questions from the Examination Committee.

**Thesis Defence**

Arrangements for the PhD thesis defence should be made 12 weeks prior to the anticipated date of the defence, and the student must submit his/her PhD thesis to the Advisory Committee at least 6 weeks prior to it (see the CIS Departmental Handbook for Graduate Students). The examination consists of an oral presentation by the candidate followed by questions from the Examination Committee.

**Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CIS*6020</td>
<td>Artificial Intelligence U [0.50]</td>
<td>0.50</td>
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<tr>
<td>CIS*6030</td>
<td>Information Systems U [0.50]</td>
<td>0.50</td>
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<tr>
<td>CIS*6040</td>
<td>Advanced Image Analysis U [0.50]</td>
<td>0.50</td>
</tr>
<tr>
<td>CIS*6050</td>
<td>Advanced Neural Networks: Dynamical Recurrent Networks U [0.50]</td>
<td>0.50</td>
</tr>
<tr>
<td>CIS*6060</td>
<td>Bioinformatics U [0.50]</td>
<td>0.50</td>
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<tr>
<td>CIS*6070</td>
<td>Discrete Optimization U [0.50]</td>
<td>0.50</td>
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<tr>
<td>CIS*6080</td>
<td>Genetic Algorithms U [0.50]</td>
<td>0.50</td>
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<tr>
<td>CIS*6090</td>
<td>Hardware/Software Co-design of Embedded Systems U [0.50]</td>
<td>0.50</td>
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<tr>
<td>CIS*6100</td>
<td>Parallel Processing Architectures U [0.50]</td>
<td>0.50</td>
</tr>
<tr>
<td>CIS*6120</td>
<td>Uncertainty Reasoning in Knowledge Representation U [0.50]</td>
<td>0.50</td>
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<tr>
<td>CIS*6130</td>
<td>Object-Oriented Modeling, Design and Programming U [0.50]</td>
<td>0.50</td>
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<tr>
<td>CIS*6140</td>
<td>Software Engineering U [0.50]</td>
<td>0.50</td>
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<tr>
<td>CIS*6150</td>
<td>Complexity of Parallel Computation U [0.50]</td>
<td>0.50</td>
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<tr>
<td>CIS*6160</td>
<td>Multiagent Systems U [0.50]</td>
<td>0.50</td>
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<tr>
<td>CIS*6200</td>
<td>Design Automation in Digital Systems U [0.50]</td>
<td>0.50</td>
</tr>
<tr>
<td>CIS*6320</td>
<td>Image Processing Algorithms and Applications U [0.50]</td>
<td>0.50</td>
</tr>
</tbody>
</table>

**Applications (category A)**

- Artificial Intelligence (area A1)
- Databases (area A2)
- Graphics, Imaging and User Interfaces (area A3)

Each CIS graduate course falls into one of the eight areas (see http://www.cis.uoguelph.ca/?q=graduate#forms). A student must have sufficient background in five of these areas, including at least one from each category. A student has gained sufficient background in an area if the student:

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- has taken an equivalent course in the MSc program, or
- has extensive industrial experience in the area, or
- has written an MSc thesis in the area.

A student must satisfy the breadth requirement no later than the fourth semester after entering the program, otherwise the student may be required to withdraw from the program. The student, therefore, should develop a plan of study no later than the end of the second semester, and seek approval from the Graduate Coordinator (see the CIS Departmental Handbook for Graduate Students).

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- A survey of appropriate background literature.
- A description of the proposed area of research.
- A statement describing the merits and scholarly value of the proposed research.
- A schedule of the research program that the candidate will follow, including a sequence of milestones and objectives.

The examination consists of an oral presentation by the candidate followed by questions from the Examination Committee.

**Thesis Defence**

Arrangements for the PhD thesis defence should be made 12 weeks prior to the anticipated date of the defence, and the student must submit his/her PhD thesis to the Advisory Committee at least 6 weeks prior to it (see the CIS Departmental Handbook for Graduate Students). The examination consists of an oral presentation by the candidate followed by questions from the Examination Committee.

**Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS*6000</td>
<td>Distributed Systems U [0.50]</td>
<td>0.50</td>
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</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CIS*6420</td>
<td>Soft Computing U [0.50]</td>
<td></td>
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<tr>
<td></td>
<td>Neural networks, artificial intelligence, connectionist model, back propagation, resonance theory, sequence processing, software engineering concepts.</td>
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<tr>
<td>CIS*6450</td>
<td>Software Systems Development and Integration U [0.25]</td>
<td></td>
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<tr>
<td></td>
<td>Techniques and tools used in the development of large software systems. Methods for organizing and constructing modular systems, manipulating files, an introduction to interface design, and use of databases. Software tools for managing projects, database connectivity, configuration management, and system application programmer interfaces.</td>
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<tr>
<td>CIS*6490</td>
<td>Analysis and Design of Computer Algorithms U [0.25]</td>
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<tr>
<td></td>
<td>The design and analysis of efficient computer algorithms: standard methodologies, asymptotic behaviour, optimality, lower bounds, implementation considerations, graph algorithms, matrix computations (e.g. Strassen's method), NP-completeness.</td>
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<tr>
<td>CIS*6650</td>
<td>Topics in Computer Science I U [0.50]</td>
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<tr>
<td></td>
<td>This special topics course examines selected, advanced topics in computer science that are not covered by existing courses. The topic(s) will vary depending on the need and the instructor.</td>
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<tr>
<td>CIS*6660</td>
<td>Topics in Computer Science II U [0.50]</td>
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</tr>
<tr>
<td></td>
<td>This is a reading course. Its aim is to provide background knowledge to students who need to get a head-start in their thesis research fields early during their program while no suitable regular graduate courses are offered. Admission is under the discretion of the instructor.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Restriction(s): Requires instructor's signature.</td>
<td></td>
</tr>
<tr>
<td>CIS*6890</td>
<td>Technical Communication and Research Methodology U [0.50]</td>
<td></td>
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<tr>
<td></td>
<td>This course aims to develop students' ability in technical communication and general research methodology. Each student is expected to present a short talk, give a mini lecture, review a conference paper, write a literature survey and critique fellow students' talks and lectures.</td>
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</tbody>
</table>
Creative Writing

The Master of Fine Arts (MFA) Program in Creative Writing is designed to prepare students for careers in creative writing, by exploring and developing their skills as writers, and providing them with a wide range of opportunities to connect with the arts and culture community. Critically acclaimed writers and literary professionals participate in the program as workshops instructors, mentors and visitors. Through its master classes, workshops and plenary courses, the MFA Program aims to assist new writers in locating their work in both a global and a national context. Students will pursue the program on a full-time basis. The program has been designed to facilitate completion within two years.

Administrative Staff

Director of SETS
Dr. Mark Fortier (425 MacKinnon, Ext. 53881)
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Graduate Coordinator
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Director, MFA Creative Writing Program
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Graduate Secretary
Sharon Ballantyne (427 MacKinnon, Ext. 56315)
sballant@uoguelph.ca

Graduate Faculty

Dionne Brand
BA, MA O.I.S.E. Toronto - Professor and University Research Chair

Thomas King
BA, MA Chico State, PhD Utah - Professor

Janice Kulyk Keefee
BA, MA Toronto, PhD Sussex - Professor

Constance Rooke
BA Smith College, MA Tulane University, PhD UNC Chapel Hill - Director, MFA Creative Writing Program

Judith Thompson
BA Queen’s, Cert. National Theatre School - Professor

MFA Program

Admission Requirements

The normal minimum requirement for admission to the MFA Program is a baccalaureate degree, in an honours program or the equivalent, from a recognized degree-granting institution. There are no requirements as to the discipline in which the degree was earned. Successful applicants will be expected to have achieved an average standing of at least second-class honours (B-) in their last four semesters of study. A limited number of students, however, may be admitted to the MFA without having satisfied the degree requirement and/or academic standing requirements set out above if they are assessed as qualified to undertake graduate studies in creative writing on the basis of other experience and/or practice.

Admissions Portfolio

Applicants will be selected for admission to the MFA Program primarily on the basis of a portfolio and a letter of no more than three pages describing the applicant’s aspirations as a writer and an indication of the genres in which he/she is most interested. The portfolio should be between 25 and 40 pages in length and may contain published and/or unpublished work and/or work-in-progress. It must include a minimum of three separate works (or excerpts from separate works). Applicants are strongly encouraged to submit works in more than one genre, e.g., fiction and poetry. Considerations of balance over the program as a whole, with respect to genres in which applicants are particularly interested and demonstrate special strength, will have some impact on admission decisions.

Degree Requirements

Students will take one workshop and one plenary course in the first (fall) semester of study; one workshop in the second (winter) semester; the individual study course in the third (summer) semester; and one workshop and a second plenary course in the fourth (fall) semester. The remaining two semesters of the two-year program will be devoted to the thesis. With permission, MFA students may choose to take one or two courses at the University of Guelph - e.g., MA courses in the School of English and Theatre Studies.

Courses

For courses without a semester designation the student should consult the graduate co-ordinator.

CRWR*6000 Plenary Course: Writers on Writing F [0.50]

All students in the program are required to take the plenary course. Students will engage with theories of creative writing proposed by such writers as Henry James, Virginia Woolf, Anton Chekhov, Milan Kunder, Octavio Paz, John Gardner, Nicole Brossard, and a great many others, including contemporary writers from Canada and abroad who will participate in the course as visitors. This course will examine how writers understand and describe their own creative processes and aims and how they create or respond to the theories of their time.

Prerequisite(s): Restricted to MFA.CW Students

CRWR*6100 Poetry Workshop F-W [0.50]

The Poetry Workshop engages students in a reading and writing intensive program of work. The workshops will be strongly focused on writing and on responding to the work of students in the course with productive, constructive criticism. Students will have the opportunity to work closely with a nationally recognized poet to develop their own skills as poets and editors. Students are expected to read widely and to develop their understanding of the technical aspects of their craft.

Prerequisite(s): Restricted to MFA.CW Students

CRWR*6200 Fiction Workshop F-W [0.50]

The Fiction Workshop engages students in a reading and writing intensive program of work. The workshops will be strongly focused on writing and on responding to the work of students in the course with productive, constructive criticism. Students will have the opportunity to work closely with a nationally recognized author to develop their skills as writers and editors. Students are expected to read widely and to develop their understanding of the technical aspects of their craft.

Prerequisite(s): Restricted to MFA.CW Students

CRWR*6300 Drama Workshop U [0.50]

The Drama workshop is writing- and reading-intensive. Students will produce a substantial amount of dramatic writing and will also provide constructive criticism of the work of other workshop participants. Required reading will cover a wide range of dramatic literature and the study of dramatic forms and techniques.

Prerequisite(s): Restricted to MFA.CW Students

CRWR*6400 Practicum in Creative Writing U [0.50]

In this course of guided study, the student will work on a creative project with a mentor who is a recognized member of the professional writing community.

CRWR*6500 Non-Fiction Workshop U [0.50]

The Non-Fiction Workshop engages students in a reading- and writing-intensive program of creative non-fiction. The workshops will be strongly focused on writing and will involve the creation and revision of a substantial body of new work in the genre, as well as critiquing the work of other students in the course. The reading component will focus on texts from a varied social and cultural range (e.g. family memoir, travel narrative, cultural memoir, themed mediations).

Workshops

Students are required to take three workshops over the course of the program; the genres in which workshops will be offered are fiction, poetry, drama, screenwriting, and creative non-fiction. Students are also required to ensure through their selection of workshops that they work in a minimum of two separate genres and are strongly encouraged to take workshops that include work in at least three genres. The workshops will be strongly focused on writing, but each will also incorporate a substantial reading component.

Plenary Courses

Plenary courses will be offered each year in the fall semester, and students are required to take two. These courses are intended in part to provide a forum for visiting writers and other literary professionals. Each course will also have a substantial component addressing practical matters associated with the progress of a writer’s career.

Individual Study Course

The individual study course, required in the third (summer) semester of the program, pairs each student with a mentor. It is intended to install within the curriculum a critical opportunity to address the variable learning needs of individual students. For some students, it will be primarily a reading course, with practice in writing in relation to particular models. For the majority of students, however, it is likely to be an intensive writing course that will allow for additional work in the genre that interests them most, or to explore the possibilities of another genre.

Thesis

The thesis is the single most important component of the MFA Program. The thesis may be a novel, a book-length manuscript of poems, a collection of short stories, a full-length play or screenplay, or a memoir. The standard to be applied is that the thesis should be of publishable quality in the estimation of the examiners.
Criminology and Criminal Justice Policy

The MA in Criminology and Criminal Justice Policy (CCJP) is a program jointly run by the Department of Sociology and Anthropology and the Department of Political Science. As such, the program offers a unique opportunity for students to pursue advanced studies and research in crime and the criminal justice system from both sociological and criminological perspectives as well as from political science and public policy and management perspectives.

Administrative Staff

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BA, MA Memorial, PhD Carleton - Assistant Professor,

Judith McKenzie
BA, MA Memorial, PhD Carleton - Assistant Professor

Ken Menzies
BA Queen's, MSc London, PhD Essex - Professor

William O’Grady
BA, MA Carleton, PhD Toronto - Associate Professor

Patrick Parnaby
Assistant Professor - BA, MA Queen’s, PhD McMaster

Troy Riddell
BA, MA Calgary, PhD McGill - Associate Professor

Byron M. Sheldrick
BA Carleton, LLB Toronto, MA, PhD York - Associate Professor and Department Chair

R. Stansfield
BSc McMaster, BA, MA Toronto, PhD York - Associate Professor

MA Program

Admission Requirements

The program requires a 4-year undergraduate (honours) degree in Sociology, Criminology or Political Science, but students with at least 5 courses in Criminology and/or Public Policy may be admitted as long as these were part of a major in another social science or humanities program. The program requires a minimum of a “B” average (second place standing) to be considered for admission. Generally, those admitted will have a higher academic average.

Degree Requirements

Students are required to complete 2.0 credits and write a thesis OR complete 3.0 credits and write a major research paper (MRP).

All students must take the following core courses:

SOC*6350 Society, Crime and Control [0.50]

Remaining credits can be fulfilled by taking elective courses, such as Courts CCJP*6000 and/or certain courses in Sociology and Anthropology and Political Science. Also, CCJP students are allowed to take one fourth year course in the undergraduate Criminal Justice and Public Policy (CJPP) program as part of their degree requirements.

Courses

For courses without a semester designation the student should consult the graduate co-ordinator.

Core Courses

SOC*6350 Society, Crime and Control U [0.50]

This seminar course surveys classical theoretical perspectives and more recent theoretical developments in the sociology of crime. It will examine the assumptions and logical structure of each perspective and justifications of particular criminal justice/public policy responses. The course will also critically assess recent empirical research relevant to each perspective.

Elective Courses

SOC*6070 Sociological Theory F [0.50]

Classical and contemporary theoretical perspectives and their inter-relationships. A central concern will be to develop the student's ability to assess theory critically and to understand how theory and research relate to each other.

SOC*6130 Quantitative Research Methods W [0.50]

The application of multiple regression to data generated by nonexperimental research, e.g., survey data and data from other sources (census, archival). In large part a course in theory construction, a thorough grounding in the mechanics and statistical assumptions of multiple regression is followed by its application to the construction of structural equation (or causal) models representing substantive theories in sociology and related disciplines.

SOC*6140 Qualitative Research Methods F [0.50]

An examination of the methods of qualitative research, including participant observation and unstructured interviews, as well as the ethnographic considerations of fieldwork. Other topics, such as comparative and historical methods, may be included.

SOC*6270 Diversity and Social Equality U [0.50]

This course will examine a range of approaches used in the study of intergroup relations, with special emphasis on struggles over influence and power. Students will acquire a deeper understanding of the complex intersections, as well as the overlap among forms of identity and group mobilization based on ethnic, linguistic, regional, class, gender, racial and other forms of social division. The course may also cover native issues and policies related to multiculturalism, equity and local or regional autonomy.

POLS*6630 Approaches to Public Policy U [0.50]

This course introduces students to the main theoretical approaches utilized in understanding public policy making and outcomes. Throughout the course, particular attention is paid to varying conceptions of institutions, ideas and interest and the role of these conceptions in various explanations of policy change and stasis.

POLS*6640 Canadian Public Administration: Public Sector Management U [0.50]

This course examines the growth of the administrative state in Canada, especially in the post World War II period. It critically reviews issues such as the concept of public sector management, the delegation of authority, personnel management, accountability and the ethics of ministers and officials to Parliament and the public.

POLS*6950 Specialized Topics in Political Studies U [0.50]

This course is intended to be an elective course for students wishing to pursue an area of investigation not covered in the other courses offered by the department. This course may also be chosen by students who want to further pursue a subject area to which they were introduced in a previous course.

POLS*6600 Reading Course U [0.50]

A program of directed reading, complemented with the writing of papers or participation in research. Reading courses are arranged by students through their advisors or advisory committees and must be approved by the chair of the department. This course may be repeated provided different content is involved.
Drama

Administrative Staff

Director
Mark Fortier (425 MacKinnon, Ext. 53881) mfortier@uoguelph.ca

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Paul A. Mulholland
BA, MA Toronto, PhD Birmingham - Associate Professor

Alan Shepard
BA St. Olaf College, PhD Virginia - Professor and Associate Vice-President Academic

Jerrard Smith
Associate Ontario College of Art - Associate Professor

Judith Thompson
BA, Queen's, Cert. National Theatre School - Professor

Ann Wilson
BA, MA, PhD York - Associate Professor

MA Program

The MA Program in Drama is designed to provide an intensive introduction to graduate-level work in the scholarly study of theatre, particularly to students with research interest in the program's primary focus, Canadian drama and theatre. A secondary focus is the drama and theatre of early modern (16th- and 17th-century) England in performance. However, supervision is available in a range of other areas, including modern British, American, and European drama, and various aspects of performance. Students interested in creative writing may apply to work with a distinguished writer on a creative thesis or research project.

Students may take courses in a variety of areas including dramatic literature, theatre history, and theory. The required core course, Approaches to Research and Theory, is designed to introduce students to research methodologies, leading eventually to individual projects using Guelph's major archival and library collections. The theatre archives at Guelph constitute the largest collection in Canada, with particular strengths in Ontario theatre and materials relating to Bernard Shaw.

Admission Requirements

The normal requirement for admission to the Drama MA program is the equivalent of an Honours degree in drama or literature from a recognized post-secondary institution with at least a high second-class standing (78% or higher) in the last year of study. Students with degrees with excellent academic records in other disciplines will also be considered, or may be allowed to do qualifying undergraduate courses at the University of Guelph prior to beginning graduate study.

Applicants are not required to write the Graduate Record Examination. In very exceptional circumstances, an applicant may lack the required Honours BA degree but may be assessed as qualified to undertake graduate studies in Drama on the basis of other experience and practice. For details, contact the Graduate Coordinator. Students wishing to enter the program normally do so in September.

Applications from international students are warmly encouraged, although the application procedures are somewhat more complex. If the applicant's first degree was completed in a country where English is not the first language, English-language proficiency must be documented at the time of application. Sample minimum scores are 580 for TOEFL or 6.5 for the British Council test.

Degree Requirements

All entering MA students will register for the joint, required two-semester course, DRMA*6010 Approaches to Research and Theory. This course must be taken upon entrance, requiring that entering students be registered in both the first Fall and Winter semesters. Students may choose between two options for completion of degree requirements:

1. Course work option: the required DRMA*6010 plus four other courses, plus either DRMA*6500 Research Paper or DRMA*6280 Independent Reading Course

2. Thesis Option: the required DRMA*6010 plus two other courses, plus a thesis of 20,000 to 25,000 words (80-100 pages)

Creative Writing Option: both the thesis and the research paper may, with approval, and contingent upon faculty availability, be completed as exercises in creative writing accompanied by critical/theoretical commentary.

Courses

Theory and Methodology

DRMA*6010 Approaches to Research and Theory U [1.00]
Introduces methodologies of graduate-level scholarship through a series of modules. Module 1 (required) focuses on a common text of imaginative literature, to introduce a range of theoretical and interpretative strategies and research tools. Subsequent modules (of which two are required) focus on particular issues in the study of literature and performance. NOTE: This course is offered over the fall and winter semesters. Students must register for both the fall and winter offerings of the course. They will receive an INP ("in progress") grade at the end of the fall semester and a final grade at the end of the winter semester.

DRMA*6220 Aspects of the Theory of Drama, Theatre, and Performance U [0.50]
Studies of selected theories of drama, theatre, and performance, and of particular theoretical issues and approaches.

Theatre History and Historiography

DRMA*6600 Aspects of Canadian Theatre History U [0.50]
A seminar on selected aspects of history of theatre as a practice and an institution in Canada.

DRMA*6608 Special Studies in Canadian Theatre U [0.50]
A detailed study of some particular aspect of Canadian theatre, providing opportunities for the student to pursue in depth an area of specialized research.

DRMA*6609 Aspects of Theatre in Early-Modern England U [0.50]
A seminar on selected aspects of the theatre of the 16th- and early 17th-centuries in England.

DRMA*6620 Aspects of 20th-Century Theatre U [0.50]
A seminar on selected aspects of theatre in the 20th century.

DRMA*6650 Special Studies in Theatre History U [0.50]
Detailed study of a particular aspect of theatre history, providing opportunities for the student to pursue in depth an area of specialized research.

DRMA*6680 Aspects of 19th-Century Theatre U [0.50]
A seminar on selected aspects of theatre in the 19th century.

Dramatic Literature and Criticism

DRMA*6620 Canadian Drama in English U [0.50]
Studies of Canadian scripts written in English, providing opportunities for detailed analyses of particular writings, periods or genres in their social and cultural contexts.

DRMA*6640 Quebec and Franco-Canadian Drama U [0.50]
Studies in Quebec and Franco-Canadian scripts written in French, providing opportunities for detailed analyses of particular writings, periods, or genres in their social and cultural contexts.

DRMA*6650 Special Studies in Canadian Drama U [0.50]
Detailed study of a particular aspect of Canadian drama, providing opportunities for the student to pursue in depth an area of specialized research.

DRMA*6660 English Drama to 1642 U [0.50]
Studies of selected scripts from the 16th- and early 17th-century in England, providing opportunities for detailed analyses of particular writings, periods, or genres in their social and cultural contexts.

DRMA*6680 Aspects of 19th-Century Theatre U [0.50]
A seminar on selected aspects of theatre in the 19th century.

DRMA*6690 Aspects of Theatre in Early-Modern England U [0.50]
A seminar on selected aspects of the theatre of the 16th- and early 17th-centuries in England.

DRMA*6720 Aspects of the Theory of Drama, Theatre, and Performance U [0.50]
Studies of selected theories of drama, theatre, and performance, and of particular theoretical issues and approaches.

DRMA*6750 Special Studies in Theatre History U [0.50]
Detailed study of a particular aspect of theatre history, providing opportunities for the student to pursue in depth an area of specialized research.

DRMA*6780 Aspects of 20th-Century Theatre U [0.50]
A seminar on selected aspects of theatre in the 20th century.

DRMA*6800 Aspects of 19th-Century Theatre U [0.50]
A seminar on selected aspects of theatre in the 19th century.

DRMA*6850 Special Studies in Theatre History U [0.50]
Detailed study of a particular aspect of theatre history, providing opportunities for the student to pursue in depth an area of specialized research.

DRMA*6900 Aspects of Theatre in Early-Modern England U [0.50]
A seminar on selected aspects of the theatre of the 16th- and early 17th-centuries in England.

DRMA*6950 Special Studies in Theatre History U [0.50]
Detailed study of a particular aspect of theatre history, providing opportunities for the student to pursue in depth an area of specialized research.

DRMA*6980 Aspects of 20th-Century Theatre U [0.50]
A seminar on selected aspects of theatre in the 20th century.

DRMA*6990 Aspects of Theatre in Early-Modern England U [0.50]
A seminar on selected aspects of the theatre of the 16th- and early 17th-centuries in England.

DRMA*6720 Aspects of the Theory of Drama, Theatre, and Performance U [0.50]
Studies of selected theories of drama, theatre, and performance, and of particular theoretical issues and approaches.

DRMA*6750 Special Studies in Theatre History U [0.50]
Detailed study of a particular aspect of theatre history, providing opportunities for the student to pursue in depth an area of specialized research.

DRMA*6780 Aspects of 20th-Century Theatre U [0.50]
A seminar on selected aspects of theatre in the 20th century.

DRMA*6800 Aspects of 19th-Century Theatre U [0.50]
A seminar on selected aspects of theatre in the 19th century.

DRMA*6850 Special Studies in Theatre History U [0.50]
Detailed study of a particular aspect of theatre history, providing opportunities for the student to pursue in depth an area of specialized research.

DRMA*6900 Aspects of Theatre in Early-Modern England U [0.50]
A seminar on selected aspects of the theatre of the 16th- and early 17th-centuries in England.

DRMA*6950 Special Studies in Theatre History U [0.50]
Detailed study of a particular aspect of theatre history, providing opportunities for the student to pursue in depth an area of specialized research.

DRMA*6980 Aspects of 20th-Century Theatre U [0.50]
A seminar on selected aspects of theatre in the 20th century.

DRMA*6990 Aspects of Theatre in Early-Modern England U [0.50]
A seminar on selected aspects of the theatre of the 16th- and early 17th-centuries in England.
# Other Courses

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>DRMA*6280</td>
<td>Independent Reading Course U [1.00]</td>
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<tr>
<td>DRMA*6500</td>
<td>Research Paper U [1.00]</td>
<td></td>
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<tr>
<td>DRMA*6801</td>
<td>Reading Course I U [0.50]</td>
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<tr>
<td>DRMA*6802</td>
<td>Reading Course II U [0.50]</td>
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</table>

**DRMA*6280 Independent Reading Course U [1.00]**

Independent Reading Course

**DRMA*6500 Research Paper U [1.00]**

An independent study course, the nature and content of which is agreed upon between the individual and the person offering the course. Subject to the approval of the student's advisory committee and the graduate committee.

**DRMA*6801 Reading Course I U [0.50]**

An independent study course, the nature and content of which is agreed upon between the individual and the person offering the course. Subject to the approval of the student's advisory committee and the graduate committee.
Economics
The Department of Economics www.economics.uoguelph.ca offers programs of study leading to the MA and PhD degrees. Students may also register in this Department to take programs in Collaborative International Development Studies (CIDS).

Admission Requirements

Students whose background is not in economics but who are otherwise outstanding will be asked to register as a non-degree undergraduate program for at least one semester. Satisfactory completion of prescribed undergraduate courses will be a prerequisite to admission to the MA program. Applicants whose background in economics is difficult to evaluate may be granted admission as a provisional graduate student for one semester. If, at the end of the semester, the Department is satisfied with the student's progress, it will recommend to the Dean of Graduate Studies that the student be transferred to regular graduate student status.

The first round of admission decisions are made at the end of February.

Degree Requirements
The MA requires the completion of 4 course credits. Most one-semester courses have 0.5 course credits. With approval from the Department, up to 1 credit of the required 4 credits can be taken outside the Department of Economics. However students may, with approval, take additional courses from other Departments provided that their program includes at least six course equivalents (3.0 credits) from the Department of Economics. The minimum duration of the program is 2 semesters of full-time study as a regular graduate student. There are two main routes to the MA in Economics: by course work and major paper, and by course work and thesis. Most candidates pursue the first route.

MA Core
Usually it takes three semesters to complete the requirements for the MA though it is possible to intensify the program and complete it in two semesters.

The program of study includes three core courses (ECON*6000, ECON*6020 and, at the discretion of the graduate committee, ECON*6180 or ECON*6140).

The alternative econometrics sequences are designed to benefit students with different undergraduate backgrounds. Students with a satisfactory record of undergraduate work in econometrics will be required to take ECON*6140, while those with less undergraduate preparation will be required to take ECON*6180. The course ECON*6050 is offered primarily to students outside the Department but is available to incoming MA students as an extra course in preparation for ECON*6180.

MA Options
In addition to the core (1.5 credits), students may take one of the following two options. The vast majority of students choose option (i).
1. 1.5 graduate course credits and the Research Project - ECON*6940 (1.0 credit)
2. 0.5 graduate course credits and a Thesis.

PhD Program
The objective of the PhD program is to train individuals who already have a strong background in economics to become independent and skilled researchers, in preparation for a career in academia, government or the private sector. Course offerings cover a broad range of topics in theoretical and applied economics. PhD candidates may write a dissertation in any of the areas of expertise of the graduate faculty in the Department. In addition, the Department offers a PhD program in Resource and Environmental Economics in collaboration with the Department of Food, Agricultural and Resource Economics. (See PhD in Resource and Environmental Economics.), and a PhD program in International Development Studies.

Graduates are expected to have demonstrated competence at an advanced level in the core areas of Microeconomic theory, Macroeconomic theory, and Econometrics, to have demonstrated competence at the cutting edge of knowledge in their area of specialization and advanced competence in at least one other area, and to have demonstrated mature scholarship, research and communication abilities.

Admission Requirements
Applicants to the PhD program should have a master's degree in economics with a minimum average of 80% (A-) in their postgraduate studies. Applicants without a master's degree but with an outstanding record at the baccalaureate level, may be admitted initially to the MA program in economics. For students who achieve a superior record and show an aptitude for research, The Board of Graduate Studies, on the recommendation of the Department, may authorize transfer to the PhD program without requiring the student to complete a master's degree.

Degree Requirements
The program requires the satisfactory completion of a minimum of 12 courses covering core theory, econometrics, and field courses. (Students with an MA will be given credit for courses already in hand, where appropriate). The following sequence of milestones represents the typical path through the PhD program.

Year I: Core Courses
Students must complete the following courses, in preparation for the comprehensive examinations in economic theory, which is written at the end of Year I:

Econometrics

| ECON*6140 | [0.50] | Econometrics I |
| ECON*6160 | [0.50] | Econometrics II |
Theory

ECON*6000 [0.50] Microeconomic Theory I
A first graduate course in microeconomics, presenting a rigorous treatment of consumer theory, producer theory, applications of duality, partial equilibrium, general equilibrium and the fundamental theorems of welfare economics.

ECON*6010 Microeconomic Theory II [0.50]
Advanced topics in modern microeconomics to include elements of game theory, information economics, economics of risk and uncertainty, the theory of incentives and others.
Prerequisite(s): ECON*6000

ECON*6020 Macroeconomic Theory I [0.50]
A first graduate course in macroeconomics, presenting a rigorous treatment of aggregate consumption, investment, government budgets, money demand and supply, aggregate demand, aggregate supply, inflation and unemployment, and open economy issues.

ECON*6040 Macroeconomic Theory II [0.50]
This course considers the dynamics resulting from intertemporal optimization models, foundations of unemployment theory, approaches to business cycles, models of long-run growth.
Prerequisite(s): ECON*6020

ECON*6110 Mathematical Economics U [0.50]
This course introduces students to the mathematical techniques used in advanced economic analysis. Topics covered in any year: analysis of dynamic economic models and optimization in dynamic economic models.

Econometrics

ECON*6050 Introduction to Econometric Methods U [0.50]
Introduction to the specification, estimation and testing of economic models. Topics include the classical linear regression model, t tests, structure tests, specification error, the consequences of the violation of the classical assumptions, detection and correction of autocorrelation and heteroscedasticity.

ECON*6140 Econometrics I U [0.50]
Topics include a review of the classical linear regression model, applications of generalized least squares, maximum likelihood methods and various statistical test procedures.

ECON*6160 Econometrics II U [0.50]
Topics include maximum likelihood as a method of estimation and inference, nonlinear estimation and simultaneous equations. Also more specialized topics such as limited-dependent-variable models and non-parametric regression methods may be covered.

ECON*6170 Topics in Econometrics U [0.50]
This is an advanced econometrics topics course that covers the area of non-parametric and semiparametric estimation and testing of econometric models, including time series and panel data semiparametric models.

ECON*6180 Econometric Methods U [0.50]
This course follows ECON*6050. It covers estimation by instrumental variables, estimations of simultaneous systems, asymptotic distribution theory, maximum likelihood estimation, binary choice and limited dependent variable models, and issues in time series analysis.

Economic History

ECON*6200 Economic History U [0.50]
This course considers topics in economic history which vary from year to year. The emphasis will be usually on late-19th or 20th century topics and often involves a world emphasis. Student presentations and papers form a large part of the course.

ECON*6370 Economic Development in Historical Perspective U [0.50]
This course will examine the experience of economic development focusing on the emergence of the Third World. Topics for discussion will vary from year to year; they may include the impact of trade expansion during the eighteenth and nineteenth centuries, the role of manufacturing as a leading sector, statist vs. the new classical approaches to government policy, and others.

Money and Finance

ECON*6320 International Finance U [0.50]
This course deals with the theoretical policy and issues of international finance. Topics may include exchange rate determination, capital flows in international markets, the financing of trade flows, and open economy macroeconomic models and policy issues.

ECON*6490 Monetary and Finance Theory U [0.50]
This course examines selected topics in monetary and finance theory. Topics may include: contingent claims markets, arbitrage asset pricing, portfolio models, firm capital structure, government debt, real business cycles, cash-in-advance models, spatial money models, overlapping generations models, and traditional models of the demand and supply of money and monetary policy.

Developmental Economics

ECON*6350 Economic Development U [0.50]
This course examines economic development from an international perspective: theories, history, policies and prospects.

Labour Economics

ECON*6600 Labour Economics U [0.50]
Major themes in labour market theory including static and dynamic labour demand and supply, migration and wage structures and dynamics, unemployment, migration and the role of social programs.

ECON*6610 Topics in Labour Economics U [0.50]
This course complements ECON*6600. Topics include advanced issues in family labour supply, human capital, wage bargaining and contract theory, search theory, duration analysis and its application to major labour market spells such as employment and unemployment.

Environmental and Resource Economics

ECON*6800 Environmental Economics U [0.50]
A topics course concerning the interrelationships between economic activities and the state of the natural environment. Topics may include: pollution and economic growth; energy use and environmental quality; international trade and pollution; policies for controlling pollution; techniques for assessing the benefits of environmental improvement.

ECON*6810 Economics of Non-Renewable Resources U [0.50]
This course examines economic models of the use of non-renewable resources to analyze issues such as resource conservation, sustainable development, taxation of resource rents, and price determination in resource markets.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON*6300</td>
<td>International Trade Theory U [0.50]</td>
<td>0.50</td>
<td>This course provides a rigorous treatment of both positive and normative aspects of trade theory through extensive use of general equilibrium models under varying assumptions. Topics may also include barriers to trade, international factor movements, growth and development, and strategic trade policy.</td>
</tr>
<tr>
<td>ECON*6400</td>
<td>Public Finance U [0.50]</td>
<td>0.50</td>
<td>This course surveys the normative theory of the public sector. Topics may include public expenditure theory, tax theory, cost benefit analysis and fiscal federalism.</td>
</tr>
<tr>
<td>ECON*6650</td>
<td>Economics of Social Welfare U [0.50]</td>
<td>0.50</td>
<td>This course deals with the analysis of social welfare programs, concentrating on national health insurance. It covers their structure, incentives and distribution effects, and includes empirical analysis of existing programs.</td>
</tr>
<tr>
<td>ECON*6700</td>
<td>Industrial and Market Organization U [0.50]</td>
<td>0.50</td>
<td>The major topics of industrial organization are analyzed from both a game theoretic perspective and from a Structure-Conduct-Performance perspective. Typical topics include: oligopoly theory, determinants of industrial structure, Coase theorem, market entry, advertising, research and development, product differentiation, and price discrimination.</td>
</tr>
<tr>
<td>ECON*6750</td>
<td>Managerial Economics U [0.50]</td>
<td>0.50</td>
<td>The course introduces students to the latest developments in the economic analysis of the inside workings and organization of firms. The course tries to explain the diversity of economic organizations, and more generally why economic activity is sometimes carried out through firms and sometimes through markets. For graduate students outside the Department of Economics.</td>
</tr>
<tr>
<td>ECON*6770</td>
<td>Financial Management U [0.50]</td>
<td>0.50</td>
<td>This course examines the implications of financing decisions made by firms in a world of uncertainty. Topics such as capital budgeting, capital structure, dividend policy, market efficiency and capital asset pricing will be analyzed from the perspective of corporate finance and portfolio management theory. Co-requisite: AGEC*6070. For graduate students outside the Department of Economics.</td>
</tr>
<tr>
<td>ECON*6930</td>
<td>Reading Course U [0.50]</td>
<td>0.50</td>
<td>In some circumstances, students may arrange to take a reading course under the direction of a faculty member.</td>
</tr>
<tr>
<td>ECON*6940</td>
<td>Research Project U [1.00]</td>
<td>1.00</td>
<td>All students who choose the research project option in the MA program will register in this course. Research projects are written under the direct supervision of a faculty member. Normally, research projects are completed within one or two semesters. Students must make a presentation of their work and a copy of the final report must be submitted to the Department before the final grade is submitted to Graduate Program Services.</td>
</tr>
</tbody>
</table>
**Engineering**

The graduate degree programs offered in the School of Engineering include a course work MEng and research thesis programs at the MASc and PhD levels. All programs are offered as full- or part-time studies. These programs provide for specialization in four fields of study: Biological Engineering, Environmental Engineering, Engineering Systems and Computing and Water Resources Engineering.

Biological Engineering is broadly categorized as bio-process, food, biomedical or bio-mechanical engineering. Research is conducted in many areas such as: physical, chemical and thermal processing of food, bio-materials or waste; physical properties of biological materials; process control; remote sensing; medical imaging; bio-instrumentation design and the development of medical diagnostics; ergonomic and prosthetic bio-mechanics; design of implants and surgical tools for human and veterinary applications.

Environmental Engineering involves methods to prevent or mitigate damage to the environment by the reduction, treatment, or reclamation of solid, liquid, or gaseous by-products of industrial, agricultural and municipal activities. Emphasis is on the behaviour and fate of contaminants in the environment. Recent research topics include the following: composting of organic solids; control and remediation of chemical spills; wastewater treatment; soil/site remediation technology; policy innovations; air pollution and meteorology; vapour exchange and supercritical fluid extraction; air-surface pollutant exchange measurement; bio-filtration and membrane technologies; modelling of environmental processes.

Engineering Systems and Computing involves development of digital or microelectronic devices, computer or robotic technologies and their application to manufacturing, computing, mechatronic or embedded systems. Some active research areas include: soft computing and neural networks; autonomous robots; intelligent control systems; micro-electromechanical (MEMS) devices; embedded systems and special purpose computing; VLSI circuit design and layout; analog integrated circuits and system-on-chip design; integrated sensor systems and networks; digital devices and signal processing; wireless and optical communication systems; cryptographic systems.

Water Resources Engineering involves investigation, analysis and design of systems for control and utilization of land and water resources as part of the management of urban and rural watersheds. Research areas include: water quality control and safety; resource use and groundwater quality; hydrologic modelling; design and planning of urban water and sewage infrastructure; rural waste treatment systems; erosion control; non-point source pollution and mitigation; Geographic Information Systems (GIS); sediment and contaminant transport; irrigation and drainage modelling. The objective of the course-work master's degree program (MEng) is to provide an opportunity for engineering graduates, usually practising engineers, to advance their understanding of engineering principles and increase their grasp of the application of these principles to the solution of complex, practical problems. Many of these students are returning to school in order to learn about recent technological developments that have occurred since graduation in their field. The objective is achieved through selecting from a number of core and elective courses and completing a major project. The project requires a final written report that is presented in a public seminar followed by an oral examination of the candidate. The MASc program is intended to provide advanced training in engineering sciences, analysis, design, and research methodology. This objective is achieved through a combination of course work, applied research, and thesis writing. Upon graduation students will be able to analyse and research an engineering problem and apply their acquired skills and knowledge in a practical solution. A final examination is conducted following a public seminar presentation of the student's thesis. The PhD program prepares candidates for a career in engineering teaching, research, or consulting. The program is designed to provide both broad knowledge of engineering science and training in advanced research. Doctoral research carries the expectation of making an original contribution to the body of existing knowledge or technology. It is also expected that the responsibility of problem definition and solution is that of the student, and that the student's advisor acts truly in an advisory capacity. Therefore, graduates are expected to have acquired autonomy in defining and analysing problems, conducting research, and preparing scholarly publications. These objectives are achieved through a combination of course work, independent research, a qualifying examination, and the production and defence of a research dissertation.

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**Graduate Faculty**

<table>
<thead>
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<th>Degree, Institution, Profession</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
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</tr>
<tr>
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<td>BSc, PhD Queen's, PEng - Assistant Professor</td>
</tr>
<tr>
<td>Ralph B. Brown</td>
<td>BSc (Agr), BSc (Eng), MSc, PhD Guelph, PEng - Professor and Graduate Coordinator</td>
</tr>
<tr>
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<td>BEng McMaster, MSc Guelph, PhD Toronto, PEng - Professor</td>
</tr>
<tr>
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</tr>
<tr>
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<td>PhD Alberta, PEng - Assistant Professor</td>
</tr>
<tr>
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<td>PhD Waterloo, PEng - Assistant Professor</td>
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<tr>
<td>Bahram Gharabaghi</td>
<td>BASc Iran Univ. of Science and Technology, MSc Shariif Univ. of Science and Technology, PhD Guelph, PEng - Assistant Professor</td>
</tr>
<tr>
<td>Karen D. Gordon</td>
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</tr>
<tr>
<td>Stefano Gregori</td>
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<td>Gordon L. Hayward</td>
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</tr>
<tr>
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</tr>
<tr>
<td>Edward McBean</td>
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<tr>
<td>Gauri S. Mittal</td>
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<tr>
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</tr>
<tr>
<td>Radu Muresan</td>
<td>Dipl. Engg Technical Univ. of Cluj-Napoca (Romania); MASc, PhD Waterloo, PEng - Assistant Professor</td>
</tr>
<tr>
<td>Michele L. Oliver</td>
<td>BPE McMaster, MPE, MSc, PhD New Brunswick, PEng - Assistant Professor</td>
</tr>
<tr>
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</tr>
<tr>
<td>Richard G. Zytner</td>
<td>BASc, MASc, PhD Windsor, PEng - Professor and Associate Director</td>
</tr>
</tbody>
</table>

**MASc and MEng Programs**

**Admission Requirements**

MASc by

Admission to the general admission standards of the university, the school has adopted additional admissions criteria for MASc studies. Applicants must meet one of the following requirements:

- Baccalaureate degree in engineering or equivalent. Applicant must be a graduate from an honours engineering program with at least a 75% average in the past four full-time semesters or the equivalent. International degree and grade equivalents will be determined by Graduate Program Services.
• Bachelor of Science degree or equivalent. At least a second class honours standing (B+ or 75%) in the work of the last four full-time semesters or the last two complete undergraduate years of an honours science degree. Applicants must demonstrate acceptable analytical ability by having taken a sufficient number of courses in mathematics and the physical sciences. Applicants lacking background in specific topics related to their research project must be prepared to complete make-up undergraduate engineering courses without receiving graduate credit.

**MEng Program**

Applicants will be graduates of an honours engineering program with at least a 70% average in the past four full semesters or the last two complete undergraduate years or the equivalent. International degree and grade equivalents will be determined by Graduate Program Services.

Applicants must demonstrate acceptable analytical ability by having taken a sufficient number of courses in mathematics, and the physical sciences.

Biological Engineering applicants must have a minimum of three of the following courses or equivalents:

- Biological/Food/Bioprocess Engineering
- Engineering Unit Operations
- Bioreactor Design
- Bio-instrumentation Design
- Food Process Engineering Design
- Digital Process Control Design
- Heat and Mass Transfer
- Process Engineering

Environmental Engineering applicants must have a minimum of three of the following courses or equivalents:

- Introduction to Environmental Engineering
- Engineering Unit Operations
- Water Quality
- Air Quality
- Solid Waste Management
- Water and Wastewater Treatment

Water Resources Engineering applicants must have a minimum of three of the following courses or equivalents:

- Fluid Mechanics
- Water Management
- Hydrology
- Water Quality
- Urban Water Systems
- Watershed Structures
- Soil and Water Conservation

Engineering Systems and Computing applicants must have a minimum of three of the following courses or equivalents:

- Electric Circuits
- Digital Systems
- Systems and Control Theory
- Programming
- Electronics
- Robotics

Applicant qualifications may be assessed via an entrance interview/oral examination conducted by the proposed advisor and one member of the school of engineering graduate studies committee. Students deficient in certain areas will be required to take make-up undergraduate courses. Such students will be admitted and allowed to continue on provisional status for a maximum of two semesters or until the requirements are completed. These courses will not count toward the student's graduate credit requirements.

**Degree Requirements**

**MASc by Thesis**

The prescribed program of study must consist of no fewer than 2.0 credits, of which at least 1.5 credits must be at the graduate level, and at least 1.0 must be engineering graduate courses. Under special circumstances the school may reduce the 1.5 credit course requirement; however, the two graduate-engineering-course requirement will not be changed. In all cases the remaining courses must be acceptable for graduate credit; that is, they must be either graduate courses or senior undergraduate courses. Depending on the student's background, the advisory committee may specify more than four courses, including undergraduate make-up courses. If make-up courses are deemed necessary, they will be considered additional courses.

**MEng Degree**

The prescribed program of studies consists of at least 5.0 credits acceptable for graduate credit. This includes 2.5 credits from the program core (see section 5.4 of the School of Engineering Graduate Handbook), and 2.5 additional credits chosen from approved courses (section 5.5 of the School of Engineering Graduate Handbook). No more than 1.0 of these credits will be for undergraduate engineering courses, as approved by the graduate co-ordinator, and no more than 1.5 credits will be from courses offered outside the School of Engineering. For the final project course (1.0 credit), one member of the graduate faculty will be appointed by the Graduate Coordinator as an advisor.

**PhD Program**

**Admission Requirements**

The minimum academic requirement for admission to the PhD program is normally a recognized master's degree in engineering. A strong recommendation from the MASc advisor is necessary. Direct admission to the PhD program is rarely granted. Applicants requesting direct admission must hold a bachelor's degree with exceptionally high academic standing and have related research experience. Such applicants should discuss this option with the graduate co-ordinator at an early opportunity.

**Degree Requirements**

The prescribed program of study must consist of no fewer than 2.0 credits in addition to those taken as part of the MASc degree. At least 1.5 of the credits must be at the graduate level, and at least 1.0 must be engineering graduate courses. Under special circumstances the school may reduce the requirement for 1.5 credit course requirement; however the two graduate-engineering-course requirement will not be changed. In all cases the remaining courses must be acceptable for graduate credit; that is, they must be either graduate courses or senior undergraduate courses. Depending on the student's background, the advisory committee may specify more than four courses, including undergraduate make-up courses. If make-up courses are deemed necessary, they will be considered additional courses.

The qualifying examination as outlined in the Graduate Calendar is held by the end of the fourth semester but no later than the fifth semester after the student has completed the required courses.

**Interdepartmental Programs**

**MSc Aquaculture Interdepartmental Program**

The School of Engineering participates in the master of science in aquaculture program. Those faculty members whose research and teaching expertise includes aspects of aquaculture may serve as advisers for MSc (Aquaculture) students. Please consult the Aquaculture listing for a detailed description of the MSc (Aquaculture) interdepartmental program.

**MSc Food Safety and Quality Assurance Collaborative Program**

The School of Engineering participates in the MSc program in food safety and quality assurance. Those faculty members whose research and teaching expertise includes aspects of food safety and quality assurance may serve as advisers for MSc students. Please consult the Food Safety and Quality Assurance listing for a detailed description of the MSc collaborative program.

**Courses**

**General**

ENGG*6000 Advanced Heat and Mass Transfer F [0.50]


ENGG*6020 Advanced Fluid Mechanics U [0.50]


ENGG*6030 Finite Difference Methods W [0.50]

Numerical solution of partial differential equations of flow through porous media; flow of heat and vibrations; characterization of solution techniques and analysis of stability; convergence and compatibility criteria for various finite difference schemes.

ENGG*6050 Finite Element Methods W [0.50]


ENGG*6060 Engineering Systems Modelling and Simulation U [0.50]

A study of theoretical and experimental methods for characterizing the dynamic behaviour of engineering systems. Distributed and lumped parameter model development. Digital simulation of systems for design and control.

ENGG*6080 Engineering Seminar W [0.50]

The course objective is to train the student in preparing, delivering and evaluating technical presentations. Each student is required to: (a) attend and write critiques on a minimum of six technical seminars in the School of Engineering; and (b) conduct a seminar, presenting technical material to an audience consisting of faculty and graduate students in the school. This presentation will then be reviewed by the student and the instructor.
ENGG*6630 Environmental Contaminants: Fate Mechanisms W [0.50]
Analysis of fate mechanisms associated with environmental contaminants. Focus on substances which are generally considered to be hazardous to humans, or other animal life at low concentrations. Study of physicochemical properties and fate estimation on control and remediation strategies. Quantitative analysis of contaminant partitioning and mass flows, including cross-media transport and simultaneous action of contaminant fate mechanisms.

ENGG*6640 Environmental Contaminants: Control Mechanisms W [0.50]
Analysis of conventional and innovative technologies for toxic contaminants; technologies for contaminated municipal and industrial waste waters, including physical, chemical, and biological treatment processes for trace toxic contaminants in water and wastewater; control technologies for contaminated gas streams, including activated carbon absorption, biofiltration, bioscrubbing, wet scrubbing, thermal-oxidation methods, and process modifications to reduce emissions of toxic air contaminants; remediation techniques for contaminated soil, including external and in-situ physical, chemical and biological treatment methods; cross-media contaminant control issues; toxicity testing and evaluation; relevant regulatory programs.

ENGG*6650 Advanced Air Quality Modelling W [0.50]
Analysis of analytical and computational models used to predict the fate of airborne contaminants; role of air quality models for the solution of engineering-related problems; analysis of important boundary layer meteorology phenomena that influence the fate of air pollutants; conservation equations and mathematical solution techniques; model input requirements such as emissions inventories; Gaussian models; higher-order closure models; Eulerian photochemical grid models.

ENGG*6670 Hazardous Waste Management F [0.50]
This course will define the different types of hazardous wastes that currently exist and outline the pertinent legislation governing these wastes. Information will be presented on different ways to handle, treat and dispose the hazardous waste, including separation, segregation, minimization, recycling and chemical, physical, biological, and thermal treatment. Also to be discussed are hazardous waste landfills and site remediation technologies. Specifics include design and operation of hazardous landfill sites, handling and treatment of leachate, comparison of pertinent soil remediation technologies. Case studies will be reviewed.

ENGG*6680 Advanced Water and Wastewater Treatment F [0.50]
This design course will discuss advanced technologies not traditionally covered during an undergraduate curriculum. An important consideration will be the reuse of water.

ENGG*6690 Non-Point Source Pollution and Its Control F [0.50]
Introduction to issues of non-point source pollution. Modelling of non-point source pollution approaches for vadose zone, surface and subsurface drained water. Scale issues in non-point source modelling. Management issues in non-point source pollution modelling. Application of non-point source pollution models to a variety of situations. Application of non-point source modelling and selection of management approaches for various types of receiving water.

ENGG*6690 Environmental Contaminants: Fate Mechanisms W [0.50]
Analysis of fate mechanisms associated with environmental contaminants. Focus on substances which are generally considered to be hazardous to humans, or other animal life at low concentrations. Study of physicochemical properties and fate estimation on control and remediation strategies. Quantitative analysis of contaminant partitioning and mass flows, including cross-media transport and simultaneous action of contaminant fate mechanisms.

ENGG*6630 Environmental Contaminants: Control Mechanisms W [0.50]
Analysis of conventional and innovative technologies for toxic contaminants; technologies for contaminated municipal and industrial waste waters, including physical, chemical, and biological treatment processes for trace toxic contaminants in water and wastewater; control technologies for contaminated gas streams, including activated carbon absorption, biofiltration, bioscrubbing, wet scrubbing, thermal-oxidation methods, and process modifications to reduce emissions of toxic air contaminants; remediation techniques for contaminated soil, including external and in-situ physical, chemical and biological treatment methods; cross-media contaminant control issues; toxicity testing and evaluation; relevant regulatory programs.

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This design course will discuss advanced technologies not traditionally covered during an undergraduate curriculum. An important consideration will be the reuse of water.

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Introduction to issues of non-point source pollution. Modelling of non-point source pollution approaches for vadose zone, surface and subsurface drained water. Scale issues in non-point source modelling. Management issues in non-point source pollution modelling. Application of non-point source pollution models to a variety of situations. Application of non-point source modelling and selection of management approaches for various types of receiving water.

ENGG*6690 Environmental Contaminants: Fate Mechanisms W [0.50]
Analysis of fate mechanisms associated with environmental contaminants. Focus on substances which are generally considered to be hazardous to humans, or other animal life at low concentrations. Study of physicochemical properties and fate estimation on control and remediation strategies. Quantitative analysis of contaminant partitioning and mass flows, including cross-media transport and simultaneous action of contaminant fate mechanisms.

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ENGG*6440 Advanced Biomechanical Design F [0.50]
Biomechanical Design from concept through prototyping and testing. This course will investigate and apply techniques used for biomechanical design including reverse engineering, solid modelling, geometric tolerancing, testing and rapid prototyping. Instructor's signature required.

ENGG*6500 Introduction to Machine Learning W [0.50]
The aim of this course is to provide students with an introduction to algorithms and techniques of machine learning particularly in engineering applications. The emphasis will be on the fundamentals and not specific approach or software tool. Class discussions will cover and compare all current major approaches and their applicability to various engineering problems, while assignments and project will provide hands-on experience with some of the tools.

ENGG*6510 Analog Integrated Circuit Design F [0.50]
In this course, operating principles and design techniques of analog integrated circuits are introduced with emphasis on device and system modelling. These circuits include analog and switched-capacitor filters, data converters, amplifiers, oscillators, modulators, circuits for communications, sensor readout channels, and circuits for integrated memories.

Prerequisite(s): ENGG*3450

ENGG*6520 VLSI Digital Systems Design U [0.50]
This course will introduce the principles of VLSI MOSFET digital design from a circuit and system perspective. Advanced topics include: power issues related to each level of design abstraction; voltage and frequency scaling; power to speed trade-offs; ASIC digital design flow; Verilog interogation, ASIC case studies.

Prerequisite(s): ENGG*3450 or equivalent.

ENGG*6530 Reconfigurable Computing W [0.50]
This course serves as a graduate introduction into reconfigurable computing systems. It introduces students to the analyses, synthesis and design of embedded systems and implementing them using Field Programmable Gate Arrays. Topics include: Programmable Logic devices, Hardware Description Languages, Computer Aided Design Flow, Hardware Accelerators, Hardware/Software Co-design techniques, Run Time Reconfiguration, High Level Synthesis.

Prerequisite(s): ENGG*2410 or equivalent.

ENGG*6540 Advanced Robotics W [0.50]
This course is intended for graduate students who have some knowledge and interest in robotics. The course covers modelling, design, planning control, sensors and programming of robotic systems. In addition to lectures, students will work on a term project in which a problem related to robotics systems will be studied. Instructor's signature required.

ENGG*6550 Intelligent Real-time Systems W [0.50]
Soft real-time systems, hard real-time systems, embedded systems, time handling and synchronization, deadlines, preemption, interruption, its languages, rts operating systems, system life-cycle, petri nets, task scheduling and allocation, fault-tolerance, resource management, rts/search techniques, dealing with uncertainty.

ENGG*6560 Advanced Digital Signal Processing W [0.50]
Discrete-time signals and systems, z transform, frequency analysis of signals and systems, fourier transform, fast fourier transform, design of digital filters, signal reconstruction, power spectrum estimation.

ENGG*6570 Advanced Soft Computing F [0.50]
Neural dynamics and computation from a single neuron to a neural network architecture. Advanced neural networks and applications. Soft computing approaches to uncertainty representation, multi-agents and optimization.

Prerequisite(s): ENGG*4430 or equivalent

ENGG*6580 Advanced Control Systems F [0.50]
This course will start with state space analysis of multi-input multi-output control systems. Then state space design will be presented. After that, non linear control systems and soft computing based intelligent control systems will be studied. Finally, hybrid control systems, H infinite control and uncertainty and robustness in control systems will be addressed.

ENGG*6600 Special Topics in Engineering Systems and Computing U [0.50]
A course of directed study involving selected readings and analyses in developing knowledge areas of Systems and Computer Engineering.

Water Resources Engineering

ENGG*6740 Ground Water Modelling W [0.50]
Introduction to current groundwater issues, definition of terms, review of fundamental equations describing fluid and contaminant transport in saturated groundwater zones. Mathematical techniques (analytical, fe and fd) for the solution of the fundamental equations. Application of numerical groundwater models to a variety of situations. Case studies. Review of groundwater models used in industry.
English

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Alan Shepard
BA St. Olaf College, PhD Virginia - Professor and Associate Vice-President Academic

J.R. (Tim) Struthers
BA, MA, PhD Western Ontario - Associate Professor

MA Program

The English MA program in the School of English and Theatre Studies is designed to provide students with an intensive introduction to graduate-level work in English studies, within a flexible program. Students can draw on the program's strengths in the following four fields: Canadian Literature, Postcolonial and Colonial Studies, Early Modern Studies, and Literary Theory/Cultural Studies. Students can also pursue a wide range of research topics in consultation with faculty members actively engaged with the literatures of different historical periods and geographical locations, and with current debates in such areas as critical theory, cultural studies, gender studies, and queer theory.

Admission Requirements

The normal requirement for admission to the English MA program is the equivalent of an Honours degree in English studies from a recognized institution with at least a high second-class standing (78% or higher) in the last year of study. Students with degrees with excellent academic records in other disciplines will also be considered, or may be allowed to do qualifying undergraduate courses at the University of Guelph prior to beginning graduate study. Students wishing to enter the program normally do so in September. (Only under exceptional circumstances may students be considered for admission in either January or May.) Applications from international students are warmly encouraged, although the application procedures are somewhat more complex. If the applicant's first degree was completed in a country where English is not the first language, English-language proficiency must be documented at the time of application. Sample minimum scores are 580 for TOEFL or 6.5 for the British Council test.

Degree Requirements

All entering MA students will register for the joint, required two-semester course, ENGL*6010 Approaches to Research and Theory. This course must be taken upon entrance, requiring that entering students be registered for both the Fall and Winter semester. Students may choose between two options for completion of remaining degree requirements:

- Course-Work Option: The required ENGL*6010 plus four other courses; plus ENGL*6803 Research Project
- Thesis Option: the required ENGL*6010 plus two other courses, plus a thesis of 20,000 to 25,000 words (80-100 pages)

Creative Writing Option: both the research paper or project and the thesis may, with approval, and contingent upon faculty availability, be completed as exercises in creative writing.

Courses

Note

With the exception of ENGL*6010, the content of the courses listed below will vary according to the research interests of the faculty involved in offering the course. Specific course descriptions for a particular offering of the course will be available from the Graduate Co-ordinator one year in advance of the course being offered.

ENGL*6002 Topics in the History of Criticism U [0.50]

This course deals with various aspects of the field of literary criticism, focusing on a specific problem or question each time it is offered. Topics may include the investigation of a specific critical debate - the debate between the Ancients and the Moderns, for instance - or the various ways in which a particular concept - such as didacticism or intentionality - has been treated or is being treated in literary studies.

ENGL*6003 Problems of Literary Analysis U [0.50]

Variable in content and practical in orientation this course seeks to familiarize the student with particular critical techniques and approaches by applying specific examples of those approaches and methods to particular topics (e.g., cultural studies and renaissance literature, discourse analysis and the Victorian novel, computer-mediated analysis and the theatre of the absurd).

ENGL*6010 Approaches to Research and Theory U [1.00]

Introduces methodologies of graduate-level scholarship through a series of modules. Module 1 (which is required) focuses on a common text of imaginative literature, to introduce a range of theoretical and interpretative strategies and research tools. Subsequent modules (of which two are required) focus on particular issues in the study of literature and performance. NOTE: ENGL*6010 is offered over the Fall and Winter semesters and students must therefore register for the course in both Fall and Winter. They will receive an INP (“in progress”) grade at the end of the Fall, and a final grade at the end of the Winter. Students may, with approval, and contingent upon faculty availability, be completed as exercises in creative writing.

ENGL*6803 Research Project

A course to be offered at least once every academic year. This course may focus on a current issue in English studies, or on a specific problem or question each time it is offered. Topics may include the investigation of a specific critical debate - the debate between the Ancients and the Moderns, for instance - or the various ways in which a particular concept - such as didacticism or intentionality - has been treated or is being treated in literary studies.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL*6412</td>
<td>Topics in Medieval/Renaissance Literature U</td>
<td>0.50</td>
<td>A examination of the literature of Britain between the 17th century and the latter part of the 18th century. Topics may focus on a single author, specific genre, or relationships between the literary and the cultural.</td>
</tr>
<tr>
<td>ENGL*6421</td>
<td>Topics in Eighteenth Century and Romantic Literature U</td>
<td>0.50</td>
<td>A examination of the literature of Britain between the 17th century and the latter part of the 18th century. Topics may focus on a single author, specific genre, or relationships between the literary and the cultural.</td>
</tr>
<tr>
<td>ENGL*6431</td>
<td>Topics in Nineteenth Century Literature U</td>
<td>0.50</td>
<td>A study of the literature of Britain from the late 18th century until the start of the First World War. Topics may focus on a single author, specific genre, or a central critical question.</td>
</tr>
<tr>
<td>ENGL*6441</td>
<td>Topics in Modern British Literature U</td>
<td>0.50</td>
<td>A study of the literature of Britain in the twentieth century. This course includes a consideration of the interaction between literature and culture in the period - sometimes through the examination of a specific author, sometimes through the study of a particular genre or issue.</td>
</tr>
<tr>
<td>ENGL*6451</td>
<td>Topics in American Literature U</td>
<td>0.50</td>
<td>Topics may include a focus on a single region, such as the American West, on a single time period, such as the Civil War, on a specific genre, such as the novels of frontier women, or other issues in American literary studies.</td>
</tr>
<tr>
<td>ENGL*6611</td>
<td>Topics in Women's Writing U</td>
<td>0.50</td>
<td>In the past the course has dealt with Victorian women poets, with the place of women in the literature of the American West, and with other issues of interest to students of women's writing and the broader issues of feminist theory.</td>
</tr>
<tr>
<td>ENGL*6621</td>
<td>Topics in Children's Literature U</td>
<td>0.50</td>
<td>Past offerings have involved a focus on a specific author - such as Lucy Maud Montgomery - or on a specific kind of writing for or by children.</td>
</tr>
<tr>
<td>ENGL*6641</td>
<td>Topics in Scottish Literature U</td>
<td>0.50</td>
<td>Courses under this rubric are concerned with the various literatures produced by Scots both within and beyond the boundaries of Scotland. The course could involve the study of a specific genre, the investigation of a specific theme, or the examination of a particular author over the course of her/his career.</td>
</tr>
<tr>
<td>ENGL*6691</td>
<td>Interdisciplinary Studies U</td>
<td>0.50</td>
<td>Designed to provide the opportunity to explore alternative fields and modes of critical inquiry, this variable-content course will study the relationship between literary study and other forms of intellectual inquiry such as the relationship between literature and sociology, between critical theory and psychology, between literary history and historical fact.</td>
</tr>
<tr>
<td>ENGL*6801</td>
<td>Reading Course I U</td>
<td>0.50</td>
<td>An independent study course, the nature and content of which is agreed upon between the individual student and the person offering the course. Subject to the approval of the student's advisory committee and the graduate committee.</td>
</tr>
<tr>
<td>ENGL*6802</td>
<td>Reading Course II U</td>
<td>0.50</td>
<td>An independent study course, the nature and content of which is agreed upon between the individual student and the person offering the course. Subject to the approval of the student's advisory committee and the graduate committee.</td>
</tr>
<tr>
<td>ENGL*6803</td>
<td>Research Project U</td>
<td>1.00</td>
<td>An independent study course, the content of which is agreed upon between the individual student and the person offering the course. Subject to the approval of the student's advisory committee and the Graduate Committee. This course is designed to provide the student with the opportunity to conduct an extended research project that, while not as complex or as extensive as a thesis, still provides the student with training in research methodology.</td>
</tr>
<tr>
<td>ENGL*6811</td>
<td>Special Topics in English U</td>
<td>0.50</td>
<td>Depending on the research interests of the instructor, courses under this rubric explore topics in the study of literature that do not fall neatly under the rubrics above. In the past the course has dealt with literature and aging, and with issues in the field of popular culture.</td>
</tr>
</tbody>
</table>
Environmental Biology

The Department of Environmental Biology offers programs of study leading to MSc and PhD degrees. Graduate studies in this department are designed to train people to work independently and imaginatively with a high level of technical skill and scientific acumen in various areas of environmental biology.

Administrative Staff

VIII. Graduate Programs, Environmental Biology 71

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BSc, MSc Acadia, PhD Guelph - Professor

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Paul H. Goodwin
BS Villanova, MSc Minnesota, PhD California (Davis) - Professor

Andrew M. Gordon
BScF New Brunswick, PhD Alaska - Professor

Ernesto Guzman
DVM Mexico, MSc California (Davis) - Associate Professor

J. Christopher Hall
BSc, MSc Guelph, PhD Alberta - Professor

Rebecca Hallett
BSc Toronto, MP, PhD Simon Fraser - Assistant Professor

Thomas Hsiang
BSc, MSc British Columbia, PhD Washington - Professor

Peter G. Kevan
BSc McGill, PhD Alberta - Professor

Hung Lee
BSc British Columbia, PhD McGill - Professor

Steven A. Marshall
BSc (Agr) Guelph, MSc Carleton, PhD Guelph - Professor

Jonathan A. Newman
BA, PhD State Univ. of New York - Associate Professor

Gard W. Otis
BS Duke, PhD Kansas - Professor

Leonard Ritter
BSc, MSc Montreal, PhD Queen's - Professor

Jonathan M. Schmidt
BSc, PhD Toronto - Associate Professor

Cynthia D. Scott-Dupree
BSc Brandon, MP, PhD Simon Fraser - Professor and Associate Chair

Mark K. Sears
BS, PhD California - Professor

Paul K. Sibley
BSc, MSc Guelph, PhD Waterloo - Associate Professor

Keith R. Solomon
BSc, MSc Rhodes, PhD Illinois - Professor

Jack T. Trevors
BSc, MSc Acadia, PhD Waterloo - Professor

MSc Program

The MSc program has five areas of specialization: entomology, environmental microbiology and biotechnology, environmental toxicology, plant and forest systems and plant pathology.

- Environmental toxicology examines how terrestrial and aquatic organisms interact with toxic compounds in the environment, describes the methods and tools needed to assess environmental impacts, and emphasizes practical management solutions to address environmental problems.
- Plant and forest systems examines the ecological interactions in forest ecosystems and controlled environments such as greenhouses, growth chambers and life support systems for humans in space. Emphasis is placed on carbon dynamics, nutrient cycling, ecological modeling, environment sensor technology, atmosphere management (eg. "sick building syndrome") and environmental remediation.
- Plant pathology emphasizes the ecology and genetics of plant pathogens, plant disease resistance and epidemiology, the genomics and molecular biology of plant-pathogen interactions, and the development of new plant disease management strategies, such as the use of chemical, cultural and biological control agents.

Admission Requirements

Normally, applicants must hold a bachelor's degree with high second-class honors standing or better in a field appropriate to their proposed area of study. Interested students from other disciplines may also be acceptable, subject to the decision of the department graduate admissions committee.

Degree Requirements

A candidate for the MSc degree is expected to have a general knowledge of fundamental aspects of biology and detailed knowledge of the specialty area. The specialty area will normally be one of the areas in which the Department of Environmental Biology is prepared to offer a graduate degree. In addition, students are encouraged to obtain knowledge of both theoretical and applied aspects of their specialty area.

Before the end of the student's first semester, the advisory committee will meet informally with the student to discuss the student's background, interests and knowledge in the proposed research area. The advisory committee will then establish a program of prescribed courses (at least 1.5 credits of graduate level courses) and, if required, additional courses.

All MSc candidates must complete a thesis. A statement of the objectives of the thesis research program should be prepared as early as possible. A normal MSc program requires six semesters. Programs involving field work may require seven or eight semesters. The number of courses per semester should not normally exceed four. Among these would be courses that are core requirements of the undergraduate specialty and represent the candidate's deficiencies.

Graduate students must take both the Seminar, ENVB*6710, and the Advanced Seminar, ENVB*6720, unless exempted from taking any of these courses by the advisory committee. Exemptions are subject to approval by the Graduate Education Committee.

PhD Program

The PhD program emphasizes the same major areas of specialization as the MSc program.

Admission Requirements

 Normally applicants should have attained a master's degree with high second-class honours standing or better in a field appropriate to their proposed area of study. Under exceptional circumstances, as noted in the Graduate Calendar, students may be permitted to transfer from an MSc to a PhD program without completing the master's degree. Interested students from other disciplines may also be acceptable subject to the decision of the department graduate admissions committee.

Degree Requirements

A candidate for the PhD degree is expected to have a general knowledge of fundamental aspects of biology and detailed knowledge of the specialty area. The specialty area will normally be one of the areas in which the Department of Environmental Biology is prepared to offer a graduate degree. In addition, students are encouraged to obtain knowledge of both the theoretical and applied aspects of their specialty area.

Before the end of the student's first semester the advisory committee will meet informally with the student to discuss the student's background, interests and knowledge in the proposed research area. The advisory committee will then establish a program of prescribed courses and, if necessary, additional courses.

All PhD candidates must complete a thesis. A statement of the objectives of the thesis research program should be prepared as early as possible. A PhD program normally requires 9 to 11 semesters. The number of courses per semester should not normally exceed four. Graduate students must take both the Seminar, ENVB*6710, and the Advanced Seminar, ENVB*6720, unless exempted from taking any of these courses by the advisory committee. Exemptions are subject to approval by the Graduate Education Committee.

Interdepartmental Programs

Toxicology MSc/PhD Collaborative Program

The Department of Environmental Biology participates in the MSc/PhD program in toxicology. Professors Hall, Kevan, Lee, Ritter, Scott-Dupree, Sibley, Solomon, and Trevors are members of the Toxicology Interdepartmental Group. The faculty members' research and teaching expertise includes aspects of toxicology; they may serve as advisers for MSc and PhD students.
Please consult the Toxicology listing [http://www.uoguelph.ca/toxicology/] for a detailed description of the MSc/PhD collaborative program.

**Collaborative International Development Studies MSc Collaborative Program**

The Department of Environmental Biology participates in the MSc program in Collaborative International Development Studies. Professors Gordon, Kevan, and Otis are faculty members who are currently participating in the program.

Please consult the Collaborative International Development Studies listing [http://www.uoguelph.ca/cids/graduate/index.shtml] for a detailed description of this program.

**Courses**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVB*6040</td>
<td>Molecular Basis of Plant-Microbe Interactions F [0.50]</td>
<td></td>
<td>A lecture and seminar course on recent advances in the study of plant-microbe interactions. Topics included are the biochemical, physiological and genetic aspects of plant defenses and the interaction of plants with pathogenic and mutualistic bacteria, fungi and viruses. Credit may be obtained for only one of ENVB<em>6040, BOT</em>6601 and PBIO*4000.</td>
</tr>
<tr>
<td>ENVB*6060</td>
<td>Topics in Phytopathology W [0.50]</td>
<td></td>
<td>Current topics and emerging issues in phytopathology and plant health will be examined through presentations, discussions and group projects. Emphasis will be placed on ecology, population biology and genetics of plant pathogens and other microorganisms, and their application to current practices in plant health.</td>
</tr>
<tr>
<td>ENVB*6080</td>
<td>Plant Disease Epidemiology and Management W [0.50]</td>
<td></td>
<td>Epidemiology and management of plant diseases caused by fungi, viruses, and bacteria. (Offered in alternate years.)</td>
</tr>
<tr>
<td>ENVB*6180</td>
<td>Physiology and Biochemistry of Herbicides W [0.50]</td>
<td></td>
<td>Chemical and biological fate of herbicides in soil. Physical, morphological and physiological factors influencing herbicidal selectivity and modes of action. (Offered in alternate years.) Department of Environmental Biology.</td>
</tr>
<tr>
<td>ENVB*6190</td>
<td>Environmental Microbial Technology W [0.50]</td>
<td></td>
<td>Current topics in selected areas of environmental microbial technology. Emphasis will be placed on the physiology and genetics of microorganisms useful in environmental biotechnology. The course involves extensive use of current journal articles. (Offered in alternate odd years.) Undergraduate degree in microbiology or related discipline.</td>
</tr>
<tr>
<td>ENVB*6340</td>
<td>Colloquium in Insect Systematics W [0.25]</td>
<td></td>
<td>Weekly discussions and seminars dealing with current topics in systematic entomology.</td>
</tr>
<tr>
<td>ENVB*6370</td>
<td>Physiology of Insects F [0.50]</td>
<td></td>
<td>Students will be assigned a library exercise and will select a laboratory project in their own area of interest. Emphasis will be placed on techniques and familiarity with current literature.</td>
</tr>
<tr>
<td>ENVB*6451</td>
<td>Topics in Environmental Biology F, W, S [0.25]</td>
<td></td>
<td>This course provides graduate students, either individually or in groups, with the opportunity to pursue topics in the major areas of departmental specialization: plant protection and environmental management. This course may be offered in any of lecture, reading/seminar, or individual project formats.</td>
</tr>
<tr>
<td>ENVB*6452</td>
<td>Topics in Environmental Biology F, W, S [0.50]</td>
<td></td>
<td>See ENVB*6451</td>
</tr>
<tr>
<td>ENVB*6520</td>
<td>Pollination Biology F [0.50]</td>
<td></td>
<td>Pollination biology is discussed from both entomological and botanical viewpoints, stressing fundamental and applied aspects. (Offered in the fall semester or by arrangement with the professor.)</td>
</tr>
<tr>
<td>ENVB*6530</td>
<td>Ecotoxicological Risk Characterization W [0.50]</td>
<td></td>
<td>A biologically based advanced course that will give students working knowledge of current procedures and techniques for ecotoxicological risk characterization. The course material will cover the topics: problem definition, dose response characterization, exposure characterization, and risk assessment and risk-management decision making. (Credit may be obtained for only one of TOX<em>6530, ENVB</em>6530 and TOX*4550) Department of Environmental Biology.</td>
</tr>
<tr>
<td>ENVB*6540</td>
<td>Integrated Pest Management - Insects W [0.50]</td>
<td></td>
<td>Concepts associated with integrated pest management of insect pests of various plant hosts will be introduced to students in an interactive lecture and laboratory format. Experiential learning and skill development, associated with economic entomology, will also be emphasized. Credit may only be obtained for one of ENVB<em>6540 and ENVB</em>4100.</td>
</tr>
<tr>
<td>ENVB*6550</td>
<td>Bioactivity and Metabolism of Pesticides W [0.50]</td>
<td></td>
<td>The basis of pesticide bioactivity will be examined, with emphasis on mode of action, structure-activity relationships and analytical methods. Students will participate in seminars and prepare a research paper and/or conduct a laboratory research project in consultation with the instructor(s).</td>
</tr>
<tr>
<td>ENVB*6560</td>
<td>Forest Ecosystem Dynamics F [0.50]</td>
<td></td>
<td>An exploration of energy flow and distribution in forest ecosystems. Both components will be examined in the context of biomass and productivity, perturbations and resilience. Some aspects of modelling will be covered.</td>
</tr>
<tr>
<td>ENVB*6620</td>
<td>Management and Biology of the Honey Bee F [0.50]</td>
<td></td>
<td>An in-depth treatment of advanced topics related to honey bees, including management techniques such as wintering bees, queen rearing and instrumental insemination, comb-honey production, genetics and breeding of honey bees, caste determination, and social behaviour of honey bees. Discussion sections will focus on recent research.</td>
</tr>
<tr>
<td>ENVB*6710</td>
<td>Seminar F-W [0.25]</td>
<td></td>
<td>This course provides information and training in scientific presentations. Students will prepare a written essay based on their research and make an oral presentation of their proposed studies. Students are expected to take this course in the second or third semester of their study.</td>
</tr>
<tr>
<td>ENVB*6720</td>
<td>Advanced Seminar W [0.25]</td>
<td></td>
<td>Graduate students will prepare either an oral or a poster presentation on their thesis research. They will also be responsible for participating in the organization of a departmental graduate student symposium during which their presentations will be given and evaluated. Students must also attend weekly departmental seminars and prepare 5 precis for evaluation.</td>
</tr>
</tbody>
</table>
European Studies

European Studies information may be currently obtained at http://arts.uoguelph.ca/european_studies_ma/european_studies_ma.php

Administrative Staff

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Graduate Secretary
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Harald Bauer
BA, MA Wayne State, PhD Wilfrid Laurier - Associate Professor, Geography

Daniel Couinard
BA, MA, PhD Montreal - Associate Professor and Director of the School of Languages and Literatures, French Studies

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Dawn Cornelio
BA, MA, PhD Connecticut - Associate Professor, School of Languages and Literatures, French Studies

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Margot Irvine
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BA, MA, PhD Toronto - Associate Professor, Philosophy

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Ellen Waterman
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Mary Woodside
BA, BMus McGill, AM, PhD Chicago - Associate Professor, School of Fine Art and Music, Music

MA Program

The European Studies MA program is designed to provide students with a flexible, interdisciplinary approach to European Studies that allows for specialization within a core discipline and promotes expertise in European languages, cultures, history, and contemporary politics and society. The program combines humanities and social science perspectives on the study of European cultures and the breadth of the MA program to prepare students for future study and research at the doctoral level, either in a related core discipline or an interdisciplinary program. It also equips students for careers in any area in which knowledge about Europe, a solid training in research, and an in-depth understanding of the forms of inquiry and methodology of more than one discipline is critical for success.

Admission Requirements

Candidates for admission must hold a B.A. in an honours program or equivalent from a recognized university or college. The applicant must have achieved a grade average of at least B+ in the work of his/her last four semesters or last two undergraduate years (full-time equivalent). Applicants, normally, must have competence in one of French, German, Italian or Spanish, equivalent to third year undergraduate level. However, exceptions may be made for applicants who have lower degree of proficiency but have particularly strong qualifications in other respects.

Degree Requirements

All European Studies M.A. students will take a minimum of six semester courses, each worth 0.5 credits, including: a) Core courses: Team-taught courses on European Identities (EURO*6010) and Research Methods (EURO*6000). b) Electives: 2 credits to be chosen from a list of restricted electives. Students will also write a research project (EURO*6100), worth 1.0 credit of approximately 15,000 words under the direction of a faculty member.

All Study Abroad It is strongly recommended that students spend a term studying abroad, in a country where their core language is spoken. This is of particular importance for students who have not made study abroad a part of their undergraduate program. While abroad, students will have the opportunity to develop language proficiency by taking language courses, take courses towards degree requirements or conduct research for their major project. The minimum average for graduation is 70%.

Courses

**EURO*6000 Research Methods F [0.50]**

This course will: a) introduce students to the field and research methods of European Studies, b) familiarize them with field-relevant research skills and methodologies.

**EURO*6010 European Identities F [0.50]**

This core course examines historical and contemporary ideas of the nation and of Europe and their relationships to identity, from an interdisciplinary perspective. Using core concepts that span various disciplines, the course investigates the construction and implications of national, minority, European and EU identities.

**EURO*6020 Myth, Fairy Tales and European Identities W [0.50]**

An exploration of how myths and fairy tales have been transformed in European literature, music and art to express political, social or psychological concerns. Examples will be chosen from different national cultures and epochs. Content will vary according to the interests of the instructor(s).

**EURO*6030 Women and the Arts in Europe: Seeking Expression F [0.50]**

This course examines women's participation in the arts in Europe. Content will vary according to the interests of the instructor(s). Possible approaches: an examination of women's relationships to European cultural institutions, or the extent of women's participation in central pan-European artistic movements.

**EURO*6040 Europe and the Discourse of Civilization U [0.50]**

This course explores the genealogy of the idea of 'civilization' with respect to Europe as it emerges from the writings of medieval, renaissance, early modern and modern art historians, and its role in contemporary political discourse. Literature and music may also be included.

**EURO*6050 European Integration and the EU X [0.50]**

This course examines the contributions of international relations, comparative politics and/or governance/public policy to the study of European integration and the EU. Students will learn about the major concepts and theories of these sub-disciplines of political science to analyze the development, institutions, policy processes, policies and politics of the EU.X

**EURO*6060 Social/Political Philosophy and European Studies**

**EURO*6070 Topics in Comparative European Culture W [0.50]**

An examination of a topic, period, or region in any aspect of European culture. The content of the course will vary according to the topic and the professor teaching the course at any given time.

**EURO*6100 Research Project U [1.00]**

This research project will result in a major paper of about 15,000 words. The student chooses a topic with the guidance of a faculty member. The topic must be approved by the Graduate Committee.

**ECON*6370 Economic Development in Historical Perspective U [0.50]**

This course will examine the experience of economic development focusing on the emergence of the Third World. Topics for discussion will vary from year to year; they may include the impact of trade expansion during the eighteenth and nineteenth centuries, the role of manufacturing as a leading sector, statist vs. the new classical approaches to government policy, and others.
<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG*6400</td>
<td>Urbanization and Development (alternate years) U</td>
<td>0.50</td>
<td>Analysis of the evolution of urban form and pattern in the developing world within the context of the global urban system. Examines national urban systems and implications for dispersed development and rural change.</td>
</tr>
<tr>
<td>HIST*6300</td>
<td>Topics in Modern Europe I U</td>
<td>0.50</td>
<td>This seminar course will focus on selected aspects of the political and social history of Europe between 1789 and 1989. Topics to be examined will vary according to the expertise of the faculty and the interest of the students.</td>
</tr>
<tr>
<td>HIST*6310</td>
<td>Topics in Modern Europe II U</td>
<td>0.50</td>
<td>This seminar course will focus on selected aspects of the political and social history of Europe between 1789 and 1989. Topics to be examined will vary according to the expertise of the faculty and the interest of the students.</td>
</tr>
<tr>
<td>HIST*6380</td>
<td>Topics in Early Modern European History U</td>
<td>0.50</td>
<td>This seminar course examines current issues in early modern European history as selected by instructor(s). Participants review current research and historiography, discuss the principal debates, and develop their own perspectives through encounter with primary source materials.</td>
</tr>
<tr>
<td>PHIL*6140</td>
<td>Continental Theory I U</td>
<td>0.50</td>
<td>A study of the historical and contemporary origins of existentialism, phenomenology and post-modernism, concentrating on one or several of the classic texts.</td>
</tr>
<tr>
<td>PHIL*6150</td>
<td>Continental Theory II U</td>
<td>0.50</td>
<td>A study of the historical and contemporary origins of existentialism, phenomenology and post-modernism, concentrating on texts not covered in PHIL*6140 in the same year.</td>
</tr>
<tr>
<td>PHIL*6200</td>
<td>Problems of Contemporary Philosophy U</td>
<td>0.50</td>
<td>A study of a particular set of problems in contemporary philosophy.</td>
</tr>
<tr>
<td>UNIV*6500</td>
<td>International Study Option U</td>
<td>0.00</td>
<td>A period of study in another country as part of a graduate program at the University of Guelph. Details may be obtained from Graduate Program Services.</td>
</tr>
</tbody>
</table>

All are reading courses for special interests.
Family Relations and Applied Nutrition

The Department of Family Relations and Applied Nutrition offers MSc and PhD level graduate study in three fields: i) applied human nutrition, ii) family relations and human development, and iii) couple and family therapy. An accredited Master of Applied Nutrition professional degree is also offered. The multidisciplinary faculty in the department have expertise in psychology, sociology, education, social work, family therapy and nutrition. The faculty share a common interest in expanding and applying knowledge about family relations and human development, especially in relation to the social, emotional, psychological, nutritional, and economic well-being of families across the life cycle. Graduate programs with an emphasis on animal nutrition are available in the Department of Animal and Poultry Science and with an emphasis on metabolism in the Department of Human Health and Nutritional Sciences.

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MSc Program

Applied Human Nutrition

The MSc program in applied human nutrition incorporates both physiological and behavioural aspects of human nutrition and spans all age groups in its focus on the role of nutrition in human health and well-being. Special attention is given to therapeutic and community nutrition, nutrition education, and nutritional epidemiology. The MSc program normally requires two years of study.

Family Relations and Human Development

The MSc program in family relations and human development takes an interdisciplinary approach to the study of family dynamics and individual development across the lifespan. The program emphasizes a balance between theory, empirical research and practice in graduate training. Students have many options for building an individualized program of study combining coursework and thesis research. Building on core theory and methodology courses, students choose from professional and applied courses as well as courses on specialized topics. The program has particular strengths in the following areas: child and adolescent development, parent-child and family relations, human sexuality, culture and acculturation, adult development and gerontology, prevention, well-being, and social policy.

Couple and Family Therapy

The MSc program in couple and family therapy is a program in theory, research, and practice, accredited by the Commission on Accreditation for Marriage and Family Therapy Education of the American Association for Marriage and Family Therapy. The program is designed to produce sophisticated therapists and scholars by integrating contemporary theory, research competence, and systemic approaches to therapy in the understanding and treatment of couples, families, and individuals. This integration is coupled with high standards of professional and ethical conduct, attention to broader social issues impacting on couples and families, and an emphasis on issues of diversity, power, and privilege. Applicants to this program have two options: (1) thesis, and (2) non-thesis - by which to complete the degree.

Admission Requirements

General admission requirements for these programs include an honours degree or equivalent with at least a 'B+' average in the last two years.

Applied Human Nutrition

Admission requirements for the MSc program in applied human nutrition are most easily satisfied by applicants with honours degrees in human nutrition, and food and nutrition. Applicants with degrees in related fields (e.g., biology, biochemistry, human kinetics, and health studies) may be considered with suitable make-up work in core areas. Credit in the following undergraduate courses is normally required by all entering students: 1) one semester course in applied statistics (min. grade of 75%); 2) one semester course in research methods (min. grade of 75%); 3) two one-semester courses in biochemistry; 4) two one-semester courses in human physiology (at or beyond the second-year level); 5) two one-semester courses in human development/sociology/psychology/communications; 6) one 300-level and three 400-level one-semester courses in human nutrition. These requirements may be in progress at the time of application. The deadline for application is February 1 of each year.

Family Relations and Human Development

Admission requirements for the MSc program in family relations and human development can be satisfied by applicants with honours degrees in a wide variety of undergraduate majors including family studies, child studies, psychology, sociology, and nursing. Credit in the following undergraduate courses is required of all entering students: 1) one semester course in applied statistics (min. grade of 75%); 2) one semester course in social-scientific research methods (min. grade of 75%); 3) one semester course in one of human development, child development, gerontology, or parent-child relations; 4) one semester course in one of family sociology, social psychology, family relations, family theory, or communications; 5) three 400-level (senior, fourth year) one-semester courses. The deadline for application is February 1 of each year.

Couple and Family Therapy

General admission requirements for the MSc with an emphasis on couple and family therapy are the same as noted for the MSc in family relations and human development (above). Beyond this, a personal statement discussing your motivation for Couple and Family Therapy graduate education must be included with the application. Applicants for the thesis stream must also submit detailed research plan, outlining the relevance of the topic, as well as the specific research questions. Prior contact with a potential research advisor in the Department is recommended. Relevant work or volunteer experience is an asset.

The American Association of Marriage and Family Therapy (AAMFT) encourages applications from qualified students who are members of identified minorities. Scholarship aid is available to minority students on a competitive basis from AAMFT.

The most qualified applicants will be short-listed and invited to attend a day-long interviewing process in mid-February with the couple and family therapy faculty. Participation in the interview is required for admission. Applications from outside of Canada are welcome and external interviewing appropriately explored. The deadline for submission of the completed application package is on or before January 2 each year.
Prior to beginning the program admitted students must submit a current police record check (CPIC - Canadian Police Information Centre) from their local police department.

NOTE: Department policy does not permit transfer applications from graduate students registered in the Family Relations and Human Development program.

**Degree Requirements**

**Applied Human Nutrition**

For all students in the MSc program in applied human nutrition a minimum of six graduate courses will be chosen in consultation with the student’s advisor and advisory committee including:

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<th>Course Code</th>
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<tr>
<td>FRAN*6000</td>
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<tr>
<td>FRAN*6010</td>
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<tr>
<td>FRAN*6020</td>
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<tr>
<td>FRAN*6160</td>
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<tr>
<td>FRAN*6310</td>
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<tr>
<td>FRAN*6400</td>
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<td>FRAN*6610</td>
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<td>FRAN*6630</td>
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<td>FRAN*6640</td>
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In addition, students must complete a research thesis. The courses and research may emphasize, for example, community nutrition, therapeutic nutrition, and/or nutritional epidemiology. The courses may be taken within the department and in other academic units of the university including Biomedical Sciences, Capacity Development and Extension, Food, Agricultural and Resource Economics, Human Health and Nutritional Sciences, Political Science, Population Medicine, Rural Planning and Development, and Sociology and Anthropology.

**Family Relations and Human Development**

For all students in the MSc program in family relations and human development there are five required graduate courses:

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<th>Course Code</th>
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<tr>
<td>FRAN*6000</td>
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<tr>
<td>FRAN*6010</td>
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<td>FRAN*6020</td>
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<tr>
<td>FRAN*6340</td>
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<tr>
<td>FRAN*6330</td>
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</table>

In addition, most students take two to four additional graduate courses related to their program of study and complete a research thesis. The student’s choice of courses is primarily determined by research specialization. Each student works closely with an advisory committee in developing an individualized program of study by selecting courses that not only provide for interdisciplinary breadth but also address the student’s specific research and professional goals.

**Couple and Family Therapy**

The intensive curriculum in Couple and Family Therapy has been designed to enable students to achieve an integration of theory, practice and research. The program is guided by a systemic perspective, with emphasis on narrative, solution oriented and dialogic approaches. Students are encouraged to attain the best fit between established approaches and a personalized therapy style. Attention to issues of gender, race, class, ethnicity, sexual identity and culture as well as experiences of oppression and abuse are infused throughout all aspects of the program.

Students are expected to develop competence in research. Students may choose to write a thesis, by conducting a research study, or they may choose the major research paper (non-thesis) option, and write a critical paper on a selected clinical topic. The thesis option is reserved for those students intending to pursue PhD studies at the University of Guelph or elsewhere. Thesis students will take additional courses to support their thesis research project (see the course numbers in the list below). Students completing the degree in the non-thesis option, take FRAN*6350, Major Paper which includes seminar sessions on tools and techniques for preparing an analytical and critical research review paper...

**MAN Program**

The MAN program comprises one year (3 semesters) of advanced professional course work and competency-based practice experience. The program is designed to meet the professional practice requirements for becoming a registered dietitian. Graduates will complete the entry-level competencies of Dietitians of Canada (DC). Completion of the competencies will qualify a graduate to write the registration examination to become a member of the College of Dietitians of Ontario (CDO), or other provincial dietetic regulatory body. The program is accredited by Dietitians of Canada as a dietetic internship.

The course work and practicum options permit the pursuit of interests in the various areas of dietetic practice, while meeting the required entry-level dietetic competencies. Students are charged a practicum fee for each semester of the program, in addition to the University academic and non-academic fees.

**Admission Requirements**

Students applying to the Master of Applied Nutrition program must have an honours degree from a dietetic program accredited by Dietitians of Canada. Applicants should have a minimum average of at least B+ in the last two years of their undergraduate program. Credit in the following courses is required prior to beginning the program: 1) one semester course in applied statistics (min. grade of 75%) and 2) one semester course in research methods (min. grade of 75%). These requirements may be in progress at the time of application.

All applications will be reviewed by a committee of Applied Human Nutrition graduate faculty. The AHN faculty will interview the most qualified applicants, rank the candidates, and forward recommendations to the Dean of Graduate Studies. The deadline for application is February 1 of each year.

**Degree Requirements**

Students in the Masters of Applied Nutrition program will take the following courses:

<table>
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<tr>
<th>Course Code</th>
<th>Credit</th>
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<tbody>
<tr>
<td>FRAN*6510</td>
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<tr>
<td>FRAN*6610</td>
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<tr>
<td>FRAN*6710</td>
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<tr>
<td>FRAN*6720</td>
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<td>1.50</td>
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<tr>
<td>FRAN*6750</td>
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</table>

Graduates who have completed all required competencies successfully can apply to write the examination and qualify as a member of the College of Dietitians of Ontario (CDO).

**PhD Program**

**Applied Human Nutrition**

The PhD Program in applied human nutrition is a three-year program with a strong research focus involving biological and/or social-science perspectives. Each student works closely with an advisory committee in developing an individualized program of study that provides depth and addresses the student’s specific research and professional goals.

**Family Relations and Human Development**

The PhD program in family relations and human development is a three-year program with a strong research focus. Each student works closely with an advisory committee to develop an individualized program of study that provides depth and addresses the student’s specific research and professional goals. Building on core theory and methodology courses, students choose from professional and applied courses as well as courses on specialized topics. The program has particular strengths in the following areas: child and adolescent development, parent-child and family relations, human sexuality, culture and acculturation, adult development and gerontology, prevention, well-being, and social policy.
Admission Requirements

Applied Human Nutrition

Students applying to the PhD program in applied human nutrition should have an MSc degree in human nutrition or a closely related field. A master's thesis is normally required for admission. These requirements may be in progress at the time of application.

Family Relations and Human Development

Students applying to the PhD program in Family Relations and Human Development should have an MSc degree (or in progress) in Family Relations and Human Development or a closely related degree program (e.g., human development, gerontology, psychology, sociology, couple and family therapy, social work). A master's thesis is normally required for admission.

Students enrolled in the MSc program are not automatically considered for the PhD program; a formal application is required for those wishing admission. Applications are evaluated with reference to academic, research, and professional experience with particular emphasis on research background and potential.

Degree Requirements

PhD students in applied human nutrition are required to take a minimum of nine courses that build a foundation for their research and/or practice:

<table>
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<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>FRAN*6000</td>
<td>Research Methods</td>
<td>0.50</td>
</tr>
<tr>
<td>FRAN*6010</td>
<td>Applied Statistics</td>
<td>0.50</td>
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<tr>
<td>FRAN*6020</td>
<td>Qualitative Methods</td>
<td>0.50</td>
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<tr>
<td>FRAN*6440</td>
<td>Applied Factor Analysis &amp; SEM</td>
<td>0.50</td>
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<tr>
<td>FRAN*6510</td>
<td>Nutrition in the Community</td>
<td>0.50</td>
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<tr>
<td>FRAN*6610</td>
<td>Advances in Clinical Nutrition/Assessment I</td>
<td>0.50</td>
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<tr>
<td>FRAN*6620</td>
<td>Nutritional Epidemiology</td>
<td>0.50</td>
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<tr>
<td>FRAN*6630</td>
<td>Advances in Clinical Nutrition/Assessment II</td>
<td>0.50</td>
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<tr>
<td>FRAN*6650</td>
<td>Research Seminar</td>
<td>0.25</td>
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These required courses and any additional course work will be chosen in consultation with the student's advisor and committee and will depend upon the availability of offerings in the co-operating departments and schools.

The student's choice of emphasis is primarily determined by research specialization and selection of elective courses. Each student works closely with an advisory committee in developing an individualized program of study by selecting courses that not only provide for interdisciplinary breadth but also address the student's specific research and professional goals. Each of the emphases indicates some broad areas of research that reflect current faculty interests and is intended to help students define an area of research and study.

Family Relations and Human Development

PhD students in family relations and human development are required to take seven courses (if not completed previously):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>FRAN*6000</td>
<td>Research Methods</td>
<td>0.50</td>
</tr>
<tr>
<td>FRAN*6010</td>
<td>Applied Statistics</td>
<td>0.50</td>
</tr>
<tr>
<td>FRAN*6020</td>
<td>Qualitative Methods</td>
<td>0.50</td>
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<tr>
<td>FRAN*6440</td>
<td>Applied Factor Analysis &amp; SEM</td>
<td>0.50</td>
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<tr>
<td>FRAN*6340</td>
<td>Interdisciplinary Perspectives in Family Relations and Human Development</td>
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<tr>
<td>FRAN*6280</td>
<td>Theorizing in Family Relations and Human Development</td>
<td>0.50</td>
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<tr>
<td>FRAN*6330</td>
<td>Research Seminar</td>
<td>0.25</td>
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The student's choice of emphasis is primarily determined by research specialization and selection of elective courses. Each student works closely with an advisory committee in developing an individualized program of study by selecting courses that not only provide for interdisciplinary breadth but also address the student's specific research and professional goals. Each of the emphases indicates some broad areas of research that reflect current faculty interests and is intended to help students define an area of research and study.

Reference check

According to recent Ontario legislation, agencies licensed by the Ministry of Community and Social Services which care for, or provide service to, children or vulnerable adults are required to do criminal reference checks on all their employees. Students enrolled in practica or field placement courses, in some instances, may be required to submit to the agency with which they are placed, personal information about any criminal convictions and pending criminal charges. The cost of acquiring this criminal reference check (Canadian police information check) will be the responsibility of each student. Applicants to the Couple and Family Therapy Program must submit the results of this check to the Department of Family Relations and Applied Nutrition at the time of their interview.

Courses

Applied Human Nutrition

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>FRAN*6510</td>
<td>Nutrition in the Community</td>
<td>0.50</td>
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<tr>
<td></td>
<td>Concepts and knowledge of nutrition as applied in community and public health nutrition. Examination of current programs in applied nutrition.</td>
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<tr>
<td>FRAN*6550</td>
<td>Research Seminar</td>
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<tr>
<td></td>
<td>Research literature in applied nutrition.</td>
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FRAN*6600 Research Methods F [0.50]

This course includes critical appraisal of the research literature. Research ethics, subject selection, measurement issues, survey design, experimental and quasi-experimental designs, cross-sectional and longitudinal designs, scale development, questionnaire development and sampling strategies are discussed.

Prerequisite(s): 75% in an undergraduate research methods course

FRAN*6010 Applied Statistics W [0.50]

Students will learn conceptual and practical applications of statistical analyses with emphasis on hypothesis formation, data screening, screening and description, test selection, inferential statistics, univariate and multivariate analysis of variance/covariance (including repeated measures designs), simple and multiple regression, logistic regression, regression diagnostics, model building and path analytic techniques.

Prerequisite(s): FRAN*6000

FRAN*6020 Qualitative Methods W [0.50]

This course teaches students how to use qualitative methods as a mode of inquiry for understanding issues in human development, nutrition and family relationships. The emphasis is on project design, data collection techniques, analysis strategies and procedures for final write-up.

FRAN*6550 Special Topics in Applied Human Nutrition U [0.50]

A survey and critical analysis of theoretical frameworks from Education and the Social Sciences as they are applied to the study and understanding of human nutrition behaviour. Research issues and applications are emphasized.

FRAN*6610 Advances in Clinical Nutrition/Assessment I U [0.50]

A first overview of nutrition assessment and clinical nutrition with emphasis on issues relevant to community based and non-acute care settings. Nutrition assessment methods will be discussed in depth along with emerging issues. Emphasis on clinical nutrition will be integration of theory and practice.

FRAN*6620 Nutritional Epidemiology U [0.50]

An exploration of selected non-communicable diseases. The emphasis is on epidemiologic methods and identification of nutritional risk factors.

FRAN*6630 Advances in Clinical Nutrition/Assessment II U [0.50]

Nutritional assessment issues specific to research will be discussed in depth. Selected clinical epidemiological and health service research methodologies, including meta-analysis, will be reviewed and applied to selected emerging issues in clinical nutrition practice.

FRAN*6710 Practicum in Applied Human Nutrition I U [1.50]

This course provides a practicum of 3 days per week with a dietetic-related agency or organization to develop and perform dietetic competencies (internship experience). In weekly seminars, students discuss and reflect on theory and dietetic practice issues.

Restriction(s): For MAN students only.

FRAN*6720 Practicum in Applied Human Nutrition II U [1.50]

This course provides a practicum of 3 days per week with a dietetic-related agency or organization to develop and perform dietetic competencies (internship experience). In weekly seminars, students discuss and reflect on theory and dietetic practice issues.

Restriction(s): For MAN students only.

FRAN*6730 Practicum in Applied Human Nutrition III U [1.50]

This course provides a practicum of 3 days per week with a dietetic-related agency or organization to develop and perform dietetic competencies (internship experience). In weekly seminars, students discuss and reflect on theory and dietetic practice issues.

Restriction(s): For MAN students only.

FRAN*6750 Final Project in Applied Human Nutrition U [0.50]

This project (usually related to an activity during the Practicum in Applied Human Nutrition (MAN)) consists of a written report of an applied research project in dietetic practice or a proposal for a research project, including literature review, purpose, methodology, and analysis and analysis plan.

Restriction(s): For MAN students only.

Family Relations and Human Development

VIII. Graduate Programs, Family Relations and Applied Nutrition

77
FRAN*6070 Sexual Issues and Clinical Interventions Across the Life Span U [0.50]
This course examines sexual issues and clinical interventions from a life span perspective. Focusing upon theory, research and clinical interventions it explores the relationship between issues in sexual development and sexual functioning.
Restriction(s): Signature required.

FRAN*6200 Research Topics in Family Relations and Human Development U [0.50]
Contemporary research in family relations and human development.
Restriction(s): Available only to FRAN graduate students.

FRAN*6210 Program Evaluation in Child and Family Services U [0.50]
An examination of the theoretical principles and practical applications of evaluation issues and strategies. Special attention is given to services for children and families across the life span. Group involvement in an actual program evaluation is a requirement for the course.

FRAN*6220 Family, Interpersonal and Social Issues in Mid and Later Life U [0.50]
This course examines conceptual, methodological and policy issues involving inter- and intra-generational family and social relationships throughout mid and later life.

FRAN*6221 Concepts and Strategies of Primary Prevention U [0.50]
The course explores selected concepts and strategies of primary prevention. Students examine research and current practice related to individual and family health and well-being, including education, community organization, competency promotion, natural care giving, and consultation.

FRAN*6260 Practicum U [0.50]
Supervised practicum experience in a variety of agencies or services. Placements are arranged on an individual basis subject to the requirements of students' programs of study and must be negotiated with faculty in advance of registration.

FRAN*6270 Issues in Family-Related Social Policy U [0.50]
This course investigates definitions of social policy, comparative family-related social policy, selected issues in Canadian family policy and frameworks for analysis of social policy. Issues in policy-related research are also explored.

FRAN*6280 Theorizing in Family Relations and Human Development U [0.50]
An examination of the meaning of science and theory in relation to the study of families and human development. Included is a discussion of the major social science paradigms including positivism, critical theory, social constructionism and post-modernity. This course is designed for doctoral students.

FRAN*6300 Theories of Development and Change Across the Life Span U [0.50]
An interdisciplinary examination of sociological and psychological theories of development and change across the life span. Critical comparisons among theories with competing assumptions at different points over individual and family life cycles is discussed.

FRAN*6310 Parent-Child Relations Across the Life Span U [0.50]
Considers theory and research on parent-child interactions, relationships and intergenerational transmission across the life span. (Offered in alternate years.)

FRAN*6320 Human Sexuality Across the Life Span U [0.50]
This course covers research, theoretical and substantive issues relevant to studying human sexuality across the life span. Topics include: child and adolescent sexuality, sexual identity, sexuality in adulthood and old age, sexual assault, international research and sex education.

FRAN*6330 Research Seminar U [0.25]
Research literature in Family Relations and Human Development.

FRAN*6340 Interdisciplinary Perspectives in Family Relations and Human Development U [0.50]
This course acquaints students with the diverse disciplinary perspectives used in the study of family relations and human development. Substantive research issues provide a forum for integrating the separate perspectives and understanding the reciprocal relationship between individual and family growth and development.

FRAN*6370 Social Development During Childhood U [0.50]
A detailed study of factors important to social competence in childhood from infancy to adolescence.

FRAN*6380 Adolescence U [0.50]
Adolescence is examined from a multidisciplinary developmental-contextual perspective. Topics include: individual differences, development, and social and environmental contributions to adolescent psychosocial functioning.

FRAN*6410 Developmental Assessment and Intervention in Childhood and Adolescence U [0.50]
An examination of psychological difficulties encountered in childhood and adolescence. Special attention will be given to theoretical models used to explain childhood difficulties, categorization systems, assessment techniques, methods of intervention, as well as ethical issues specific to working with children and adolescence.

FRAN*6440 Applied Factor Analysis & SEM F [0.50]
This course introduces students to exploratory factor analysis, confirmatory factor analysis, and structural equation modeling. Topics include: model selection and validation, multiple group models, measurement equivalence/invariance and latent mean analyses. This course is data-driven and students will learn through hands-on analytic experiences accompanied by in-class lectures and readings.
Prerequisite(s): FRAN*6000, FRAN*6100
Restriction(s): Instructor permission for non-FRAN students

FRAN*6450 Cultural Perspectives on the Family U [0.50]
Family relationships throughout the life span are considered drawing from the perspectives of cross-cultural psychology, cultural psychology and acculturation and diversity. Topics include the cultural context of family forms, dating and marriage, childrearing, socialization, and marital relations, parent-child relationships and intergenerational relationships.

Couple and Family Therapy

Note
The following courses are taken primarily by students in the Couple and Family Therapy emphasis. A limited number of spaces are available for some courses each time the courses are offered for students outside the Couple and Family Therapy area.

FRAN*6080 Special Topics in Couple and Family Therapy U [0.50]
This graduate seminar will feature research and practice issues in selected areas pertinent to the field of Couple and Family Therapy. Selected topics may vary from year to year.

FRAN*6090 Practicum in Couple and Family Therapy U [0.50]
This course features supervised clinical practice in couple and family therapy. It involves regular clinical work with couples, families, and individuals. Students meet with faculty each week for up to six hours of supervision. Supervision over the semester will involve both group and individual/dyadic meetings.
Restriction(s): Available only to students in the Couple and Family Therapy program

FRAN*6095 Externship in Couple and Family Therapy U [0.50]
This is an advanced clinical practicum in Couple and Family Therapy. Students are placed in a community agency where they accumulate 10-15 hours per week (over 3 days) of direct clinical contact time. All clinical work is supervised by a clinical supervisor on site.
Prerequisite(s): FRAN*6090
Restriction(s): Available only to students in the Couple and Family Therapy program

FRAN*6100 Clinical Issues in Couple and Family Therapy U [0.50]
This course features selected clinical issues each semester; examination of each issue will include the socio-cultural context, theoretical location, and conceptual and practical implications for couple and family therapy.
Co-requisite(s): FRAN*6090
Restriction(s): Available only to students in the Couple and Family Therapy program

FRAN*6120 Theories and Methods of Family Therapy I U [0.50]
This course will offer an historical perspective on the development of the field of couple and family therapy beginning with family systems therapy, through intergenerational models, to current constructionist approaches. Intervention methods consistent with these conceptual frameworks are examined.

FRAN*6130 Theories and Methods of Family Therapy II U [0.50]
This course explores clinical theory and methods associated with structural, strategic and solution focused models of couple and family therapy. Feminist perspectives and approaches are used to examine power and gender dynamics in therapy.

FRAN*6140 Professional Issues U [0.50]
An exploration of ethics in couple and family therapy; legal issues in the practice of family therapy; and professional issues regarding identity, licensure and practice.

FRAN*6160 Introduction to Systemic Practice in Couple and Family Therapy U [0.50]
An exploration of family process to understand diversity in family structures and functioning from a systemic conceptual framework. Applied activities focus on developing basic communication, observational, and therapy skills. Student participation in small learning groups supports skill development and integration of theory and practice.
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Value</th>
<th>Description</th>
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</thead>
</table>
| FRAN*6180           | Research Issues in Couple and Family Therapy W    | 0.50         | The focus of this course is on research in Couple & Family Therapy, including issues related to evidence-based practice, therapeutic outcome, and therapeutic process. A selected review of quantitative and qualitative research methods and exemplary research is included.  
*Restriction(s):* FRAN graduate students only. |
| FRAN*6350           | Major Research Paper U                            | 1.00         | The major research paper is an option open only to MSc students within the Couple and Family Therapy area. Students must demonstrate their ability to accurately synthesize and critically evaluate the literature in a specific area of interest. Detailed guidelines are provided. |
Food, Agricultural and Resource Economics

The graduate program in Food, Agricultural and Resource Economics offers opportunities for master of science (MSc) and doctor of philosophy (PhD) studies in agricultural economics. The MSc and PhD are research-oriented degrees which require both course work and a thesis.

Administrative Staff

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BSc Queen's, MBA Wilfrid Laurier, PhD McMaster - Associate Professor (Joint appointment with College of Management and Economics)

Alfonso J. Weersink
BSc Guelph, MSc Montana State, PhD Cornell - Professor

MSc Program

The MSc program in Food, Agricultural and Resource Economics focuses on three major areas of emphasis:

• Economics of agricultural markets
• Food business economics
• Natural resource and environmental economics

The aim of the MSc program is to develop in students a fundamental understanding of economic principles and their application in identifying and solving relevant problems related to food, agriculture, and natural resources. The program also strives to develop appropriate analytical, methodological, and communication skills to enable students to analyze agriculture and resource problems effectively and explain their findings.

Admission Requirements

All students entering the Master of Science program must have achieved the University required minimum 70% (B-) average or equivalent. In addition, they are expected to have already taken, or be expected to take at the initiation of the program, the following basic courses:

• Intermediate level micro- and macro-economic theory (ECON*2310 and ECON*2410 or equivalent)
• Calculus and matrix algebra with applications to economics (ECON*2770 or equivalent)
• Intermediate level statistics (ECON*3740 or equivalent).

These courses, if needed, normally are taken as make-up courses and do not carry graduate credit. In some instances they may be supplemented with other undergraduate courses at the discretion of the Departmental Graduate Program Committee. The Departmental Graduate Program Committee examines each application before the student is proposed to the School of Graduate Studies for admission into the program.

Degree Requirements

MSc students are required to complete successfully six taught courses plus a seminar course. The minimum course work requirements (assuming all undergraduate background requirements have been met) are:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ECON*6000</td>
<td>[0.50]</td>
<td>Microeconomic Theory I</td>
</tr>
<tr>
<td>or</td>
<td></td>
<td>Advanced Microeconomic Theory</td>
</tr>
<tr>
<td>ECON*6910</td>
<td>[0.50]</td>
<td>Applied Policy Analysis I</td>
</tr>
<tr>
<td>AGEC*6670</td>
<td>[0.50]</td>
<td>Applied Quantitative Methods for Agricultural Economics</td>
</tr>
<tr>
<td>AGEC*6610</td>
<td>[0.50]</td>
<td>Methodology of Economics</td>
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</table>

Two graduate courses in Food, Agricultural or Resource Economics as approved by the student's advisory committee

<table>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>AGEC*6800</td>
<td>[0.00]</td>
<td>Seminar in Agricultural Economics</td>
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</tbody>
</table>

PhD Program

The PhD program in Food, Agricultural and Resource Economics focuses on three major areas of emphasis:

• Economics of agricultural markets
• Food business economics
• Natural resource and environmental economics

Across these areas there is a focus on both developed and developing countries. Students in the PhD program focus on an area of specialization relevant to their thesis research, plus complete courses in microeconomic theory and economic research methods. All students must complete and defend a thesis in their chosen area of specialization.

Admission Requirements

Minimum University of Guelph admission requirements for a Doctoral program include:

1) a satisfactory baccalaurate; and 2) at the very minimum high second-class honours ('B' standing) in a recognized Master's degree. Students are admitted to the PhD program in the fall of each year. Students entering the PhD program are expected to have satisfied the requirements, or their equivalents, of the department's MSc degree in Food, Agricultural and Resource Economics.

In cases where a student's master's degree is not equivalent to that offered by the department, the student may initially be accepted into the MSc program and may then apply for transfer to the PhD program at some time during the first three semesters. Applications for transfer must be supported by the Departmental Graduate Program Committee and approved by the Board of Graduate Studies. The student does not have to complete all the requirements of the MSc before transferring to the PhD program, but must achieve high academic standing.

Degree Requirements

Students enrolled in the PhD program must successfully complete a program of at least nine taught courses that prepare them for the various elements of comprehensive examination, as outlined below. However, students that are able to demonstrate satisfactory level of competence in any of these requirements may have these course requirements adjusted accordingly, subsequent to evaluation and the decision of the Departmental Graduate Program Committee.

Microeconomic Theory:

<table>
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<tr>
<th>Course Code</th>
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<th>Course Title</th>
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<tbody>
<tr>
<td>ECON*6000</td>
<td>[0.50]</td>
<td>Microeconomic Theory I</td>
</tr>
<tr>
<td>ECON*6010</td>
<td>[0.50]</td>
<td>Microeconomic Theory II</td>
</tr>
</tbody>
</table>

Economic Research Methods:

<table>
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<tr>
<th>Course Code</th>
<th>Units</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEC*6360</td>
<td>[0.50]</td>
<td>Mathematical Programming</td>
</tr>
<tr>
<td>AGEC*6100</td>
<td>[0.50]</td>
<td>The Methodology of Economics</td>
</tr>
</tbody>
</table>

Plus ONE from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>ECON*6050</td>
<td>[0.50]</td>
<td>Introduction to Econometric Methods</td>
</tr>
<tr>
<td>ECON*6140</td>
<td>[0.50]</td>
<td>Econometrics I</td>
</tr>
</tbody>
</table>

Food, Agricultural and Resource Economics

<table>
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<tr>
<th>Course Code</th>
<th>Units</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEC*6920</td>
<td>[0.50]</td>
<td>Applied Policy Analysis II</td>
</tr>
<tr>
<td>AGEC*6400</td>
<td>[0.50]</td>
<td>Advanced Topics in Agricultural Economics</td>
</tr>
</tbody>
</table>

Plus ONE from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEC*6940</td>
<td>[0.50]</td>
<td>Food Firms, Consumers and Markets II</td>
</tr>
<tr>
<td>AGEC*6960</td>
<td>[0.50]</td>
<td>Natural Resource Economics II</td>
</tr>
</tbody>
</table>

Qualifying Examination

The required taught courses are intended to prepare students for the qualifying examination. The PhD qualification examination process evaluates a student's readiness to conduct independent research in Food, Agricultural and Resource Economics at the PhD level, including:

1. Mastery of the breadth and depth of the subject matter.
2. Ability to integrate the material derived from his or her studies.
3. Ability and promise in research.

It should be noted that successful completion of these courses is not necessarily sufficient for qualification to PhD candidacy.

Before proceeding to the qualifying examination students are expected to complete successfully pre-qualifying examinations in microeconomic theory and in Food, Agricultural and Resource Economics, which aim to assess a student's understanding of key theoretical and empirical concepts. Students are allowed two attempts at each of these pre-qualifying examinations. Students that fail any one of these pre-qualifying examinations at the second attempt will not be permitted to proceed to the qualifying examination.

The qualifying examination consists of a written thesis proposal and an oral defence of this proposal. Students will be permitted two attempts at the qualifying examination.

**Interdepartmental Programs**

**International Development Studies Collaborative MA/MSc Program**

The Department of Food, Agricultural and Resource Economics participates in the Collaborative International Development Studies (CIDS) program. Please consult the Collaborative International Development Studies listing for a detailed description of the MA/MSc collaborative program including the special additional requirements for each of the participating departments.

**Resource and Environmental Economics PhD Program**

A PhD in Resource and Environmental Economics is offered collaboratively by the Departments of Economics and Food, Agricultural and Resource Economics. Students apply to and enroll in one of these departments and the degree is awarded in the subject area of that department. This program is described in detail under Resource and Environmental Economics.

**Courses**

**Production Economics**

**AGEC*6360 Mathematical Programming W [0.50]**

A study of the algebra, assumptions and economic logic of important optimizing techniques and their application to problems in quantitative economics.

**AGEC*6430 Case Studies in Farm Management U [0.50]**

Identification of problems and opportunities on selected representative farms; use of selected management tools for diagnosis analysis and planning; evaluation of relevant management strategies based on the concept of management as a continuous decision-making process.

**AGEC*6970 Applied Quantitative Methods for Agricultural Economists F [0.50]**

This course exposes students to the empirical tools agricultural economists use when conducting research. Emphasis is placed on what tool(s) to use in a variety of circumstances. Topics covered will include advanced econometric techniques, optimization and simulation modelling. Students will also be exposed to the different quantitative software packages used in empirical research.

**Prerequisite(s):** ECON*2770

**AGEC*6980 Agricultural Trade Relations W [0.50]**

An examination of the institutional, theoretical and empirical aspects of international agrofood trade.

**Prerequisite(s):** ECON*3710, AGEC*6910

**Agricultural Policy and Trade**

**AGEC*6600 Agriculture in Economic Development F [0.50]**

The course is concerned with the role of agriculture as a source of food, fibre and employment in developing countries. The interaction between agriculture and other sectors of the economy and other countries is also examined.

**Prerequisite(s):** ECON*1050 and ECON*1100

**AGEC*6910 Applied Policy Analysis I F [0.50]**

An overview of domestic and international agrifood policies and an introduction to the concepts and methods used to evaluate domestic trade policies.

**Prerequisite(s):** ECON*3710

**AGEC*6920 Applied Policy Analysis II F [0.50]**

A presentation and evaluation of advanced quantitative agrifood policy models and selected special topics related to domestic and trade policy evaluation.

**Prerequisite(s):** AGEC*6910

**Co-requisite(s):** ECON*3710

**Economics of Food Markets**

**AGEC*6930 Food Farms, Consumers and Market I F [0.50]**

This course examines the application of microeconomic theory to food markets. Topics covered include: optimizing behaviour by economic agents, the certainty equivalent profit model and decision making under risk, optimal capital replacement models and their application to food system economics, consumer behaviour with respect to food products and behaviour with respect to food products and behaviour of marketing intermediaries and food processors. New developments in the economic theory of the form are surveyed.

**Prerequisite(s):** ECON*2310, ECON*3740

**AGEC*6940 Food Farms, Consumers and Markets II F [0.50]**

This course builds on Food Farms, Consumers and Markets I by extending the breadth and depth of student's understanding and scope of economic analysis. Advanced techniques in producer and consumer theory, as well as advance market analysis techniques are presented and utilized. Understanding of the research process and advanced methods is emphasized throughout.

**Prerequisite(s):** AGEC*6930, ECON*3710

**Natural Resource Economics**

**AGEC*6950 Natural Resource Economics I W [0.50]**

Natural Resources I introduces conventional theoretical modeling approaches to renewable resources, e.g. fisheries & forestry. Seminal literature is reviewed and contemporary theoretical work and empirical papers discussed. Emphasis is placed on setting up economic models, deriving and interpreting general results. Applied methods include dynamic optimization and regression analysis. Additional topics include land economics and the property rights approach.

**AGEC*6960 Natural Resource Economics II F [0.50]**

Natural Resources II reviews & extends conventional theoretical modeling approaches to renewable resources, e.g. fisheries & forestry. Seminal literature is reviewed and contemporary theoretical work and empirical papers discussed. Emphasis is placed on setting up economic models addressing natural resource issues - uncertainty, externalities & policy instruments, and derive reduced-form versions of forestry & fishery for empirical estim. & analysis. Primary method of math analysis involves dyn. opt. techniques. Detailed math derivations & proofs expected. Also- extinction, climate change, carb sequest.

**Prerequisite(s):** ECON*6010, AGEC*6950

**Agribusiness Management**

**AGEC*6070 Research Methods for Managers F [0.50]**

The objective of the course is to provide students with a working knowledge of quantitative and qualitative techniques used in the analysis of management problems. The emphasis is on the application and interpretation of quantitative and qualitative methods rather than on theoretical background.

**AGEC*6110 Marketing Research W [0.50]**

A study of marketing research analysis in agribusiness firms, with emphasis on the marketing research function and the application of quantitative problem solving techniques.

**AGEC*6120 Marketing Management F [0.50]**

A study of marketing decision-making in agribusiness firms, with emphasis on the formulation of strategic marketing plans.

**AGEC*6130 Special Topics in Financial Management U [0.50]**

An advanced course for students who wish to explore current and future topics in financial management, trends and problems in financial management, and capital and investment theory related to food and agribusiness firms.

**AGEC*6140 Food and Agribusiness Strategic Management U [0.50]**

An advanced course requiring the application of conceptual, analytical, problem identification, and problem solving skills to develop organizational strategy. Food, agribusiness and other cases are used to explore the development and implementation of strategy and to assess the dynamic relationship between strategy and competition.

**AGEC*6180 Financial and Managerial Accounting F [0.50]**

This course emphasizes the gathering and use of financial information to facilitate effective financial and management decisions. Cases are used to approach the subject from the perspective of the user of accounting information rather than that of the supplier.

**AGEC*6200 Financial Management W [0.50]**

This course takes the viewpoint of the senior financial officer of a commercial enterprise. The focus is on the management of cash, accounts receivable, inventories and capital assets, as well as on the sourcing of funds through short-term liabilities, long-term debt and owners' equity.

**Prerequisite(s):** AGEC*6180

**Restriction(s):** Non MBA students only by permission of instructor.
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<th>Course Code</th>
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<tbody>
<tr>
<td>AGEC*6230</td>
<td>Food and Agribusiness Economics and Policy W [0.50]</td>
<td>An analysis of economic and policy issues relevant for food and agribusiness managers in affluent economies, with emphasis on the economic and policy environment that exists within North America.</td>
</tr>
<tr>
<td>AGEC*6250</td>
<td>Futures and Options W [0.50]</td>
<td>The theory and application of futures, options and other derivative securities for marketing, risk management, and investment purposes. Emphasis is placed on application of the instruments to real business situations, and on the development and implementation of trading strategies designed to meet the precise needs of specific business clients.</td>
</tr>
<tr>
<td>AGEC*6260</td>
<td>Managing Business Risk U [0.50]</td>
<td>This course is designed to help students recognize, measure and understand different components of business risk. Case studies are used to explore and evaluate risk management alternatives and to implement and monitor risk mitigating strategies. Corporate responsibility in relation to risk management is also addressed.</td>
</tr>
<tr>
<td>AGEC*6410</td>
<td>Operations Management I S [0.50]</td>
<td>Overview of the management problems involved in planning, operating and controlling the systems used in operations, with emphasis on farm and agribusiness applications.</td>
</tr>
<tr>
<td>AGEC*6750</td>
<td>Problems in Agricultural Business F [0.50]</td>
<td>Seminar course with industry speakers, in preparation to AGEC*6760, and leading to a formal business project proposal.</td>
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<tr>
<td>Other Courses</td>
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<tr>
<td>AGEC*6400</td>
<td>Advanced Topics in Agricultural Economics S [0.50]</td>
<td>The application of economic theory and various contemporary tools of economic analysis in solving production problems in the agricultural sector of the economy.</td>
</tr>
<tr>
<td>AGEC*6760</td>
<td>Major Project in Food and Agribusiness Management U [0.50]</td>
<td>Management project leading to a referenced technical report on some aspect of food and agribusiness management. Completion of this course requires a formal presentation of the project to faculty and students.</td>
</tr>
<tr>
<td>AGEC*6100</td>
<td>The Methodology of Economics W [0.50]</td>
<td>Alternative views on the methodology of economics are reviewed and assessed. The process of problem identification in the development of a research project proposal is investigated.</td>
</tr>
<tr>
<td>AGEC*6720</td>
<td>Readings in Agricultural Economics F,S,W [0.50]</td>
<td>A reading course on selected topics of special interest. May be offered to individual students or to groups of students in any semester.</td>
</tr>
<tr>
<td>AGEC*6800</td>
<td>Seminar in Agricultural Economics S [0.00]</td>
<td>Students in the MSc program must give two presentations at the annual MSc research symposium; one in their first year outlining their research plan, and one in their second year on their thesis research results.</td>
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</table>
Food Safety and Quality Assurance

The interdepartmental collaborative program is the focal point for graduate teaching and research in food safety and quality assurance. The collaborative MSc program in food safety and quality assurance is intended to prepare food scientists, food engineers, veterinarians and others with appropriate scientific backgrounds for participation in food safety monitoring and maintenance in the food industry and in government. Students wishing to undertake graduate studies at the MSc level with emphasis on food safety and quality assurance will enter the program through a participating department. The participating academic units are Biomedical Sciences, Marketing and Consumer Studies, Environmental Biology, Food Science, Pathobiology, Population Medicine, and Engineering.

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Judy Campbell (106 Food Science, Ext. 56589) jacampe@uoguelph.ca

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Milena Corredig
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Valerie J. Davidson
Professor, Engineering

H. Douglas Goff
Professor, Food Science

Jeffrey Gray
Associate Professor, Pathobiology

Mansel W. Griffiths
Professor, Food Science

Carlton L. Gyles
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S. Wayne Martin
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Professor, Food Science

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Professor, Population Medicine

Keith Warriner
Assistant Professor, Food Science

Anne Wilcock
Associate Professor, Marketing and Consumer Studies

Rickey Y. Yada
Professor, Food Science

MSc Program

Admission Requirements

The program is most suitable for those with an undergraduate science background or for those currently employed in the food area in government regulatory work or in the processing industry who desire upgrading of skills and knowledge. Applicants for admission to this program must meet the university minimum admission requirement of a baccalaureate in an honour program (or the equivalent) or a DVM from a recognized university or college with an average standing of at least second-class honours (‘B’- average). Applicants will be expected to have completed undergraduate courses that prepare them for participation in the core graduate courses and electives of the collaborative program. Undergraduate upgrading may be necessary to ensure sufficient background in topics such as microbiology, toxicology, statistics, and analytical methods.

Degree Requirements

Completion of the program requires a minimum of eight courses (or 4.0 credits) acceptable for graduate credit. This includes the seminar course which has a value of 0 credit. All students must complete:

- FSQA*6000 [0.00] Food Safety and Quality Assurance Seminar
- FSQA*6500 [1.00] Food Safety and Quality Assurance Research Project

This project is equal to 1.0 credit and counts as one course of the eight required courses.

At least five additional courses, in consultation with the student’s advisory committee. Suitable courses are listed below. Other courses, not listed here, also may be considered. Up to two senior undergraduate courses can be taken. At least one course must be taken from each of three of the participating departments, including the department in which the student is registered. The courses selected will depend upon the student’s background, specialty, interest and area of project research. The normal duration of the program will be three to four full-time semesters.

Courses

- FSQA*6000 Food Safety and Quality Assurance Seminar U [0.00]

Students are expected to present two seminars during the course, one on current advances and issues in an approved area and one on their research project. Faculty associated with the program also present seminars. Students are expected to attend all seminar sessions.

- FSQA*6500 Food Safety and Quality Assurance Research Project U [1.00]

An original research project related to food safety and quality assurance which includes the preparation of a written report suitable for publication and an oral presentation of the findings to the graduate faculty.

- FSQA*6600 Principles of Food Safety and Quality Assurance S [0.50]

An integrated approach to factors affecting food safety and quality including microbial and chemical contamination is provided. Major food-borne disease outbreaks are studied as examples. Modern methods of quality management to minimize contamination of processed foods is discussed.

Restriction(s): Offered by distance education only.

Other Graduate Courses Suitable for Credit in this Program

Biomedical Sciences

- BIOM*6440 [0.50] Biomedical Toxicology

Marketing and Consumer Studies

- MCS*6150 [0.50] Quality Assurance Management

Engineering

- ENGG*6110 [0.50] Food and Bio-Process Engineering
- ENGG*6160 [0.50] Advanced Food Engineering

Food Science

- FOOD*6190 [0.50] Advances in Food Science
- FOOD*6220 [0.50] Advanced Food Analysis Methodology
- FOOD*6280 [0.50] Rapid Methods in Food Microbiology
- FOOD*6300 [0.50] Seminar
- FOOD*6600 [0.50] Advanced Food Microbiology

Human Biology and Nutritional Sciences

- HBNS*6400 [0.50] Functional Foods and Nutraceuticals

Microbiology

- MICR*6070 [0.50] Bacterial Structures and Virulence

Pathobiology

- PABI*6000 [0.50] Bacterial Pathogenesis

Population Medicine

- POPM*6200 [0.50] Epidemiology I
- POPM*6210 [0.50] Epidemiology II
- POPM*6300 [0.50] Epidemiology of Zoonoses
- POPM*6350 [0.50] Safety of Foods of Animal Origins

Undergraduate Courses Suitable for Credit in this Program

Food Science

- FOOD*3030 [0.50] Food Chemistry I
- FOOD*4120 [0.50] Food Analysis
- FOOD*4090 [0.50] Functional Foods and Nutraceuticals
<table>
<thead>
<tr>
<th></th>
<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>Human Biology and Nutritional Sciences</td>
<td>NUTR*4510</td>
<td>Toxicological Aspects of Nutrition</td>
</tr>
<tr>
<td>Population Medicine</td>
<td>POPM*4040</td>
<td>Epidemiology of Food-Borne Diseases</td>
</tr>
</tbody>
</table>
Food Science
Food Science may be defined as the study of scientific and technological principles applied to the processing, preservation, packaging, distribution, handling, storage and evaluation of food products. It is an applied science, drawing heavily upon the principles of chemistry, engineering and microbiology. Research-based MSc and PhD thesis programs have existed in the Department of Food Science since its creation from the Department of Dairy Science in 1967. The Food Science program at Guelph is the only one of its kind in Ontario and over the years has trained a large percentage of the Food Scientists currently employed in the Ontario food industry. In February 1990, the Department of Food Science entered a new and exciting stage in its history when it moved into its newly renovated 30,000 ft² state-of-the-art teaching and research facility. In 1992, a course-based MSc in Food Safety and Quality Assurance was developed by Food Science in collaboration with several other departments at the University of Guelph. Please consult the Food Safety and Quality Assurance listing on the Graduate Studies web site for a detailed description of this MSc collaborative program.

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Graduate Secretary
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BSc Milano, MSc, PhD Guelph - Associate Professor
Douglas Dalgleish
PhD Edinburgh - Professor and Research Chair, Dairy Technology
H. Douglas Goff
BSc (Agr) Guelph, MS, PhD Cornell - Professor
Jeffrey Gray
BSc, MSc Nebraska-Lincoln, PhD Iowa State - Associate Professor (joint appointment with Pathobiology)
Mansel W. Griffiths
BSc North-East London Polytechnic, PhD Leicester - Professor and Ontario Milk Marketing Board Industrial Research Chair in Dairy Microbiology
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Alejandro G. Marangoni
BSc McGill, PhD Guelph - Professor
Donald Mercer
BSc, PhD Waterloo - Associate Professor, Kemptville College
Yoshinori Mine
BSc, MSc Shinshu, PhD Tokyo - Associate Professor and Egg Marketing Board Industrial Research Chair in Egg Material Science
Ramón Mira de Orduña
BSc, MSc Germany, PhD New Zealand - Assistant Professor
Gopi Paliyath
BSc Ed Mysore, MSc Calicut, PhD Indian Inst of Science - Associate Professor (joint appointment with Plant Agriculture)
Peter Purslow
BSc, PhD Reading - Professor
Keith Warriner
BSc Nottingham, PhD Aberystwyth - Assistant Professor
Rickey Y. Yada
BSc (Agr), MSc, PhD British Columbia - Professor

MSc Program

The objective of this program is to provide graduates with general scientific knowledge as well as a more in-depth understanding of particular aspects of Food Science. This objective is accomplished through course work and departmental research seminars. Extensive laboratory and technical training is obtained by performing experiments under the supervision of a professor and advisory committee. A mandatory communications course also teaches effective oral and written communication. All these training aspects culminate through the writing of the MSc thesis. With this background, MSc graduates will be qualified to obtain positions with responsibility in government and the research, development and production sectors of the food and beverage industry.

Admission Requirements
To be considered for admission, applicants should hold an honours baccalaureate degree with at least a B- average during the last two years of study. Supportive letters of reference are essential and should outline the applicant's strengths and weaknesses. Students whose first language is not English require a TOEFL score of at least 550 (paper-based), 213 (computer-based), or 89 (internet-based). To assist in identifying a suitable thesis advisor, applicants should submit a short statement of research interests.

Degree Requirements
MSc students are required to register in at least three graduate courses, plus seminar (a minimum of 2.0 credits) and prepare an acceptable thesis. A graduate degree program form signed by the student and approved by the student's advisory committee will be submitted during the first semester for approval of the departmental graduate studies committee. The student must maintain a minimum B- average to remain in the program. Each student is required to take a compulsory seminar course which provides training in technical communications. The thesis research is planned by the student in consultation with the advisor and approved by the advisory committee during the first semester of the program. The program is completed by the successful defense of the thesis.

PhD Program

Objectives
The objective of this program is to develop highly competent scientists who will provide leadership in academic institutions, or as managers in Food Science research and development institutes in industry or government. Written comprehensive exams ensure that students have a solid background in food chemistry, processing/engineering and microbiology. Creativity and the ability to perform independent research is fostered by requiring PhD students to submit a written research proposal and defend it orally. Having obtained research skills during their MSc studies, PhD students are expected to conduct autonomous research. The preparation of a PhD thesis and scientific publications ensure that graduates have attained prowess in research and communication.

Admission Requirements
The usual requirement for admission into the PhD program is a research-based MSc degree with a minimum 'B' average and supportive letters of reference. Students whose first language is not English require a TOEFL score of at least 550 (paper-based), 213 (computer-based), or 89 (internet-based). To assist in identifying a suitable thesis advisor, applicants should submit a short statement of research interests.

Degree Requirements
The major emphasis in the PhD program is research and the preparation of an acceptable thesis. There are no specific course requirements except for a seminar course which provides training in technical communications. It is usual however for most students, in consultation with their advisory committee, to select prescribed studies and additional courses in preparation for the qualifying examination and thesis research. The qualifying examination is in two parts, written and oral, and evaluates the student's knowledge in the fields of food chemistry, food microbiology and food processing/engineering. In addition, the advisory committee is required to submit a written evaluation of the student's performance to date in research and the student's potential as a researcher. The PhD program is completed by the submission and successful defense of an acceptable thesis.

Courses

*FOOD*6160 Chemistry of Food Lipids U [0.50]
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOOD*6170</td>
<td>Chemistry of Food Proteins U [0.50]</td>
<td>This course deals with theoretical and practical approaches to food proteins including their analysis. The following topics will be covered: physiochemical properties of proteins/amino acids, quantification of protein/amino acids, protein structure analysis, protein denaturation, chemical modification/genetic engineering and structure-functional properties of food proteins. In addition, food protein systems such as muscle, eggs, milk and vegetable proteins will be discussed.</td>
</tr>
<tr>
<td>FOOD*6190</td>
<td>Advances in Food Science U [0.50]</td>
<td>Topics of current research interest and importance are examined. A project supervised by a faculty member is undertaken, the topic of which is chosen after considering the interests of the student.</td>
</tr>
<tr>
<td>FOOD*6210</td>
<td>Chemistry of Food Carbohydrates U [0.50]</td>
<td>This course is designed to familiarize students with the principles of carbohydrate chemistry. It focuses on the structural and functional characteristics of food carbohydrates - both sugars and polysaccharides - their analysis and applications in various food systems.</td>
</tr>
<tr>
<td>FOOD*6220</td>
<td>Advanced Food Analysis Methodology U [0.50]</td>
<td>Theory and practical applications of modern analytical techniques. Topics covered include differential scanning calorimetry, spectroscopy, gas liquid chromatography, high performance liquid chromatography and microscopy as well as various spectroscopic techniques (e.g. UV, fluorometry, circular dichroism).</td>
</tr>
<tr>
<td>FOOD*6260</td>
<td>Food Colloids U [0.50]</td>
<td>Principles of colloid science as applied to foods that contain small particles, e.g., emulsions, foams. Methods for studying colloidal particles in food materials. Manufacture, structure, properties and stability of food colloids, e.g., oil-in-water emulsions, water-in-oil emulsions, milk and dairy products. Use of food emulsifiers.</td>
</tr>
<tr>
<td>FOOD*6270</td>
<td>Applied Enzymology and Biotechnology U [0.50]</td>
<td>A lecture course dealing with principles of modern enzymology and biotechnology and their application in food science and food industry. Typical topics include - enzymes in biotechnology; basics of enzyme kinetics; enzymes in recombinant DNA technology; enzymes in analysis (ELSA, DNA-probes, reporter genes, microbial analysis); enzymes in food production, food analysis.</td>
</tr>
<tr>
<td>FOOD*6280</td>
<td>Rapid Methods in Food Microbiology U [0.50]</td>
<td>The course is designed to update knowledge of modern methods for the microbiological analysis of foods. Theory and practical applications are discussed. Methods reviewed include bioluminescence, impedimetry, immunological techniques, gene probes and other emerging technologies.</td>
</tr>
<tr>
<td>FOOD*6300</td>
<td>Seminar U [0.50]</td>
<td>Each student must present a seminar on an assigned topic or a topic related to his/her research project as well as participate in the seminars of colleagues and faculty.</td>
</tr>
<tr>
<td>FOOD*6350</td>
<td>Applied Functional Foods and Nutraceuticals W [1.00]</td>
<td>This course prepares students to develop an innovative product or service from conceptualization to market entry considering regulatory, product development, safety/efficacy and market readiness issues. Offered jointly with HBNS*6410</td>
</tr>
</tbody>
</table>
French

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Alain Thomas
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MA Program

The French MA program is designed for students who wish to pursue post-secondary teaching, research, administration, federal and provincial government service, national and international organisations, and other areas in which advanced bilingual and multicultural skills are required. This program highlights the converging and emerging historical and linguistic forces at play in cultural environments that share French as a common language.

Fields of Study

Research and teaching fall within two main fields: I) Language in context II) Politics and aesthetics of Francophone literatures. Students may take a range of courses in Quebec, continental French, African and Caribbean literatures, as well as in intermediality, literary translation, sociolinguistics and the pedagogy of French as a second language.

Special Feature

This program offers an experiential service-learning practicum which takes place outside the classroom. Students choose from a list of volunteer activities approved by the School of Languages and Literatures. This practicum normally takes place in a Francophone milieu and is the equivalent of one academic course (0.5 credit).

Admission Requirements

The normal requirement for admission to the French MA program is the equivalent of an Honours degree in French studies from a recognized post-secondary institution with an overall average of B+ or equivalent. Applicants who do not have an Honours BA in French from a Canadian university may be required to take a short competence test and/or qualifying undergraduate courses prior to beginning graduate study. Students enter the program in September with full-time status.

Degree Regulations

Students are required to take a minimum of six semester courses (3.0 credits), with the service-learning placement counting as one of these courses. They are also required to write a 50 page mémoire (mini-thesis). Courses must be approved by the Graduate Coordinator and will normally be completed in four semesters on a full-time basis. The minimum average required for graduation from the program is a B or equivalent. All work is written in French. A successful defence of the mémoire (mini-thesis) is also required. Required courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREN*6010</td>
<td>Introduction to Graduate Studies in French</td>
<td>0.50</td>
</tr>
<tr>
<td>FREN*6042</td>
<td>Topics in FSL Pedagogy</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Courses

The content of the courses listed below will vary according to the research interests of the faculty involved in offering the course. Specific course descriptions for a particular offering of the course will be available from the Graduate Co-ordinator in advance of the course being offered.

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREN*6010</td>
<td>Introduction to Graduate Studies in French</td>
<td>0.50</td>
</tr>
<tr>
<td>FREN*6020</td>
<td>Topics in French Literature</td>
<td>0.50</td>
</tr>
<tr>
<td>FREN*6021</td>
<td>Topics in Quebec and French-Canadian Literatures</td>
<td>0.50</td>
</tr>
<tr>
<td>FREN*6022</td>
<td>Topics in Caribbean and African Literatures</td>
<td>0.50</td>
</tr>
<tr>
<td>FREN*6023</td>
<td>Practicum in French Studies</td>
<td>0.50</td>
</tr>
<tr>
<td>FREN*6030</td>
<td>Topics in Translation</td>
<td>0.50</td>
</tr>
<tr>
<td>FREN*6031</td>
<td>Topics in Intermediality</td>
<td>0.50</td>
</tr>
<tr>
<td>FREN*6040</td>
<td>Topics in Caribbeand African Literatures</td>
<td>0.50</td>
</tr>
<tr>
<td>FREN*6041</td>
<td>Topics in French and French-Canadian Sociolinguistics</td>
<td>0.50</td>
</tr>
<tr>
<td>FREN*6042</td>
<td>Topics in FSL Pedagogy</td>
<td>0.50</td>
</tr>
<tr>
<td>FREN*6043</td>
<td>Practicum in French Studies</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Admission Requirements:

- An independent study course, the nature and content of which is agreed upon between the student and the professor offering the course. Subject to the approval of the graduate coordinator.
- A compulsory major paper, 50 pages in length. An oral examination is required. 
- A successful defence of the mémoire (mini-thesis) is also required.
- Required courses: FREN*6010 and FREN*6042
Geography

The Department of Geography offers programs of study leading to the degrees of MA, MSc and PhD in Geography, and MA/MSc in Collaborative International Development Studies. Details regarding faculty, areas of research, current research opportunities and application procedures are provided on the Department's web site http://www.uoguelph.ca/geography/

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Ze'ev Gedalof
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Alice Hovorka
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Alun E. Joseph
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BA Simon Fraser, MSc Calgary, PhD McMaster - Professor

Reid D. Kretzwyser
BES, MA Waterloo, PhD Western Ontario - Professor

Richard G. Kuhn
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Janet E. Mersey
BA Mount Allison, MSc, PhD Wisconsin - Associate Professor

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BA McMaster, MA Carleton, PhD Ottawa - Professor and Chair

Barry Smit
BA, MA Auckland, PhD McMaster - Professor

John A. Smithers
BA Western Ontario, MA, PhD Guelph - Associate Professor

René Veron
MSc, PhD Zurich - Associate Professor

Wanhong Yang
BSc Hubei, MSc Chinese Academy of Sciences, PhD Illinois - Associate Professor

MA and MSc Programs

The Department of Geography offers MA and MSc degrees in Geography, by thesis and by project. The Master's program offers opportunities for research in the areas of human geography, resource and environmental management, and biophysical processes. The program is distinctive in that it emphasizes emphasizes interrelationships among biophysical and human systems. Scales of inquiry range from the local to the global, and students conduct research in both developed and developing countries.

Admission Requirements

To be considered for admission, students should meet the minimum requirements of a four-year honours degree with a 73% ('B') average during the final two years of study. Applicants must submit a statement of their research interests with their application. It is essential that applicants contact potential advisors in the department prior to submission of an application. Students are admitted in September and applications should be completed by January 10 for consideration for admission and funding.

Degree Requirements

Students may undertake an MA or an MSc program in geography by thesis or by research project (the non-thesis option). Students taking the thesis option are required to complete an acceptable thesis and the Research Methods course. In addition, students must take four courses (2.0 credits), three of which must be from the Department of Geography, and these must include courses from at least two of the biophysical processes, rural studies and resource assessment course groupings (see Courses section below). For the MA degree, students must complete at least two courses from the rural studies and the resource assessment groupings combined. For the MSc degree, students must complete at least two courses in biophysical processes, one of which may be outside the department, as approved by the student's advisory committee.

Students taking the non-thesis option must complete the Research Methods course and the Research Project course. In addition, six other courses (3.0 credits) are required, at least four of which must be from the Department of Geography, and these must include courses from at least two of the biophysical processes, rural studies and resource assessment course groupings. MA students must complete at least two courses from the rural studies and the resource assessment groupings combined. MSc students must complete at least two courses in biophysical processes, one of which may be outside the Department, as approved by the student's advisory committee.

PhD Program

The objective of the PhD program is to offer opportunities for advanced research in the broad field of rural resource evaluation and environmental analysis. This field is part of a broader domain which encompasses theoretical and empirical investigations of interrelationships within and between biophysical processes and social systems. Doctoral students conduct research relating to these areas at various geographic scales, from the local to the global.

Admission Requirements

Applicants for the PhD program should have a recognized master's degree with an 80% ('A') average in their postgraduate studies. Applicants must submit a statement of their research interests including some evidence of experience in their chosen research area. It is essential that applicants contact potential advisors in the department prior to submission of an application. Students are admitted in September and applications should be completed by January 10 for consideration for admission and funding.

Degree Requirements

All students in the PhD program are required to complete the Geographic Scholarship and Research course during the first two semesters of study. The advisory committee may prescribe additional courses to help the student prepare for the qualifying examination and thesis research. All students in the PhD program must complete a qualifying examination and submit a satisfactory research proposal by the end of the fourth semester of study.

The qualifying examination has written and oral components and evaluates the student's knowledge of the broader scholarly field as well as the specific theoretical and empirical content of the intended research area. Submission and defence of an acceptable thesis is required by the student's advisory committee.

Interdepartmental Program

Collaborative International Development Studies MA and MSc Programs

The Department of Geography participates in the MA and MSc programs in Collaborative International Development Studies (CIDS). Consult the International Development Studies listing for a detailed description of the requirements of the collaborative program.

Courses

Biophysical Processes

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG*6330</td>
<td>Biotic Processes and Biophysical Systems U</td>
<td>0.50</td>
</tr>
<tr>
<td>GEOG*6500</td>
<td>Sedimentary Processes in Geomorphology W</td>
<td>0.50</td>
</tr>
<tr>
<td>GEOG*6610</td>
<td>Global Hydrology F</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Investigation of biotic processes influencing the composition, structure and distribution of plant and animal communities and of approaches to biophysical systems analysis, focusing on environmental system interaction at the landscape scale.

An integrated study of fluid flow and sedimentary processes in water and air, setting key elements of sediment erosion, transport and deposition within a global context.

An examination of global environmental hydrology including precipitation, evaporation, subsurface water and runoff. Physical processes, measurement, analytical techniques and modelling strategies will be considered in the context of global change.
### Rural Studies

**GEOG*6200 Land Use and Agricultural Systems**
F,W [0.50]

Rural land uses and processes, particularly agricultural systems, their dynamics and interactions with the resource base and competing activities. Theoretical models and analytical methods related to applied questions in agricultural decision making and land use planning.

**GEOG*6270 Rural Community Systems**
W [0.50]

Characterization and delineation of rural community systems in Canada with attention to the impact of processes of centralization and diffusion on rural economy, society and settlement. Credit may not be obtained for both GEOG*6270 and RPD*6020.

### Resource Assessment

**GEOG*6281 Environmental Resource Evaluation**
F [0.50]

Analysis, evaluation and management of environmental resources. Emphasis is on biophysical and socio-economic concepts and methods which offer a more comprehensive and integrative basis for environmental decisions.

**GEOG*6340 Human-Environment Systems Analysis**
F [0.50]

A critical review of philosophies, concepts and analytical methods for analysis and management of systems involving the interaction of environmental processes and human spatial activity.

### International Development Studies

**GEOG*6400 Urbanization and Development**
(alternate years) U [0.50]

Analysis of the evolution of urban form and pattern in the developing world within the context of the global urban system. Examines national urban systems and implications for dispersed development and rural change.

**GEOG*6450 Political Identities, Territory and Territoriality**
(alternate years) U [0.50]

Group identities at various scales in relation to concepts of territory and territoriality, and their changing impact on the world's political map.

### General

**GEOG*6060 Special Topics in Geography**
F [0.50]

A course on some specific topic not covered by the regular graduate courses for which there are both available faculty and sufficient interest among students.

**GEOG*6090 Research Methods**
F-W [0.50]

A review of philosophies and research methods in geography. The development and presentation of a context paper and proposal for the thesis or research project. This course extends over two semesters (fall and winter).

**GEOG*6100 Geographic Scholarship and Research**
F-W [0.50]

A review of geographic scholarship including conceptual, theoretical and methodological issues in resource assessment, biophysical resources and rural socio-economic resources. The course extends over two semesters (fall and winter).

**GEOG*6180 Research Project in Geography**
F,W,S [1.00]

The preparation and presentation of a report on the research project approved in GEOG*6090.
History - Tri-University Program

The Departments of History of the University of Guelph, the University of Waterloo and Wilfrid Laurier University offer a joint program leading to the MA and PhD degrees. The Tri-University Graduate Program in History includes members from all three departments covering a wide range of research interests. It is a semi-autonomous program responsible directly to the three graduate schools. It looks after admissions, arranges courses of instruction, names students' advisory committees, and monitors student progress generally. Students in the Tri-University Graduate Program in History register either at Guelph, Waterloo or Wilfrid Laurier (depending on where their advisor is located) but undertake their course work jointly at all three universities. Students in the program are governed by the general regulations of the university in which they are registered and their degree is granted by that university.

The department at Guelph also participates in the Interdepartmental Group on Scottish Studies, in the work of the Centre for International Programs, and the Historical 1891 Canadian Census Project. As well, the History Department at Guelph has formed, with the History Department of the University of Waterloo, a Consortium for Reformation Studies. Students are encouraged to begin their studies in the fall or winter semesters. All applications, with requests for financial support, must be received by the Tri-University Graduate Program secretariat in completed form by February 1.

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Kris E. Inwood
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BA, MA McGill, PhD Edinburgh - Associate Professor

Femi Kolapo *
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Sofie Lachapelle *
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Linda L. Mahood *
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P. Douglas McCalla *
BA Queen's, MA Toronto, DPhil Oxford - Professor and Canada Research Chair

Stuart G. McCook *
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PhD Queen's

Erich Haberer
PhD Toronto

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PhD Natal

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BA, PhD Liverpool

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PhD East Anglia, UK

Susan Neylan
PhD UBC

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PhD Queen's

Erich Haberer
PhD Toronto

John Laband
PhD Natal

Douglas A. Lorimer
BA, PhD British Columbia

Joyce Lorimer
BA, PhD Liverpool

David Monod
BA, MA McGill, PhD Toronto

Darren Mulloy
PhD East Anglia, UK

Susan Neylan
PhD UBC


Admission Requirements

An applicant must have a recognized honours degree in history, or its equivalent, with at least a high second class or upper ‘B’ average. Applicants are required to include with their application a separate statement describing their proposed area of study and, where possible, the suggested thesis topic.

Degree Requirements

Students normally obtain the MA degree by satisfactorily completing six courses (at least 3.0 credits) and submitting a major paper on an approved topic (10,000 to 12,000 words). Alternatively, the student may qualify for the MA degree by completing four courses (at least 2.0 credits) and submitting a satisfactory thesis on an approved topic (25,000 words). They may also qualify for an MA by completing 8 courses (at least 4 credits) three of which must require a research paper. It is recommended but not required that students take HIST*6000 and HIST*6020. The remaining courses are subject to the approval of the Department of History. A reading knowledge of French is highly recommended and a student's advisory committee may require a second language for research purposes. MA students generally register for up to three courses per semester, or two if they hold a graduate teaching assistantship.

Graduate students are encouraged to consider including, as part of their program, appropriate graduate course offerings from other departments.

Interdepartmental Programs

Scottish Studies Interdepartmental Group

The Department of History participates in the activities of the Scottish Studies Interdepartmental Group. Those faculty members whose research and teaching expertise includes aspects of Scottish studies may serve as advisors and examiners of MA students specializing in Scottish studies areas and who are registered in the Department of History.

PhD Program

Each student is required to demonstrate competence in one major field and two areas of concentration. This competence will be demonstrated by successful completion of the colloquium or the qualifying examination. One area of concentration must be in an area of study distinct from the major field and one area of concentration may be in another discipline. The distinction between a major field and an area of concentration is the depth and required range of reading rather than by geographical or chronological span. The major field and areas must be constructed so that a student can complete the major during two terms and both areas of concentration within another two terms. Students must take a seminar course in each of their qualifying or colloquium fields.

The student's advisory committee, in collaboration with the student, will establish the field and areas to be examined. The student's advisory committee, in collaboration with the candidate, will select either the comprehensive or the colloquium mode of examination, determine the scheduling of the examinations or colloquium, and approve the thesis proposal submitted by the student before the student proceeds to the examination. The comprehensive mode involves one historiographical essay and one written examination in each field or area and an oral examination covering the three. The colloquium mode requires two essays, one of which must be historiographical, to be written in each field or area. Following the completion of field preparations to the satisfaction of the advisory committee, the candidate in the colloquium mode presents an independent research paper on a topic approved by the advisory committee. For both modes, the examining committee will be composed of the thesis advisor, the field or area advisors, an additional member of the graduate faculty, and the director or designate as chair.

The PhD fields and the oral qualifying examination must be completed by the end of the fifth term/semester. The colloquium must be completed by the end of the sixth term/semester. No extensions will be permitted, except in cases where approval has been given by the co-ordinating committee. Continuation in the program after the qualifying exam or colloquium requires at least a B+ average, based on all courses taken in the program to that point and their proportionate weighting.

Following successful completion of the colloquium or qualifying examination, the student must complete, under the supervision of a Tri-University Doctoral Program in History faculty member, an original research project on an advanced topic. A thesis embodying the results of that research must be presented and defended before an examining committee. The Tri-University Doctoral Program limits thesis supervision to five fields of study - Canadian history; Scottish history; early modern European history; modern European history; Race, Slavery and Imperialism.

Admission Requirements

Applications are considered by the Tri-University co-ordinating committee. Only students who are graduates of accredited universities and colleges are eligible for admission. Students will be admitted only after they have obtained an MA in which they have received at least an A- standing. Since not all applicants can be admitted, close attention is paid to samples of applicants' written work, to applicants' transcripts and past records as a whole, and to their statement of research interests. Applicants from outside Canada whose previous education cannot be assessed readily may be required to demonstrate their knowledge by samples of their written work, to applicants' transcripts and past records as a whole, and to their statement of research interests. Applicants from outside Canada whose previous education cannot be assessed readily may be required to demonstrate their knowledge by

A course that examines the current historiography of selected aspects of Canadian history. Topics will vary with the expertise of individual instructors.

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### Scottish History

#### HIST*6310 Topics in Modern Europe II U [0.50]
- Continuation of HIST*6310 in which students prepare an indepth research paper based on primary sources.

#### HIST*6350 History of the Family U [0.50]
- This course will cover a broad range of historical developments within the family, all concentrating on the interaction between the family (or elements within it) and outside authority (both formal and informal).

#### HIST*6351 Family History Research U [0.50]
- Continuation of HIST*6350 in which students prepare an indepth research paper based on primary sources.

#### HIST*6360 History of Sexuality and Gender U [0.50]
- This course will provide a thematic approach to the foundations of Western attitudes towards sexuality and gender, especially as they developed in premodern Europe. The complex interweaving of medicine, Christian law and theology, and popular practices and beliefs will be explored.

#### HIST*6361 Sexuality History Research U [0.50]
- Continuation of HIST*6360 in which students prepare an indepth research paper based on primary sources.

#### HIST*6370 Topics in Cultural History U [0.50]
- History 6370 investigates the practices of cultural history and the utility of the cultural history paradigm in the investigation of topics including politics and power, religion, war, empire, gender, class, 'race', ethnicity, the environment, and consumption.

#### HIST*6371 Cultural History Research U [0.50]
- Continuation of HIST*6370 in which students prepare an indepth research paper based on primary sources.

#### HIST*6380 Topics in Early Modern European History U [0.50]
- This seminar course examines current issues in early modern European history as selected by instructor(s). Participants review current research and historiography, discuss the principal debates, and develop their own perspectives through encounter with primary source materials.

#### HIST*6381 Early European Research U [0.50]
- Continuation of HIST*6380 in which students prepare an indepth research paper based on primary sources.

#### HIST*6400 Major Paper U [1.00]
- This is to be a major piece of research, based on the extensive use of primary sources. An oral examination of this work is required.

#### HIST*6450 Quantitative Evidence and Historical Methods U [0.50]
- An overview of the use for historical research of quantitative evidence and methodologies.

#### HIST*6501 Global History Research U [0.50]
- Continuation of HIST*6500 in which students prepare an indepth research paper based on primary sources.

#### HIST*6520 Topics in Latin American History U [0.50]
- In-depth study of a particular event or process in Latin American history. Topics may include: religions, women, race and ethnicity, environment issues, intellectual history, or have a regional or temporal focus.

#### HIST*6521 Latin American Research U [0.50]
- Continuation of HIST*6520 in which students prepare an indepth research paper based on primary sources.

#### HIST*6540 Topics in South Asian History U [0.50]
- Topics in South Asian History will examine the history and historiography of imperialism and nationalism in India from 1757 to 1947.

#### HIST*6541 South Asian History Research U [0.50]
- Continuation of HIST*6540 in which students prepare an indepth research paper based on primary sources.

### Courses - PhD

#### HIST*7000 Doctoral Seminar U [0.00]
- This seminar will meet regularly every semester to discuss research problems and issues of professional interest.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST*7010</td>
<td>Qualifying Examination U [1.00]</td>
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<tr>
<td></td>
<td>This oral examination is designed to assess 1) the student's knowledge of the subject matter and ability to integrate the material read and 2) the student's ability and promise in research.</td>
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<tr>
<td>HIST*7020</td>
<td>Colloquium U [1.00]</td>
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<tr>
<td></td>
<td>This public presentation of the student's research in the major field is assessed on the basis of 1) the student's knowledge of the subject matter and ability to integrate the material read and 2) the student's ability and promise in research.</td>
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</tr>
<tr>
<td>HIST*7030</td>
<td>Language Requirement U [0.00]</td>
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<tr>
<td></td>
<td>A written demonstration of the student's knowledge of written French (or other appropriate second language).</td>
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<tr>
<td>HIST*7040</td>
<td>Major Field U [1.00]</td>
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<tr>
<td>HIST*7050</td>
<td>First Minor Field U [0.50]</td>
<td></td>
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<tr>
<td>HIST*7060</td>
<td>Second Minor Field U [0.50]</td>
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<tr>
<td></td>
<td>The following courses are designed to study the central issues, ideas and historiography of the designated major field, within certain geographical and temporal limits. All seminar courses extend over two semesters. Students must register for the courses in each semester.</td>
<td></td>
</tr>
<tr>
<td>HIST*7100</td>
<td>Canadian History Major Seminar U [1.00]</td>
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<tr>
<td>HIST*7120</td>
<td>British History Major Seminar U [1.00]</td>
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<td>HIST*7120</td>
<td>Scottish History Major Seminar U [1.00]</td>
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<td>HIST*7120</td>
<td>British History Major Seminar U [1.00]</td>
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<td>HIST*7120</td>
<td>Scottish History Major Seminar U [1.00]</td>
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<tr>
<td>HIST*7130</td>
<td>Community Studies Major Seminar U [1.00]</td>
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<tr>
<td>HIST*7140</td>
<td>Early Modern European History Major Seminar U [1.00]</td>
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<tr>
<td>HIST*7150</td>
<td>Modern European History Major Seminar U [1.00]</td>
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<tr>
<td>HIST*7160</td>
<td>Gender, Women and Family Major Seminar U [1.00]</td>
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<tr>
<td>HIST*7170</td>
<td>Race, Slavery, and Imperialism Major Seminar U [1.00]</td>
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<tr>
<td>HIST*7180</td>
<td>United States History Major Seminar U [1.00]</td>
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<tr>
<td>HIST*7600</td>
<td>Canadian History Minor Seminar U [0.50]</td>
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<tr>
<td>HIST*7610</td>
<td>British History Minor Seminar U [0.50]</td>
<td></td>
</tr>
<tr>
<td>HIST*7620</td>
<td>Scottish History Minor Seminar U [0.50]</td>
<td></td>
</tr>
<tr>
<td>HIST*7630</td>
<td>Community Studies Minor Seminar U [0.50]</td>
<td></td>
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<tr>
<td>HIST*7640</td>
<td>Early Modern European History Minor Seminar U [0.50]</td>
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<tr>
<td>HIST*7650</td>
<td>Modern European History Minor Seminar U [0.50]</td>
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<tr>
<td>HIST*7660</td>
<td>Gender, Women and Family Minor Seminar U [0.50]</td>
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<tr>
<td>HIST*7680</td>
<td>United States History Minor Seminar U [0.50]</td>
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<tr>
<td>HIST*7690</td>
<td>International History Minor Seminar U [0.50]</td>
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<tr>
<td>HIST*7700</td>
<td>Science, Medicine and Technology Minor Seminar U [0.50]</td>
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<tr>
<td>HIST*7710</td>
<td>Other Minor Seminar U [0.50]</td>
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<tr>
<td>HIST*7990</td>
<td>U [2.00]</td>
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</tbody>
</table>

The requirements for an MA student taking a 7000-level course are substantially different from those for a PhD student. Therefore a PhD student who has previously taken any of these 7000-level courses may, with the permission of the department, repeat any of those 7000-level for credit in the Tri-University Doctoral Program.
Human Health and Nutritional Sciences

The Human Health and Nutritional Sciences Graduate Program offers MSc degrees by thesis, MSc degrees by course work and project, and PhD degrees. The three areas of emphasis and the faculty associated with those areas are:

- **Biodynamics** -- Bent, Dickey, Jadeski, Lindinger, Murrant, Vallis
- **Nutrition, Exercise and Metabolism** -- Bakovic, Bonen, Dyck, Graham, Robinson, Spriet
- **Nutritional and Nutraceutical Sciences** -- Bakovic, Bettger, Duncan, Kirkland, Meckling, Robinson, Woodward, Wright

Interdepartmental programs are available for students wishing to specialize in biophysics or toxicology.

Administrative Staff

**Chair**
Terry E. Graham
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**Assistant Graduate Co-ordinator for MSc by Coursework and Project Program**
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**Graduate Secretary**
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Graduate Faculty

**Marica Bakovic**
BSc, MSc Belgrade, PhD Alberta - Associate Professor

**Leah R. Bent**
BSc, MSc Guelph, PhD British Columbia - Assistant Professor

**William J. Betiger**
BS, PhD Missouri - Associate Professor

**Arend Bonen**
BA Western, MS, PhD Illinois - Professor

**James P. Dickey**
BSc, MSc Waterloo, PhD Queen's - Assistant Professor

**Alison M. Duncan**
BASc Guelph, MSc Toronto, PhD Minnesota - Associate Professor

**David J. Dyck**
BSc, MSc, PhD Guelph - Associate Professor

**Terry E. Graham**
BA & BPHE, MSc, PhD Queen's - Professor and Chair

**Lorraine Jadeski**
BSc Guelph, MSc Waterloo, PhD Western - Assistant Professor

**James B. Kirkland**
BSc, PhD Guelph - Associate Professor

**Michael I. Lindinger**
BSc Victoria, MSc, PhD McMaster - Associate Professor

**Kelly A. Meckling**
BSc Calgary, PhD Toronto - Associate Professor

**Coral L. Murrant**
BSc, PhD Guelph - Assistant Professor

**Lindsay E. Robinson**
BSc Acadia, PhD Alberta - Assistant Professor

**Lawrence L. Spriet**
BSc Waterloo, MSc York, PhD McMaster - Professor

**Lori A. Vallis**
BSc, MA Ottawa, PhD Waterloo - Assistant Professor

**William D.H. Woodward**
BSc, MSc British Columbia, PhD Sheffield - Professor

**Amanda Wright**
BSc, PhD Guelph - Assistant Professor

MSc Program

To be considered, applicants must meet the requirements of a four-year honours science degree with a minimum 75% average during the final two years or 4 semesters of undergraduate study. Applicants should have completed a course in statistics. Applicants are urged to identify and contact a faculty member who is willing to serve as their advisor.

Admission Requirements

Admission to all graduate programs in the Department of Human Health and Nutritional Sciences will normally be granted in September. Completed applications should arrive by December 1 of the year in which the student wishes to begin study. Applications from international students, especially those applying for financial support, should arrive by December 1 of the year before the expected date of admission.

Admission Process

There are two parts to the application process (see steps below). Before submitting an application, you are strongly encouraged to view the "Before you Apply" section on the CBS Graduate Opportunities webpage for further details. This is a two-step self-administered application process. First you must complete an online "submission summary" and second, assemble all required documentation (listed below) and forward the complete package to the ADR Office, Laurie Winn, CBS Graduate Admissions Secretary, Room 256, Axelrod Building (moving to Science Complex effective August 1, 2007), University of Guelph, Guelph, Ontario Canada N1G 2W1.

For further information, contact the CBS Graduate Admissions Secretary at lwinn@uoguelph.ca.

Degree Requirements

MSc by Thesis

Students must complete and defend an acceptable thesis which comprises a scientifically defensible account of the student's research on a particular, well-defined research problem or hypothesis. Such research should begin with the practical expectation that it could be completed and the thesis defended in not more than 5 semesters. Paramount to the notion of acceptability of the thesis is its quality with respect to problem identification, the approach used to address the problem, and the evaluation of the results. In addition they must successfully complete courses totalling not fewer than 1.5 graduate credits. The graduate credits of course work will consist of:

a) at least one of:

- HBNS*6700 (0.50) Nutrition, Exercise and Metabolism
- HBNS*6940 (0.50) Research Fronts in Nutritional and Nutraceutical Sciences

b) at least 1.0 credits of electives as determined with the Advisory Committee

MSc by Course Work and Project

Students must complete at least 4.0 graduate credits as follows:

- HBNS*6010 (0.50) Seminar in Human Biology and Nutritional Sciences
- HBNS*6320 (0.50) Advances in Human Biology and Nutritional Sciences

at least one of:

- HBNS*6910 (0.50) Basic Research Techniques and Processes
- HBNS*6920 (0.50) Applied Research Techniques and Processes
- HBNS*6930 (0.50) Research Project

at least one of:

- HBNS*6700 (0.50) Nutrition, Exercise and Metabolism
- HBNS*6940 (0.50) Research Fronts in Nutritional and Nutraceutical Sciences

at least 1.0 to 2.0 graduate credits of electives.

PhD Program

Applicants must have a recognized master's degree in a related field obtained with a minimum academic standing of 80% in their postgraduate studies, and the endorsement of a potential thesis advisor. Applicants should have completed a course in statistics. Under exceptional circumstances admission directly to a PhD program with an appropriate honours degree alone, or transfer from MSc to PhD program without completing the MSc thesis requirements, is also possible.

Admission Requirements

Admission to all graduate programs in the Department of Human Health and Nutritional Sciences will normally be granted in September. Completed applications should arrive in the department by April 1 of the year in which the student wishes to begin study. Applications from international students, especially those applying for financial support, should arrive by December 1 of the year before the expected date of admission.

Admission Process

There are two parts to the application process (see steps below). Before submitting an application, you are strongly encouraged to view the "Before you Apply" section on the CBS Graduate Opportunities webpage for further details. This is a two-step self-administered application process. First you must complete an online "submission summary" and second, assemble all required documentation (listed below) and forward the complete package to the ADR Office, Laurie Winn, CBS Graduate Admissions Secretary, Room 256, Axelrod Building (moving to Science Complex effective August 1, 2007), University of Guelph, Guelph, Ontario Canada N1G 2W1.

For further information, contact the CBS Graduate Admissions Secretary at lwinn@uoguelph.ca.

Degree Requirements

The major part of a student's time will be devoted to research in fulfillment of the dissertation requirement. Course work would be established through discussion with the student's Advisory Committee.

HBNS*6010 (0.50) Seminar in Human Biology and Nutritional Sciences
HBNS*6320 (0.50) Advances in Human Biology and Nutritional Sciences

at least one of:

- HBNS*6910 (0.50) Basic Research Techniques and Processes
- HBNS*6920 (0.50) Applied Research Techniques and Processes
- HBNS*6930 (0.50) Research Project

at least one of:

- HBNS*6700 (0.50) Nutrition, Exercise and Metabolism
- HBNS*6940 (0.50) Research Fronts in Nutritional and Nutraceutical Sciences

at least 1.0 to 2.0 graduate credits of electives.
PhD students will become candidates for the PhD degree upon completion of a qualifying examination, which must be conducted not later than the fifth semester of the PhD program. The examination will be primarily research focused.

**Thesis Requirements**

Submission and defence of an acceptable dissertation complete the requirements for a PhD. An acceptable dissertation comprises a report of the candidate's research on a particular and well-defined research problem or hypothesis. It should represent a significant contribution to knowledge in that field. Emphasis is placed on the quality of the work judged by the expression of mature scholarship and critical judgment in the dissertation. Dissertation approval implies that it could be published in reputable, refereed journals in its field.

**Interdepartmental Programs**

### Toxictology MSc/PhD Collaborative Program

The Department of Human Health and Nutritional Sciences participates in the MSc/PhD program in Toxictology. Professor Kirkland is a member of the Toxictology Interdepartmental Group. This faculty member's research and teaching expertise includes aspects of toxicology; he may serve as advisor for MSc and PhD students. Please consult the Toxictology listing for a detailed description of the MSc/PhD collaborative program.

### Biophysics Interdepartmental Group (BIG)

Several faculty members in the Department of Human Health and Nutritional Sciences are members of the Biophysics Interdepartmental Group, which offers MSc and PhD programs in biophysics. Students admitted to and enrolled in the biophysics program and advised by a member of the graduate faculty in the Department of Human Health and Nutritional Sciences will be accommodated in the facilities of the department but are subject to the regulations of the biophysics program. Members of the graduate faculty in the Department of Human Health and Nutritional Sciences who are members of the Biophysics Interdepartmental Group are permitted to advise MSc and PhD students in biophysics. These faculty members include J.P. Dickey and M. Lindinger. Please consult the Biophysics listing for a detailed description of the graduate programs offered by the Biophysics Interdepartmental Group.

**Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBNS*6010</td>
<td>Seminar in Human Biology and Nutritional Sciences</td>
<td>S [0.50]</td>
</tr>
<tr>
<td>HBNS*6040</td>
<td>Research Fronts in Nutritional and Nutraceutical Sciences</td>
<td>F [0.50]</td>
</tr>
<tr>
<td>HBNS*6130</td>
<td>Advanced Skeletal Muscle Metabolism in Humans</td>
<td>W [0.50]</td>
</tr>
<tr>
<td>HBNS*6200</td>
<td>Research Methods in Biomechanics</td>
<td>F [1.00]</td>
</tr>
<tr>
<td>HBNS*6320</td>
<td>Advances in Human Biology and Nutritional Sciences Research</td>
<td>S,F,W [0.50]</td>
</tr>
<tr>
<td>HBNS*6400</td>
<td>Functional Foods and Nutraceuticals</td>
<td>F [0.50]</td>
</tr>
<tr>
<td>HBNS*6410</td>
<td>Applied Functional Foods and Nutraceuticals</td>
<td>W [1.00]</td>
</tr>
<tr>
<td>HBNS*6440</td>
<td>Nutrition, Gene Expression and Cell Signalling (offered odd-numbered years)</td>
<td>W [0.50]</td>
</tr>
<tr>
<td>HBNS*6700</td>
<td>Nutrition, Exercise and Metabolism</td>
<td>F [0.50]</td>
</tr>
<tr>
<td>HBNS*6710</td>
<td>Basic Research Techniques and Processes</td>
<td>S,F,W [0.50]</td>
</tr>
<tr>
<td>HBNS*6720</td>
<td>Applied Research Techniques and Processes</td>
<td>S,F,W [0.50]</td>
</tr>
<tr>
<td>HBNS*6910</td>
<td>Research Project</td>
<td>S,F,W [0.50]</td>
</tr>
<tr>
<td>HBNS*6930</td>
<td>Research Project</td>
<td>S,F,W [0.50]</td>
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</tbody>
</table>

This course emphasizes the role nutrients play as modulators of gene expression at the molecular level. The mechanisms by which nutrients modulate gene expression through specific cell signalling cascades are examined.

A discussion of recent concepts in the relationships among nutrition, exercise and metabolism. Information from the molecular to the whole-animal level will be presented with a focus on understanding nutrition and exercise in the human. Emphasis is placed on the development and testing of experimental hypotheses in these areas of research.

Advanced topics will be presented to establish an in-depth understanding of current investigations in nutrition and exercise. Based on the integrated understanding of nutrition and exercise developed in HBNS*6700, the focus of this course will be to develop the student's ability to independently analyze original research investigations.

Under the supervision of a faculty advisor, students will gain practical experience in discipline-specific aspects of research. This will be accomplished through experience in a pre-arranged practicum in an applied setting. Objective outcomes will be evaluated and will include documentation of the experience in a written report. (Instructor's signature required.)

Under the supervision of a faculty advisor and building on knowledge gained from Basic or Applied Research Techniques and Processes, students will carry out a specific research project to its completion. Results will be documented in a written report and communicated through a scientific poster.

**Prerequisite(s):** HBNS*6910 or HBNS*6920

**Restriction(s):** Instructor's signature required
International Development Studies

The Collaborative International Development Studies (CIDS) program provides a focal point for graduate teaching and research in the area of international development. The program combines training in a particular discipline with exposure to a broad range of social-science perspectives. Faculty expertise encompasses various aspects of development in Asia, Africa, Eastern and Western Europe and the Americas.

Administrative Staff

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Graduate Secretary
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Graduate Secretary
Wendy McGrattan (144 ANNU, Ext. 56215)

Administrative Staff from Capacity Development and Extension

Graduate Co-ordinator
Al Lauzon (145 Landscape Architecture, Ext. 53379)

Graduate Secretary
Sue Hall (100 Landscape Architecture, Ext. 56780)

Administrative Staff from Economics

Graduate Co-ordinator
Ross McKitrick (730 MacKinnon, Ext. 52532)

Graduate Secretary
Ann Bolger (723 MacKinnon, Ext. 56341)

Administrative Staff from Engineering

Graduate Co-ordinator
Ralph Brown (2340 Thornbrough, Ext. 53922)

Graduate Secretary
Lucy Cremasco (2363 Thornbrough, Ext. 56187)

Administrative Staff from English and Theatre Studies

Graduate Co-ordinator
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Graduate Secretary
Sharon Ballantyne (427 MacKinnon, Ext. 56315)

Administrative Staff from Food, Agricultural and Resource Economics

Graduate Co-ordinator
Spencer Henson (327 MacLachlan, Ext. 53134)

Graduate Secretary
Kathryn Selves (311 MacLachlan, Ext. 52771)

Administrative Staff from Geography

Graduate Co-ordinator
Rob de Loe (121 Hutt, Ext. 53525)

Graduate Secretary
(118 Hutt, Ext. 56719)

Administrative Staff from History

Graduate Co-ordinator
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Graduate Secretary
Barbara Merritt (2010 MacKinnon, Ext. 56528)

Administrative Staff from Philosophy

Graduate Co-ordinator
Mark McCullagh (356 MacKinnon, Ext. 53221)

Graduate Secretary
Pam Speers (348 MacKinnon, Ext. 53272)

Administrative Staff from Political Science

Graduate Co-ordinator
Janine Clark (540 MacKinnon, Ext. 52927)

Graduate Secretary
Shelagh Daly (524 MacKinnon, Ext. 56973)

Administrative Staff from Rural Planning and Development

Graduate Co-ordinator
F. Harry Cummings (102B Landscape Architecture, Ext. 53637)

Graduate Secretary
(100 Landscape Architecture, Ext. 56780)

Administrative Staff from Sociology and Anthropology

Graduate Co-ordinator
Myrna Dawson (641 MacKinnon, Ext. 56028)

Graduate Secretary
Millie MacQueen (624 MacKinnon, Ext. 53895)

MA and MSc Programs

Students wishing to pursue an MSc or MA degree with the designation "International Development Studies" must enter the CIDS program through a participating department.

Admission Requirements

Students must meet both departmental and CIDS requirements. They must demonstrate familiarity with conceptual frameworks employed in the social sciences. More detailed information is available in the CIDS Information Package found on the CIDS Graduate website: www.uoguelph.ca/cids/graduate/index.shtml.

Degree Requirements

Students complete CIDS core requirements and requirements designated for CIDS students by the relevant department. Following are requirements for select departments; consult the CIDS Graduate website for other departments. One CIDS core course may be waived if a student has taken a comparable course at the senior undergraduate level.

Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDEV*6000</td>
<td>Regional Context U</td>
<td>[0.50]</td>
</tr>
<tr>
<td>IDEV*6100</td>
<td>International Development Studies Seminar U</td>
<td>[0.50]</td>
</tr>
<tr>
<td>IDEV*6500</td>
<td>Fieldwork in International Development Studies U</td>
<td>[0.50]</td>
</tr>
<tr>
<td>CIDS Core*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDEV*6100</td>
<td>International Development Studies Seminar</td>
<td>[0.50]</td>
</tr>
<tr>
<td>SOC*6460</td>
<td>Gender and Development</td>
<td>[0.50]</td>
</tr>
<tr>
<td>ANTH*6460</td>
<td>Gender and Development</td>
<td>[0.50]</td>
</tr>
<tr>
<td>CDE*6420</td>
<td>Development Communication</td>
<td>[0.50]</td>
</tr>
<tr>
<td>SOC*6420</td>
<td>Development, Community and Rurality</td>
<td>[0.50]</td>
</tr>
<tr>
<td>ANTH*6420</td>
<td>Development, Community and Rurality</td>
<td>[0.50]</td>
</tr>
<tr>
<td>SOC*6270</td>
<td>Diversity and Social Equality</td>
<td>[0.50]</td>
</tr>
<tr>
<td>ANTH*6270</td>
<td>Diversity and Social Equality</td>
<td>[0.50]</td>
</tr>
<tr>
<td>GEOG*6400</td>
<td>Urbanization and Development (alternate years)</td>
<td>[0.50]</td>
</tr>
<tr>
<td>GEOG*6450</td>
<td>Political Identities, Territory and Territoriality (alternate years)</td>
<td>[0.50]</td>
</tr>
<tr>
<td>EDRD*6050</td>
<td>Farming Systems Analysis and Development</td>
<td>[0.50]</td>
</tr>
<tr>
<td>ECON*6370</td>
<td>Economic Development in Historical Perspective</td>
<td>[0.50]</td>
</tr>
<tr>
<td>AGEC*6600</td>
<td>Agriculture in Economic Development</td>
<td>[0.50]</td>
</tr>
<tr>
<td>ECON*6350</td>
<td>Economic Development</td>
<td>[0.50]</td>
</tr>
<tr>
<td>POLS*6750</td>
<td>Development in Practice</td>
<td>[0.50]</td>
</tr>
<tr>
<td>POLS*6730</td>
<td>The Politics of Development and Underdevelopment</td>
<td>[0.50]</td>
</tr>
</tbody>
</table>

Note

*This does not apply to students in Rural Planning and Development and to students in Engineering. Please see Rural Planning and Development and Engineering sections below for required courses (both CIDS and departmental).
Optional CIDS Courses
Students in the collaborative program may undertake any course offered by a collaborating department with the permission of the instructor. There are also two optional interdisciplinary courses available:

IDEV*6000 [0.50] Regional Context
IDEV*6500 [0.50] Fieldwork in International Development Studies

Departmental Requirements
Programs not listed below are designed by special arrangements.

Anthropology (MA)
ANTH*6080 [0.50] Anthropological Theory
ANTH*6140 [0.50] Qualitative Research Methods
ANTH*6600 [0.50] Public Issues Anthropology

Either a Thesis and one additional course or
ANTH*6660 [1.00] Major Paper and three additional courses

Capacity Development and Extension (MSc)
CDE*6070 [0.50] Foundations of Capacity Building and Extension
CDE*6260 [0.50] Research Design
One of:
RPD*6380 [0.50] Application of Quantitative Techniques in Rural Planning and Development
EDRD*6000 [0.50] Qualitative Analysis in Rural Development
Two additional courses from the following group:
CDE*6060 [0.50] Adult Learning and Development
CDE*6190 [0.50] Fundamentals of Interpersonal and Intercultural Communication
CDE*6290 [0.50] Special Topics in Capacity Building and Extension
CDE*6311 [0.50] Extension Theory and Methods
CDE*6320 [0.50] Capacity Building for Sustainable Development
CDE*6330 [0.50] Facilitation and Conflict Management
CDE*6410 [0.50] Readings in Capacity Building and Extension
CDE*6420 [0.50] Development Communication
CDE*6690 [0.50] Decision Making and Conflict
One additional course in other areas of research (open elective)
A thesis OR
CDE*6900 [1.00] Major Research Paper
plus two more courses from the restricted electives group (see course list above)

Economics (MA)
ECON*6000 [0.50] Microeconomic Theory I
ECON*6020 [0.50] Macroeconomic Theory I
ECON*6094 [1.00] Research Project
One of:
ECON*6050 [0.50] Introduction to Econometric Methods
AND ECON*6180 [0.50] Econometric Methods
OR ECON*6140 [0.50] Econometrics I

Engineering: MEng (Environmental Engineering or Water Resources Engineering)
CIDS Core Courses Required:
IDEV*6100 [0.50] International Development Studies Seminar
One of:
SOC*6460 [0.50] Gender and Development
ANTH*6460 [0.50] Gender and Development
CDE*6420 [0.50] Development Communication
SOC*6420 [0.50] Development, Community and Rurality
ANTH*6420 [0.50] Development, Community and Rurality
SOC*6270 [0.50] Diversity and Social Equality
ANTH*6270 [0.50] Diversity and Social Equality
One of:
ECON*6370 [0.50] Economic Development in Historical Perspective
AGEC*6600 [0.50] Agriculture in Economic Development
ECON*6370 [0.50] Economic Development in Historical Perspective
(with permission of instructor)
One of:
POLS*6750 [0.50] Development in Practice
POLS*6730 [0.50] The Politics of Development and Underdevelopment

Departmental Requirements:
Six courses from the list of required graduate courses in Engineering (to be selected in consultation with advisor)
ENGG*6080 [0.50] Engineering Seminar
One of:
ENGG*6950 [1.00] Final Project in Environmental Engineering

ENGG*6900 [1.00] Final Project in Water Resources Engineering

Engineering: MSc (Environmental Engineering or Water Resources Engineering)
CIDS Core Courses Required:
IDEV*6100 [0.50] International Development Studies Seminar
One of:
SOC*6460 [0.50] Gender and Development
ANTH*6460 [0.50] Gender and Development
CDE*6420 [0.50] Development Communication
SOC*6420 [0.50] Development, Community and Rurality
ANTH*6420 [0.50] Development, Community and Rurality
SOC*6270 [0.50] Diversity and Social Equality
ANTH*6270 [0.50] Diversity and Social Equality
One of:
ECON*6370 [0.50] Economic Development in Historical Perspective
AGEC*6600 [0.50] Agriculture in Economic Development
ECON*6370 [0.50] Economic Development in Historical Perspective
(with permission of instructor)
One of:
POLS*6750 [0.50] Development in Practice
POLS*6730 [0.50] The Politics of Development and Underdevelopment

Departmental Requirements:
Two courses from the list of required graduate courses in Engineering (to be selected in consultation with advisor)

English (MA)
ENGL*6010 [1.00] Approaches to Research and Theory
One other English course and a thesis, or
ENGL*6803 [1.00] Research Project

Food, Agricultural and Resource Economics (MSc)
One of:
ECON*6000 [0.50] Microeconomic Theory I
ECON*3710 [1.00] Advanced Microeconomics
AND ECON*4810 [1.00] Advanced Macroeconomic Theory
One of:
MCS*6060 [0.50] Multivariate Research Methods
AGEC*6360 [0.50] Mathematical Programming
ECON*6050 [0.50] Introduction to Econometric Methods
AND (if not taken as part of CIDS core):
AGEC*6600 [0.50] Agriculture in Economic Development
One additional Agricultural Economics course
A thesis

Note
* NB: a departmental course from the policy area may substitute for the Politics course in the CIDS core.

Geography (MA or MSc)
GEOG*6090 [0.50] Research Methods
One other Geography course not taken as part of the CIDS core
Either a thesis OR
GEOG*6180 [1.00] Research Project in Geography
plus one other Geography course not taken as part of the CIDS core

History (MA)
HIST*6000 [0.50] HIST*6000 Historiography I
HIST*6020 [0.50] HIST*6020 Historiography II
Two additional History courses
OR (only one if the CIDS core includes):
ECON*6370 [0.50] Economic Development in Historical Perspective
One of:
The thesis
HIST*6400 [1.00] Major Paper

Note
N.B. Historical Conceptions of the City HIST*6390 may substitute for the geography component of the CIDS core.

Philosophy (MA)
PHIL*6950 [0.50] MA Seminar
Additional philosophy courses in consultation with the department
Either a thesis or research paper (in conjunction with)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credit Hours</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHIL*6990</td>
<td>1.00</td>
<td>Guided Research Project</td>
</tr>
<tr>
<td>POLS*6900</td>
<td>0.25</td>
<td>Pro-Seminar</td>
</tr>
<tr>
<td>POLS*6940</td>
<td>0.50</td>
<td>Qualitative Research Design and Methods</td>
</tr>
<tr>
<td>RPD*6030</td>
<td>0.50</td>
<td>International Rural Development Planning: Principles and Practices</td>
</tr>
<tr>
<td>RPD*6170</td>
<td>0.50</td>
<td>Rural Research Methods</td>
</tr>
<tr>
<td>RPD*6240</td>
<td>0.50</td>
<td>Planning and Development Theory</td>
</tr>
<tr>
<td>RPD*6300</td>
<td>0.50</td>
<td>Rural Planning Synthesis</td>
</tr>
<tr>
<td>RPD*6380</td>
<td>0.50</td>
<td>Application of Quantitative Techniques in Rural Planning and Development</td>
</tr>
<tr>
<td>RPD*6360</td>
<td>1.00</td>
<td>Major Research Paper</td>
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</table>

Rural Planning and Development (MSc [Plan])

CIDS Core Courses Required:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credit Hours</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDEV*6100</td>
<td>0.50</td>
<td>International Development Studies Seminar</td>
</tr>
<tr>
<td>SOC*6460</td>
<td>0.50</td>
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<td>0.50</td>
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</tr>
<tr>
<td>AGEC*6600</td>
<td>0.50</td>
<td>Agriculture in Economic Development</td>
</tr>
<tr>
<td>ECON*6370</td>
<td>0.50</td>
<td>Economic Development in Historical Perspective</td>
</tr>
</tbody>
</table>

Departmental Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credit Hours</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>RPD*6030</td>
<td>0.50</td>
<td>International Rural Development Planning: Principles and Practices</td>
</tr>
<tr>
<td>RPD*6170</td>
<td>0.50</td>
<td>Rural Research Methods</td>
</tr>
<tr>
<td>RPD*6240</td>
<td>0.50</td>
<td>Planning and Development Theory</td>
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<td>RPD*6380</td>
<td>0.50</td>
<td>Application of Quantitative Techniques in Rural Planning and Development</td>
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<td>RPD*6360</td>
<td>1.00</td>
<td>Major Research Paper</td>
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</table>

Sociology (MA)

<table>
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<tr>
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<th>Credit Hours</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>SOC*6070</td>
<td>0.50</td>
<td>Sociological Theory</td>
</tr>
<tr>
<td>SOC*6700</td>
<td>0.00</td>
<td>Pro-seminar</td>
</tr>
<tr>
<td>SOC*6130</td>
<td>0.50</td>
<td>Quantitative Research Methods</td>
</tr>
<tr>
<td>ANTH*6140</td>
<td>0.50</td>
<td>Qualitative Research Methods</td>
</tr>
</tbody>
</table>

Plus a thesis and one additional course OR

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credit Hours</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOC*6660</td>
<td>1.00</td>
<td>Major Paper</td>
</tr>
</tbody>
</table>

Plus three additional courses
Land Resource Science

The objective of the MSc and PhD programs in land and atmospheric science is to provide opportunities for advanced studies and research on the lower atmosphere, soil, water, surficial geological deposits, the relationships among these resources, and their management within the context of sustainable development. Cross-disciplinary research with a focus on biophysical sciences is emphasized.

Administrative Staff

Chair
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Michael E. Brookfield
BSc Edinburgh, PhD Reading - Professor

Robert Brown
BSc Saskatchewan, MLA Guelph, PhD Guelph - Adjunct Professor

Nigel Bunce
BA, MA, DPHIL Oxford - Adjunct Professor

Terry Daynard
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Kari Dunfield
BSc Calgary, MSc, PhD Saskatchewan - Assistant Professor

Leslie J. Evans
BSc Southampton, PhD Wales - Professor

Susan Glasauer
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BSc London, MSc Birmingham, PhD Reading - Professor and Director, Kemptville College

Beverley Hale
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Richard J. Heck
BSA, MSc, PhD Saskatchewan - Associate Professor

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Claudia Wagner-Riddle
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Jon S. Warland
BSc Cornell, MSc British Columbia, PhD Guelph - Assistant Professor

MSc Program

Admission Requirements

In addition to the minimum requirements stated elsewhere in the Graduate Calendar, admission to the program is dependent on the availability of an advisor, space and funding. Students entering the MSc program will be expected to have taken, or be familiar with the content of, introductory courses in atmospheric science, soil science, earth science and land resource management, either through appropriate courses or a program of self study.

Degree Requirements

All students in the MSc program are required to enroll in the two-course sequence Research Issues I and II. The objectives of these courses are to enhance the skills needed for a research career (including cross-disciplinary research); foster the development of superior communication skills; increase the student’s awareness of major issues related to land resources, and current research; and provide an environmental, social and economic context for this research. It is recommended that students enrol in the courses during their first year.

PhD Program

Admission Requirements

Students who are applying for admission to the PhD program, and who have completed an MSc in another program (at Guelph or at a different University), will follow the application procedures prescribed by Graduate Program Services. Students lacking the same level of understanding across fields and within fields as graduates from the MSc program will be expected to correct this deficiency early in their PhD program.

Students intending to continue directly into a PhD program after the completion of an MSc within the program must complete a full application for the PhD degree. This application should be submitted at least two months before meeting the requirements of the MSc degree. Superior MSc students may be permitted to transfer to the PhD program without completing the master's degree.

Degree Requirements

Students must pass a qualifying examination and successfully prepare and defend a thesis, as specified under the general regulations for the PhD degree. Students must complete the following courses as the minimum course requirements. Additional courses will be determined by the advisory committee.

LRS*6900 [0.25] Research Issues I
LRS*6910 [0.25] Research Issues II

Students are encouraged to develop an advanced level of understanding of two or more additional areas of specialization which are related to the area of their research and to participate in cross-disciplinary or collaborative research programs where opportunities permit.

Interdepartmental Programs

Toxicology Program

Land Resource Science participates in the interdepartmental program in Toxicology. Students register in both the department and the collaborative program.

Courses

Atmospheric Science

LRS*6000 Physical Environment of Crops and Forests F [0.50]
Recent literature on temperature, humidity, radiation, wind, gases and particles in crop and forest environments; evapotranspiration and photosynthesis of plant communities; modification of microclimates; applied micrometeorology. Offered in even-numbered years.

LRS*6040 Micrometeorological Instrumentation W [0.50]
Exchanges of mass, momentum and energy between the surface and the atmosphere will be studied in the context of larger-scale meteorology. Diffusion and turbulence in and above plant canopies will be examined from theoretical and practical perspectives. Topics include time-series analysis, micrometeorological measurement theory, and basic principles of atmospheric science. Offered in even-numbered years.

LRS*6060 Agrometeorological Instrumentation W [0.50]
Theoretical and practical aspects of electronic circuits, sensors, and equipment used in agrometeorological research.

LRS*6241 Special Topics in Atmospheric Science F,U [0.25]
The content is determined by the interests of the students and the availability of instructors. Topics may include aspects of statistics for climatology, animal biometeorology, air pollution meteorology, and hydrometeorology.

LRS*6242 Special Topics in Atmospheric Science F,U [0.50]
See LRS*6241

Soil Science

LRS*6250 Soil Genesis and Classification F [0.50]
A discussion of world soil regions for students not specializing in soil genesis.

LRS*6280 Soil Physics W [0.50]
The soil as a physical system with special regard to soil water movement and the diffusion and dispersion of chemical substances. Numerical techniques and computer solutions will be developed.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRS*6300</td>
<td>Applied Soil Physics F [0.50]</td>
<td></td>
<td>The application of soil physical principles to practical problems concerning soil physical quality, erosion, land reclamation and industrial-waste disposal on land. Prerequisite(s): SOIL*3070.</td>
</tr>
<tr>
<td>LRS*6320</td>
<td>Non-equilibrium Thermodynamics of Porous Media W [0.50]</td>
<td></td>
<td>Transport processes in porous media such as soils, clays, and membranes are dealt with in the framework of non-equilibrium thermodynamics with emphasis on the coupling between water, solutes, heat and electric charge transport. Offered in even-numbered years.</td>
</tr>
<tr>
<td>LRS*6340</td>
<td>Soil Organic Matter and Biochemistry F [0.50]</td>
<td></td>
<td>(1) Soil organic matter characterization, (2) dynamics of soil organic matter, (0.5) nutrient cycling. Offered in odd-numbered years.</td>
</tr>
<tr>
<td>LRS*6360</td>
<td>Soil and Water Chemistry F [0.50]</td>
<td></td>
<td>Thermodynamics of soil solutions; solution-solid phase equilibria; reaction kinetics; computer modelling of solute-mineral interactions.</td>
</tr>
<tr>
<td>LRS*6380</td>
<td>Advanced Soil Chemistry W [0.50]</td>
<td></td>
<td>The mathematical development of solute speciation models for aqueous solutions, surface complexation models for inorganic soil constituents and discrete and continuous functional group models for humic materials.</td>
</tr>
<tr>
<td>LRS*6400</td>
<td>Soil Nitrogen Fertility and Crop Production W [0.50]</td>
<td></td>
<td>Emphasis will be placed on soil N transformations and processes, and N sources for crops; field experimentation methods; environmental issues.</td>
</tr>
<tr>
<td>LRS*6420</td>
<td>Soil Productivity F [0.50]</td>
<td></td>
<td>Soil physical, chemical and biological characteristics as they influence crop growth with emphasis on processes and mechanisms.</td>
</tr>
<tr>
<td>LRS*6440</td>
<td>Field Sampling Strategies and Geostatistics W [0.50]</td>
<td></td>
<td>Concepts and practical aspects of collecting, synthesizing and interpreting data from spatially and temporally variable and/or correlated fields. Hands-on experience in describing spatial structure of large data sets (supplied by student or instructor) using available software. Offered in even-numbered years.</td>
</tr>
<tr>
<td>LRS*6580</td>
<td>Special Topics in Soil Science U [0.25]</td>
<td></td>
<td>Issues that are relevant to the current research of faculty or visiting faculty. Generally presented as a combination of lectures, student seminars and written projects.</td>
</tr>
<tr>
<td>LRS*6581</td>
<td>Special Topics in Soil Science U [0.50]</td>
<td></td>
<td>See LRS*6580.</td>
</tr>
<tr>
<td>LRS*6582</td>
<td>Special Topics in Soil Science U [0.50]</td>
<td></td>
<td>See LRS*6581.</td>
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</tbody>
</table>

**Environmental Earth Science**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRS*6280</td>
<td>Soil Physics W [0.50]</td>
<td></td>
<td>The soil as a physical system with special regard to soil water movement and the diffusion and dispersion of chemical substances. Numerical techniques and computer solutions will be developed.</td>
</tr>
<tr>
<td>LRS*6360</td>
<td>Soil and Water Chemistry F [0.50]</td>
<td></td>
<td>Thermodynamics of soil solutions; solution-solid phase equilibria; reaction kinetics; computer modelling of solute-mineral interactions.</td>
</tr>
<tr>
<td>LRS*6730</td>
<td>Special Topics in Environmental Earth Science U [0.50]</td>
<td></td>
<td>A study of principles and analyses of local environmental problems involving the application of geological and soil information of land use applications and possible hazardous conditions.</td>
</tr>
</tbody>
</table>

**Land Resources Management**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRS*6760</td>
<td>Advanced Remote Sensing W [0.50]</td>
<td></td>
<td>Critical review of the latest research papers on the use of remotely sensed data for temporal monitoring of the biosphere. Offered in odd-numbered years.</td>
</tr>
<tr>
<td>LRS*6881</td>
<td>Special Topics in Land Resources Management U [0.25]</td>
<td></td>
<td>Issues that are relevant to the current research of faculty or visiting faculty. Generally presented as a combination of lectures, student seminars and written projects.</td>
</tr>
<tr>
<td>LRS*6882</td>
<td>Special Topics in Land Resources Management U [0.50]</td>
<td></td>
<td>See LRS*6881.</td>
</tr>
</tbody>
</table>

**Other**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRS*6900</td>
<td>Research Issues I F [0.25]</td>
<td></td>
<td>Principles and philosophy of scientific research including the development of superior communication skills.</td>
</tr>
</tbody>
</table>

**Research Issues**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRS*6910</td>
<td>Research Issues II W [0.25]</td>
<td></td>
<td>A continuation of Research Issues I.</td>
</tr>
<tr>
<td>LRS*6941</td>
<td>Analytical Instrumentation and Techniques U [0.25]</td>
<td></td>
<td>Equipment and techniques of soil and plant analyses. Variable credit will be assigned based on the number of laboratory units covered.</td>
</tr>
<tr>
<td>LRS*6942</td>
<td>Analytical Instrumentation and Techniques U [0.50]</td>
<td></td>
<td>See LRS*6941.</td>
</tr>
</tbody>
</table>
Landscape Architecture

The Landscape Architecture program offers courses of study leading to the Master of Landscape Architecture (MLA) degree.

Administrative Staff

Director
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BLA, MLA Illinois, PhD Wisconsin, ASLA - Associate Professor

Nancy Pollock-Ellwand
BLA Guelph, MArch Manitoba, PhD Waterloo, CSLA, OALA, ASLA - Associate Professor

MLA Program

The MLA program is designed for students with a previous degree in a field unrelated to landscape architecture; for students who hold other professional degrees in architecture, planning and engineering; and for students who have received a BLA degree and are interested in advanced education in a particular area of landscape architecture. The MLA program emphasizes research, analysis, planning, design and management of landscapes ranging in scale from individual sites to entire communities and regions. The MLA program is accredited by the Canadian Society of Landscape Architects. This accreditation is also recognized by the American Society of Landscape Architects.

Admission Requirements

Any applicant to the MLA program is required to have at least a four-year undergraduate degree, with a minimum of 90 semester credit hours (or its equivalent) and a cumulative GPA of at least 3.0 in the last 60 semester credit hours. Applicants must also have completed at least 12 semester hours of coursework in the field of architecture, planning, or engineering and five or more credits of landscape architecture or landscape design. Applicants must also have completed an undergraduate studio component that emphasizes the profession of landscape architecture.

Degree Requirements

Students are encouraged to relate their major emphasis in the MLA to their undergraduate discipline through course work and thesis.

Required Core

For the holder of a BLA with several subsequent years of significant professional experience:

- LARC*6380 [0.25] Research Seminar
- LARC*6600 [0.50] Critical Inquiry & Research Analysis
- LARC*6610 [0.50] Research Methods
- LARC*6710 [0.50] Special Study
- 1 Elective

For the holder of a BLA without such professional experience:

- LARC*6380 [0.25] Research Seminar
- LARC*6430 [0.50] Landscape Resource Analysis
- LARC*6470 [0.50] Integrative Environmental Planning
- LARC*6600 [0.50] Critical Inquiry & Research Analysis
- LARC*6610 [0.50] Research Methods
- LARC*6710 [0.50] Special Study

Thesis

For holders of degrees other than the BLA:

- HORT*3260 Woody Plants (audit)
- LARC*6010 Landscape Architecture Studio I F [0.50]
- LARC*6020 Landscape Architecture Studio II F [0.50]
- LARC*6030 Landscape Architecture Studio III F [0.50]
- LARC*6040 Landscape Architecture Studio IV W [0.50]
- LARC*6430 Landscape History Seminar F [0.25]
- LARC*6450 Landscape Resource Analysis F [0.50]
- LARC*6470 Integrative Environmental Planning F [0.50]
- LARC*6600 Environmental Design F [0.50]
- LARC*6610 Critical Inquiry & Research Analysis F [0.50]
- LARC*6611 Research Methods F [0.50]
- LARC*6711 Special Study F [0.50]

Interdepartmental Programs

Rural Studies PhD Program

Landscape Architecture participates in the PhD program in Rural Studies in the field of sustainable rural communities. Those landscape architecture faculty members whose research and teaching expertise includes aspects of rural studies may serve as advisors for PhD students. For further information consult the Rural Studies listing in this calendar.

Courses

Theory and Practice

The special study in professional practice, environmental design, and landscape analysis and planning, for PhD students. For further information consult the Rural Studies listing in this calendar.

LARC*6010 Landscape Architecture Studio I F [0.50]

Studio and field instruction introduces the student to landscape architecture through acquisition of basic professional skills and knowledge. Topics include design theory, landscape inventory and analysis, application of the design process to projects at the site scale, graphic and oral communication, and graphic communication.

Prerequisite(s): Students are required to satisfy a woody plants requirement either through the course HORT*3260 or equivalent.

LARC*6020 Landscape Architecture Studio II F [0.50]

Studio and field instruction introduces the student to landscape architecture through acquisition of basic professional skills and knowledge. Topics include surveying, principles of site grading and drainage, introduction to materials and methods of construction, and graphic communication.

Prerequisite(s): Students are required to satisfy a woody plants requirement either through the course HORT*3260 or equivalent.

LARC*6030 Landscape Architecture Studio III W [0.50]

Studio and field instruction introduces the student to landscape architecture through acquisition of basic professional skills and knowledge. Topics include site grading and drainage, introduction to materials and methods of construction, and graphic communication.

Prerequisite(s): Students are required to satisfy a woody plants requirement either through the course HORT*3260 or equivalent.

LARC*6040 Landscape Architecture Studio IV W [0.50]

Studio and field instruction introduces the student to landscape architecture through acquisition of basic professional skills and knowledge. Topics include surveying, principles of site grading and drainage, introduction to materials and methods of construction, and graphic communication.

Prerequisite(s): Students are required to satisfy a woody plants requirement either through the course HORT*3260 or equivalent.

LARC*6430 Landscape History Seminar F [0.25]

A lecture/seminar course focussed on the legal, business, ethical and professional practices of Landscape Architecture professionals. Skills emphasize the development of oral and written communication.

LARC*6360 Professional Practice Seminar F [0.25]

A lecture/seminar course focussed on the legal, business, ethical and professional practices of Landscape Architecture professionals. Skills emphasize the development of oral and written communication.

LARC*6380 Landscape Resource Analysis F [0.50]

Integrated field and classroom instruction introduces the student to inventory and analysis of biological, physical, social and cultural elements of the landscape. Projects will incorporate principles of landscape ecology and landscape planning. Field study will require some travel at student's expense.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LARC*6440</td>
<td>Environmental Design F</td>
<td>0.50</td>
</tr>
<tr>
<td>LARC*6470</td>
<td>Integrative Environmental Planning W</td>
<td>0.50</td>
</tr>
<tr>
<td>LARC*6380</td>
<td>Research Seminar W</td>
<td>0.25</td>
</tr>
<tr>
<td>LARC*6600</td>
<td>Critical Inquiry &amp; Research Analysis W</td>
<td>0.50</td>
</tr>
<tr>
<td>LARC*6610</td>
<td>Research Methods F</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6170</td>
<td>Rural Research Methods U</td>
<td>0.50</td>
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<tr>
<td>LARC*6710</td>
<td>Special Study S,F,W</td>
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**Research Techniques and Practice**

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>EDRD*6000</td>
<td>Qualitative Analysis in Rural Development U</td>
<td>0.50</td>
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<tr>
<td>LARC*6380</td>
<td>Research Seminar W</td>
<td>0.25</td>
</tr>
<tr>
<td>LARC*6600</td>
<td>Critical Inquiry &amp; Research Analysis W</td>
<td>0.50</td>
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**Independent Study**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>LARC*6710</td>
<td>Special Study S,F,W</td>
<td>0.50</td>
</tr>
</tbody>
</table>

This course integrates field and classroom study to apply landscape ecology to current landscape problems, including analysis of regional landscapes, restoration of degraded landscapes, and application of aesthetic and ecological principles across scales in site to regional settings. Case studies component will require some travel at students' expense.

Landscape planning emphasizing the integration and interrelationships between biophysical and cultural resources, with application at a regional landscape planning scale. This course typically incorporates community-outreach projects and develops student facilitation abilities.

A seminar course focussed on the process and communication of research, influenced by the current research of the participants. Participants organize a conference to present their research results.

Students are introduced to critical inquiry as a method of evaluating information, design, and planning. The focus of the course is on the quantification and analysis of research data. Modelling and simulation are introduced and discussed in the context of planning, design, and research.

An introduction to a broad array of research methods as they apply to landscape planning and design, with a focus on the connections between research and design. Emphasis is on developing foundations for the creation of appropriate research questions.

The course provides rural planning and development professionals with a number of theoretical frameworks and practical approaches to problem solving in rural Canadian and international contexts. The course content provides an introduction to hypothesis development, data collection, analytical frameworks, research management, and information synthesis and presentation methodologies that are appropriate to the practicing rural planner and developer. It views the roles of the researcher and research as interventionist and intervention in the rural community. Research methods are discussed as an integral and supporting part of the planning and development process.

Independent study. A proposal for the content and product required for this course must be developed in conjunction with the student's Advisory Committee.
Leadership

Administrative Staff

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BA, MA Guelph, D Phil Oxford

John Walsh
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MA Leadership

The MA (Leadership) focuses on the challenges facing leaders in the public, private and not-for-profit sectors, with an emphasis on the interaction between, and interdependency of, these spheres. Successful completion of the MA (Leadership) degree involves a comprehensive program of theoretical study backed by significant practical experience and analysis. Participants will also undertake a formal self-assessment process to gain insight into their own strengths and weaknesses and their ultimate leadership potential.

As a full cost recovery program, the MA (Leadership) is designed to enable mid-career professionals to complete a graduate degree without interrupting their careers. Web-based distance courses are combined with brief summer sessions in Guelph or Toronto and the completion of a major research project.

Admission Requirements

Minimum admission requirements are:

A four year undergraduate degree or its equivalent (from a recognized university or college) with an average of at least a “B-” (70-72%) in the last two years of study AND having completed at least five years of relevant work experience

OR

General degree, diploma and/or an acceptable professional designation AND having completed at least seven years of relevant work experience.

Meeting the minimum criteria for admission does not guarantee acceptance into the program. Limitations of funds, space, facilities or personnel may make it necessary for the University, at its discretion, to refuse admission to an otherwise qualified applicant.

Applicants for the program must have confirmed access to appropriate computer hardware and software. The computer equipment to be used by participants must have adequate peripherals to support the learning system, including CD-ROM capability and a sound card. For information pertaining to computer equipment and software requirements contact the College of Management and Economics Executive Programs Office at 1-888-622-2474 or visit the MA (Leadership) web site at http://wwwleadership.uoguelph.ca. Participants are solely responsible for arrangement for the purchase and maintenance of the recommended computer system and software.

Degree Requirements

On average participants allot 20 to 25 hours per week to study and participate in the program. This is an approximate number of hours and may vary depending on personal learning style. Participants normally complete the MA (Leadership) in 24 months. Normally, course modules are eight weeks in length and are completed in a pre-determined sequence, but some variations exist. Participants must complete the program within six years of commencement.

The MA (Leadership) involves a challenging combination of course work and a research-based project. Six web-based courses (3.0 credits) and two residency courses (1.0 credit) must be completed, followed by the major research project (1.0 credit). Faculty and senior executives at the participant’s workplace often jointly supervise the research project. The project requires a literature review, data collection, data analysis, and culminates in a major paper that is presented to faculty and other program participants.

Courses

LEAD*6000 Foundations of Leadership S [0.50]
The course will enhance participants’ interpersonal competency, as well as their knowledge and understanding of the theory and research underlying the impact of team management and collaboration on the organization.

LEAD*6100 Theories of Leadership F [0.50]
This course traces the development of the concept of leadership. Through the interplay of theory and practical application, participants will gain a deeper appreciation for the requirements, responsibilities, and consequences of effective leadership.

LEAD*6200 Leadership of Organizational Change F [0.50]
This course studies the role of leadership in the management of change within an organization and the changes required of management. The course examines the development of trust, the building of organizational loyalty, and motivation and inspiring of high performance teams.

LEAD*6300 Role of the Leader in Decision-Making W [0.50]
The role of the leader in decision-making is explored through the study of the rational model for decision-making, human biases, creativity, and risk and uncertainty in decision-making. The course will also examine ethical issues and group decision-making.

LEAD*6400 Research Methods for Decision-Making W [0.50]
The course will explore both quantitative and qualitative techniques used in the analysis of research results from a variety of sources (surveys, government statistics, in-depth interviews, focus groups and program evaluation results). Case studies will be used to demonstrate the application of multiple research methods.

LEAD*6500 Ethics in Leadership F [0.50]
Issues in the use and application of ethical standards by leaders are explored through examples from history, current events, novels, films and television. Relevant theory is applied to leadership examples to help students develop an ethical framework for the exercise of leadership skills.

LEAD*6720 Politics of Organizations F [0.50]
This elective course reviews a variety of theories and models that help to explain the behavioural underpinnings that influence and shape leadership processes within organizations. Examples from history and current events are explored to illustrate theory.

LEAD*6740 Coaching and Developing Others F [0.50]
This course will provide student with an opportunity to design developmental plans for direct reports, assess their coaching skills, and develop their coaching skills to support the development of others.

Restriction(s): Executive programs students only.

LEAD*6800 Personal Skill Self-Assessment S [0.50]
Using the “Basis of Competence” model, this course examines personal skills in four areas: Managing Self, Communicating, Managing People and Tasks, and Mobilizing Innovation and Change. The skills required to make smooth transitions from one job to another in a dynamic workplace will be explored.

LEAD*6900 Major Research Project W-S [1.00]
This course involves a directed research project leading to a referenced, professional report on a leadership problem or issue. Completion of this course will require formal presentation on the research, analysis, evaluation and recommendations to faculty and students.
**Literary Studies/Theatre Studies in English**

### Administrative Staff

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**Jerred Smith**  
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**James Weldon**  
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### PhD Program

**Admission Requirements**

Admission to the Joint PhD Program normally requires an MA in English, an MA in Drama/Theatre, or an equivalent degree with at least an A- average in graduate work. Applications are considered by the Joint PhD Program Committee and a recommendation to admit or decline is forwarded to the Dean of Graduate Studies at the proposed home university.

**Program Requirements**

Although students might choose either Literary Studies or Theatre Studies, innovative opportunities exist in the program to pursue work across these traditional disciplinary boundaries. The degree requirements consist of three one-semester (0.5 credit) graduate courses normally taken in the first year of the program; one secondary area seminar (0.5 credit) culminating in a written candidacy exam and a colloquium presentation; one primary area seminar (1.0 credit) culminating in an oral and written candidacy exam; and a dissertation (2.0 credits). For purposes of the Joint PhD Program, the qualifying examination related to the student's knowledge of the subject area and field shall consist of the oral and written candidacy exam for the primary area seminar.

**Area Seminars**

The area seminars are structured directed-reading courses in two different fields, intended to provide concentrated training in the student's expected areas of research concentration and preparation for the written examination at the conclusion of each area seminar. The seminars involve regular consultations between the student and the seminar director. The secondary area seminar will normally be taken during the second and third semesters of the program (year one). The primary area seminar will normally be taken in the fourth and fifth semesters of the program and will culminate in the oral candidacy examination (year two).
VIII. Graduate Programs, Literary Studies/Theatre Studies in English

Secondary Area Seminar (Year One)

The secondary area seminar explores an area in a field other than that in which the student has chosen to specialize and write a dissertation. The seminar emphasizes thorough general knowledge of the area's scope, relevant theoretical frameworks, and research methodologies, with due regard to the student's own teaching, research interests, and critical perspectives. The reading and other activities proceed in close consultation with an advisory committee consisting of an assigned area seminar director (who will normally be a faculty member other than the anticipated dissertation advisor) and two other faculty members. The area seminar director is selected from the core faculty in the student's resident institution, while the two faculty members may be from one or both institutions. This advisory committee, together with the PhD Director from the student's home university, comprises the student's candidacy examination committee.

Primary Area Seminar (Year Two)

The primary area seminar involves individualized, directed study of the immediate literary, cultural, and theoretical contexts of the student's approved dissertation subject. Ordinarily, the assigned seminar director is the confirmed dissertation advisor. Two additional faculty members serve in an advisory capacity, and together with two additional members of the graduate faculty (at least one of whom must be a member of the unit), plus the appropriate PhD Director or the chair of the academic unit, form the candidacy examination committee. The primary area seminar ensures that the student's dissertation work is supported by a broad and contextualized understanding of the primary materials associated with the area of specialization and dissertation.

Both the written and oral examinations for the primary area seminar shall constitute the qualifying candidacy examination. Upon satisfactory completion of these examinations the student is deemed to have met the Joint PhD Program standards and becomes a candidate for the PhD degree.

PhD Dissertation

Following successful completion of the two Area Seminars, the student must complete an original research project on an advanced topic. The advisory committee for the dissertation will consist of three members of the graduate faculty, one of whom will assume the primary advisory role. The dissertation should normally be between 50,000 and 75,000 words in length. The regulations and procedures at the university in which the student is registered will govern both the dissertation and the examination formats.

Language Requirement

Students will be required to demonstrate reading knowledge of one language other than English, as approved by the Joint PhD Program Committee. Assessment of the student's reading knowledge will be based on the student's translation (with the help of a dictionary) of a critical passage, and a written analysis (in English) of the passage's critical implications. Evidence that a student has already demonstrated similar language ability at another university prior to admission may be submitted to the Joint PhD Program Committee with a request to have the language requirement waived. Credit will be given to any student who has fulfilled the language requirement through an MA-level examination. Credit will not normally be given for the completion of a university-level language course.

Typically the language requirement will be completed by the end of the fifth semester of study, and no later than the sixth semester (year two). A student who fails the language examination twice will normally be required to withdraw from the program.

Residency Regulations

At least five semesters of full-time study must be devoted to the doctoral program following the completion of a recognized Master's degree.

Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>LTS*7770</td>
<td>Language Requirement U [0.00]</td>
<td>A written demonstration of a student's reading knowledge of one language other than English, as approved by the Joint PhD Program Committee.</td>
</tr>
<tr>
<td>LTS*8700</td>
<td>Secondary Area Studies U [0.50]</td>
<td>A directed-reading course to provide concentrated training in an area of research other than the student's expected area of research concentration. This seminar emphasizes thorough general knowledge of a chosen area's scope, theoretical frameworks, and research methodologies. The course is normally taken during the first year of a student's program.</td>
</tr>
</tbody>
</table>

Note

* N.B. all courses, except for the Intensive Area Seminar and the Dissertation, are weighted 0.5.

Courses Offered at the University of Guelph*

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
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<tr>
<td>DRMA*6020</td>
<td>Canadian Drama</td>
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</tr>
<tr>
<td>DRMA*6040</td>
<td>Quebec and Franco-Canadian Drama</td>
<td>[0.50]</td>
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<tr>
<td>DRMA*6050</td>
<td>Special Studies in Canadian Drama</td>
<td>[0.50]</td>
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<tr>
<td>DRMA*6060</td>
<td>Aspects of Canadian Theatre History</td>
<td>[0.50]</td>
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<tr>
<td>DRMA*6080</td>
<td>Special Studies in Canadian Theatre</td>
<td>[0.50]</td>
</tr>
<tr>
<td>DRMA*6090</td>
<td>Aspects of Theatre in Early-Modern England</td>
<td>[0.50]</td>
</tr>
<tr>
<td>DRMA*6100</td>
<td>English Drama to 1642</td>
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<td>ENGL*6003</td>
<td>Problems of Literary Analysis</td>
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<td>Topics in Canadian Literature</td>
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<td>ENGL*6209</td>
<td>Topics in Commonwealth/Postcolonial Literature</td>
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<td>ENGL*6412</td>
<td>Topics in Medieval/Renaissance Literature</td>
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<td>ENGL*6421</td>
<td>Topics in Eighteenth Century and Romantic Literature</td>
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<td>Topics in Nineteenth Century Literature</td>
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<td>Topics in Modern British Literature</td>
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<td>ENGL*6451</td>
<td>Topics in American Literature</td>
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<td>ENGL*6611</td>
<td>Topics in Women's Writing</td>
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<td>ENGL*6621</td>
<td>Topics in Children's Literature</td>
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<td>ENGL*6641</td>
<td>Topics in Scottish Literature</td>
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<tr>
<td>ENGL*6691</td>
<td>Interdisciplinary Studies</td>
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<td>ENGL*6811</td>
<td>Special Topics in English</td>
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<td>ENGL*6801</td>
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<td>ENGL*6802</td>
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<td>[0.50]</td>
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* N.B. all courses, except for the Intensive Area Seminar and the Dissertation, are weighted 0.5.

Courses Offered at Wilfrid Laurier University*

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<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>WLU*600E</td>
<td>Research Methods, Theory, and Professional Issues U [0.50]</td>
<td>Descriptions of all Wilfrid Laurier University Graduate courses may be found at <a href="https://www.wlu.ca/page.php?grp_id=36&amp;s_id=750">https://www.wlu.ca/page.php?grp_id=36&amp;s_id=750</a></td>
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<td>WLU*601E</td>
<td>Fiction by Contemporary British Women U [0.50]</td>
<td>Descriptions of all Wilfrid Laurier University Graduate courses may be found at <a href="https://www.wlu.ca/page.php?grp_id=36&amp;s_id=750">https://www.wlu.ca/page.php?grp_id=36&amp;s_id=750</a></td>
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<td>WLU*602E</td>
<td>Gender and Genre in Renaissance Drama U [0.50]</td>
<td>Descriptions of all Wilfrid Laurier University Graduate courses may be found at <a href="https://www.wlu.ca/page.php?grp_id=36&amp;s_id=750">https://www.wlu.ca/page.php?grp_id=36&amp;s_id=750</a></td>
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<tr>
<td>WLU*603E</td>
<td>American Women Writers U [0.50]</td>
<td>Descriptions of all Wilfrid Laurier University Graduate courses may be found at <a href="https://www.wlu.ca/page.php?grp_id=36&amp;s_id=750">https://www.wlu.ca/page.php?grp_id=36&amp;s_id=750</a></td>
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<tr>
<td>WLU*604E</td>
<td>The Gender of Modernism U [0.50]</td>
<td>Descriptions of all Wilfrid Laurier University Graduate courses may be found at <a href="https://www.wlu.ca/page.php?grp_id=36&amp;s_id=750">https://www.wlu.ca/page.php?grp_id=36&amp;s_id=750</a></td>
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<td>WLU*605E</td>
<td>Representations of Gender in Victorian Literature U [0.50]</td>
<td>Descriptions of all Wilfrid Laurier University Graduate courses may be found at <a href="https://www.wlu.ca/page.php?grp_id=36&amp;s_id=750">https://www.wlu.ca/page.php?grp_id=36&amp;s_id=750</a></td>
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<tr>
<td>Course Code</td>
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<td>Descriptions of all Wifrid Laurier University Graduate courses may be found</td>
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<tr>
<td>WLU*607E</td>
<td>Ideologies of Genre in 19th-Century Literature U [0.50]</td>
<td>Descriptions of all Wifrid Laurier University Graduate courses may be found</td>
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<td>WLU*608E</td>
<td>Women Writers of the 17th Century U [0.50]</td>
<td>Descriptions of all Wifrid Laurier University Graduate courses may be found</td>
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<tr>
<td>WLU*610E</td>
<td>Feminist Theory and Women’s Writing U [0.50]</td>
<td>Descriptions of all Wifrid Laurier University Graduate courses may be found</td>
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<tr>
<td>WLU*621E</td>
<td>The Nature Lyric: Genre and Gender U [0.50]</td>
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<tr>
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<tr>
<td>WLU*623E</td>
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<td>Medieval Dream Vision Narrative U [0.50]</td>
<td>Descriptions of all Wifrid Laurier University Graduate courses may be found</td>
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<td>WLU*625E</td>
<td>Medieval Romance U [0.50]</td>
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<tr>
<td>WLU*626E</td>
<td>Postcoloniality: Theory and Practice U [0.50]</td>
<td>Descriptions of all Wifrid Laurier University Graduate courses may be found</td>
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<tr>
<td>WLU*628E</td>
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<td>Descriptions of all Wifrid Laurier University Graduate courses may be found</td>
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<td>Descriptions of all Wifrid Laurier University Graduate courses may be found</td>
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<tr>
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<td>Descriptions of all Wifrid Laurier University Graduate courses may be found</td>
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<tr>
<td>WLU*635E</td>
<td>The Gothic U [0.50]</td>
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<td>WLU*636E</td>
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<tr>
<td>WLU*640E</td>
<td>Reading Theory U [0.50]</td>
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<td>WLU*641E</td>
<td>Voices of the Diaspora U [0.50]</td>
<td>Descriptions of all Wifrid Laurier University Graduate courses may be found</td>
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<tr>
<td>WLU*642E</td>
<td>Oral Performance and Oral Theory U [0.50]</td>
<td>Descriptions of all Wifrid Laurier University Graduate courses may be found</td>
</tr>
</tbody>
</table>

**Note**

*N.B. All courses, except for the Intensive Area Seminar and the Dissertation, are weighted 0.5.*
Marketing and Consumer Studies

Faculty and graduate students in the Department of Marketing and Consumer Studies share a focus on the multi-disciplinary examination of consumer behaviour and marketplace phenomena. Central to the department's research and graduate teaching program is the application of consumer behaviour and marketplace knowledge to marketing, housing and real estate management, quality management, and policy issues of concern to a wide variety of private, public and nonprofit sector organizations. The department's graduate program leads to the master of science degree in marketing and consumer studies.

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BASc Guelph, MSc, PhD Purdue - Professor

Sunghwan Yi
BBA, MBA Seoul National, PhD Pennsylvania State - Assistant Professor

MSc Program

The MSc program draws on a variety of disciplines for theory, concepts, and research methods. Students are required to successfully complete five departmental core courses; consumption behaviour theory, marketing theory, and three graduate courses in measurement and analysis. One elective course is selected by the student in conjunction with the graduate coordinator and/or his/her advisory committee and is normally chosen to provide theoretical, conceptual, and/or methodological background for the thesis. Each student is also required to attend the department’s graduate seminar for the duration of his or her program.

A significant number of graduate students in marketing and consumer studies direct their course work and thesis research toward applications related to marketing within private, public, and non-profit sector organizations. This particular focus is especially appropriate for students with undergraduate preparation in business administration, commerce, economics, or marketing who have career interests in research and analysis in marketing management. The program also provides excellent training towards the pursuit of a PhD in marketing or consumer behaviour or a related business discipline.

Departmental Core Courses

The departmental core is required of all graduate students in the Department of Marketing and Consumer Studies. It contains a minimum of 6 half credits (3.0 full credits) in total, and enrolment in the marketing and consumer studies department seminar (MCS*6950) for each semester of full-time graduate study. The program consists of:

Full Semester:
MCS*6000 [0.50] Consumption Behaviour Theory

Winter Semester:
MCS*6080 [0.50] Qualitative Research Methods
MCS*6060 [0.50] Multivariate Research Methods
(Or 2 suitable methods courses)
1 elective*
MCS*6950 [0.00] Consumer Studies Seminar

Note
*Chosen by the graduate student with the approval of the graduate coordinator and his/her advisory committee.

Note
MCS*6950 is taken during each semester of full-time graduate study.

Admission Requirements

Admission information and application forms should be requested directly from the graduate secretary in the Department of Marketing and Consumer Studies. Offers of admission are granted on a competitive basis and, in part, on the ability of graduate faculty to supervise the student's intended research. Potential applicants are urged to visit the department to discuss their research objectives with graduate faculty prior to applying. Visits should be arranged directly with members of graduate faculty (go to http://www.uoguelph.ca/consumerstudies/ for graduate faculty phone numbers and e-mail addresses).

All applicants should have completed a minimum of one course in statistics as part of their undergraduate program. Applicants are also encouraged to have completed courses in areas such as marketing, consumer behaviour, marketing research, and related subjects. Students may be admitted to the graduate program despite deficiencies in certain academic areas. Students admitted with deficiencies will likely be required to address academic weaknesses by enrolling in one or more undergraduate courses at the University of Guelph. Undergraduate courses do not count toward fulfillment of master of science graduation requirements.

All applicants are required to submit GRE or GMAT scores. The deadline to apply for September admission to the masters of science program is April 1. The Department of Marketing and Consumer Studies admits students to the graduate program only in September.

Degree Requirements

The program normally consists of at least 6 half credit (3.0 full credits) graduate courses, enrollment in the consumer studies seminar (MCS*6950) for each semester of full-time graduate study, and a successfully defended thesis. Additional course credits may be required by the student's advisory committee depending upon the student's background preparation for his/her intended area of study and thesis research.

Courses

For courses without a semester designation the student should consult the graduate co-ordinator.

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<td>MCS*6020 Marketing Strategy &amp; Decision Support Systems U</td>
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<td>MCS*6050 Research Methods in Marketing and Consumer Studies F</td>
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<td>MCS*6060 Multivariate Research Methods W</td>
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<td>MCS*6080</td>
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<td>MCS*6090</td>
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<td>MCS*6120</td>
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<td>MCS*6150</td>
<td>Quality Assurance Management W [0.50]</td>
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<td>Special Topics in Food Marketing U [0.50]</td>
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<td>MCS*6300</td>
<td>Special Topics in Consumer Studies U [0.50]</td>
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<td>MCS*6350</td>
<td>Consumer, Business and Government Relations F,W [0.25]</td>
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<td>MCS*6370</td>
<td>Consumer Economics U [0.50]</td>
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<td>MCS*6500</td>
<td>Global Business Today U [0.50]</td>
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<td>MCS*6700</td>
<td>Special Topics in International Marketing U [0.50]</td>
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<td>MCS*6710</td>
<td>Special Topics in Marketing U [0.50]</td>
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<td>MCS*6720</td>
<td>Special Topics in Housing and Real Estate U [0.50]</td>
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<tr>
<td>MCS*6950</td>
<td>Consumer Studies Seminar F,W [0.00]</td>
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Mathematics and Statistics

The objective of the graduate program is to offer opportunities for advanced studies and research in the fields of applied mathematics and applied statistics, including the interface between the two. Although the two fields within the program have different requirements in terms of specific courses and qualifying examination areas, there is a considerable degree of interaction and commonality between them, from both philosophical and practical viewpoints. Philosophically, this commonality relates to the methodology of constructing and validating models of specific real-world situations. The major areas of specialization in applied mathematics are dynamical systems, mathematical biology, numerical analysis and operations research. Applied statistics encompasses the study and application of statistical procedures to data arising from real-world problems. Much of the emphasis in this field concerns problems originally arising in a biological setting. The major areas of specialization include linear and nonlinear models; bioassay; and survival analysis, life testing and reliability.

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Radhey S. Singh
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Gary J. Umphrey
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Allan Willms
BMath, MMath Waterloo, PhD Cornell - Assistant Professor

MSc Program

The department offers an MSc degree with several options. Students choose between either mathematics or statistics fields and complete their program either by thesis or project. The two main program types are regular and interdisciplinary.

Interdisciplinary programs involve faculty members of this and other university departments and focus on problems of common interest to both departments. Examples include joint studies in quantitative genetics involving faculty in the Department of Animal and Poultry Science; studies of economic management of renewable resources involving faculty from the economics departments; modeling of physiological processes involving faculty from the Ontario Veterinary College or the College of Biological Science; toxicological modeling or risk assessment in collaboration with faculty involved in the Toxicology Research Centre.

Admission Requirements

For the MSc Degree Program, an honours degree with an equivalent to a major in the intended area of specialization is preferred. Applicants with an honours degree with the equivalent of a minor in mathematics or in statistics as defined in the University of Guelph Undergraduate Calendar will be considered.

An applicant who does not meet the requirements must register as a nondegree undergraduate student and take courses to achieve an equivalent to the above. Such students are encouraged to consult the departmental graduate officers or the chair of the department.

The department's diploma in applied statistics fulfills the requirement of a minor equivalent in statistics.

Degree Requirements

For both regular and interdisciplinary programs, the degree requirements may be met by taking either:

- an MSc by thesis which requires at least 2.0 credits (four courses) plus a thesis; or
- an MSc without thesis (by project) which requires at least six courses; i.e., 3.0 credits, 2.0 of which must be for graduate-level courses plus successful completion within two semesters:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
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<tbody>
<tr>
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<td>MSc Project in Mathematics</td>
</tr>
<tr>
<td>STAT*6998</td>
<td>1.00</td>
<td>MSc Project in Statistics</td>
</tr>
</tbody>
</table>

All programs of study must include the appropriate core courses (see below). Students who have obtained prior credit for a core course or its equivalent will normally substitute a departmental graduate course at the same or higher level, with the approval of the graduate co-ordinator. The remaining prescribed courses are to be selected from either graduate courses or 400-level undergraduate courses. Courses taken outside of this department must have the prior approval of the graduate program committee.

Mathematical Area of Emphasis

All candidates for the MSc with a mathematical area of emphasis are required to include in their program of study at least three of the following core courses:

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>MATH*6011</td>
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<td>Dynamical Systems I</td>
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<td>MATH*6021</td>
<td>0.50</td>
<td>Optimization I</td>
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<td>MATH*6400</td>
<td>0.50</td>
<td>Numerical Analysis I</td>
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<tr>
<td>MATH*6041</td>
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<td>Partial Differential Equations I</td>
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Statistical Area of Emphasis

All candidates for the MSc with a statistical area of emphasis are required to include in their program of study the following core courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT*6801</td>
<td>0.50</td>
<td>Advanced Data Analysis I</td>
</tr>
<tr>
<td>STAT*6802</td>
<td>0.50</td>
<td>Advanced Data Analysis II</td>
</tr>
<tr>
<td>STAT*6860</td>
<td>0.50</td>
<td>Linear Statistical Models</td>
</tr>
</tbody>
</table>

It is recommended that students take the undergraduate course Statistical Inference, STAT*4340, if this course or its equivalent has not previously been taken.

Interdisciplinary Programs

1. The general course requirements, above, must be met.
2. The project or thesis of an interdisciplinary program must directly integrate the study of mathematics or statistics with another discipline.

PhD Program

Admission Requirements

A candidate for the PhD degree program must possess a recognized master's degree obtained with high academic standing. Also, a member of the department's graduate faculty must agree to act as an advisor to the student.

Degree Requirements

The PhD degree is primarily a research degree. For that reason, course work commonly comprises a smaller proportion of the student's effort than in the master's program. Course requirements are as follows:
Mathematics and Statistics may serve as advisors for MSc and PhD students in biophysics. Professor teaching expertise includes aspects of biophysics. Professors Bauch, Eberl, Lawniczak, the Biophysics Interdepartmental Group (BIG). These faculty members' research and

The Department of Mathematics and Statistics participates in the MSc/PhD programs in Biophysics. Professors Bauch, Eberl, Langford, Lawniczak, and Willms are members of the Biophysics Interdepartmental Group (BIG). These faculty members' research and teaching expertise includes aspects of biophysics. Professors Bauch, Eberl, Lawniczak, and Willms may serve as advisors for MSc and PhD students in biophysics. Professor Langford may serve as co-advisor. Please consult the Biophysics listing for a detailed description of the graduate programs offered by the Biophysics Interdepartmental Group.

Courses

Mathematics

**MATH*6011 Dynamical Systems I U [0.50]**
Basic theorems on existence, uniqueness and differentiability; phase space, flows, dynamical systems; review of linear systems, Floquet theory, Hopf bifurcation, perturbation theory and structural stability; differential equations on manifolds. Applications drawn from the biological, physical, and social sciences.

**MATH*6012 Dynamical Systems II U [0.50]**
The quantitative theory of dynamical systems defined by differential equations and discrete maps, including: generic properties; bifurcation theory; the center manifold theorem; nonlinear oscillations, phase locking and period doubling; the Birkhoff-Smale homoclinic theorem; strange attractors and deterministic chaos.

**MATH*6021 Optimization I U [0.50]**
A study of the basic concepts in: linear programming, convex programming, non-convex programming, geometric programming and related numerical methods.

**MATH*6022 Optimization II U [0.50]**
A study of the basic concepts in: calculus of variations, optimal control theory, dynamic programming and related numerical methods.

**MATH*6031 Functional Analysis U [0.50]**
Review of metric, normed, and inner product spaces; Banach contraction principle; brief introduction to measure and integration; elementary Fourier analysis; adjoint and compact operators; nonlinear operators and the Frechet derivative; Baire category theorem; principles of uniform boundedness; open mapping theorem; principle of uniform boundedness; closed graph theorem.

**MATH*6041 Partial Differential Equations I U [0.50]**
Classification of partial differential equations. The Hyperbolic type, the Cauchy problem, range of influence, well- and ill-posed problems, successive approximation, the Riemann function. The elliptic type: fundamental solutions, Dirichlet and Neumann problems. The parabolic type: boundary conditions, Green's functions and separation of variables. Introduction to certain non-linear equations and transformations methods.

**MATH*6042 Partial Differential Equations II U [0.50]**
A continuation of some of the topics of Partial Differential Equations I. Also, systems of partial differential equations, equations of mixed type and non-linear equations.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT*6841</td>
<td>Statistical Inference U</td>
<td>0.50</td>
</tr>
<tr>
<td>STAT*6850</td>
<td>Advanced Biometry U</td>
<td>0.50</td>
</tr>
<tr>
<td>STAT*6860</td>
<td>Linear Statistical Models U</td>
<td>0.50</td>
</tr>
<tr>
<td>STAT*6860</td>
<td>Linear Statistical Models U</td>
<td>0.50</td>
</tr>
<tr>
<td>STAT*6870</td>
<td>Experimental Design U</td>
<td>0.50</td>
</tr>
<tr>
<td>STAT*6880</td>
<td>Sampling Theory U</td>
<td>0.50</td>
</tr>
<tr>
<td>STAT*6920</td>
<td>Topics in Statistics U</td>
<td>0.50</td>
</tr>
<tr>
<td>STAT*6950</td>
<td>Statistical Methods for the Life Sciences F</td>
<td>0.50</td>
</tr>
<tr>
<td>STAT*6960</td>
<td>Design of Experiments and Data Analysis for the Life Sciences W</td>
<td>0.50</td>
</tr>
<tr>
<td>STAT*6970</td>
<td>Statistical Consulting Internship U</td>
<td>0.25</td>
</tr>
<tr>
<td>STAT*6990</td>
<td>Statistics Seminars by Graduate Students U</td>
<td>0.00</td>
</tr>
<tr>
<td>STAT*6998</td>
<td>MSc Project in Statistics U</td>
<td>1.00</td>
</tr>
<tr>
<td>STAT*7010</td>
<td>Strategies for Study Design and Regression Analysis F</td>
<td>0.50</td>
</tr>
<tr>
<td>STAT*7020</td>
<td>Data Analysis and Statistical Inference W</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Note:

*STAT*6950 and STAT*6960 are intended for graduate students of other departments and may not normally be taken for credit by mathematics and statistics graduate students.
Microbiology

The Microbiology Graduate Program offers MSc and PhD degrees. The four major areas of emphasis and the faculty associated with those areas are:

- **Microbial Physiology and Structure** -- Beveridge, Clarke, Forsberg, Krell, Lam, Meng, Mutharia, Seah, van der Merwe, Whitfield, Wood
- **Pathogenesis and Immunity** -- Kaushik, Lam, Lo, Mutharia, Seah, Stevenson, Whitfield, Wood
- **Virology** -- Krell, Meng
- **Biotechnology** -- Beveridge, Clarke, Forsberg, Kaushik, Krell, Lam, Lo, Mutharia, Seah, Stevenson, Whitfield, van der Merwe

As a result of the reorganization in the College of Biological Science, there is a further field of *Biochemistry*. This is described in detail under the Molecular Biology and Genetics Graduate Program. The faculty associated with this research area are: Brauer, Coppolino, Dawson, Graether, Josephy, Keates, Kimber, Mangroo, Merrill, Sharom

Interdepartmental programs are available for students wishing to specialize in toxicology, biophysics and aquaculture.

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**Graduate Secretary**
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**Manfred Brauer**
BSc Calgary, MSc, PhD Wisconsin - Associate Professor

**Anthony J. Clarke**
MSc, PhD Waterloo - Professor

**Marc Coppolino**
BSc Waterloo, MSc, PhD Toronto - Assistant Professor

**John Dawson**
BSc Wilfrid Laurier, PhD Alberta - Assistant Professor

**Cecil W. Forsberg**
BSA, MSc Saskatchewan, PhD McGill - Professor

**Steffen Graether**
BSc, MSc, PhD Queen’s - Assistant Professor

**David Joseph**
BSc Toronto, PhD British Columbia - Professor

**Azad Kaushik**
BVsC, MVsC Haryana, DSc Inst. Pasteur - Associate Professor

**Robert Keates**
BA Cambridge, PhD Glasgow - Associate Professor

**Matthew Kimber**
BSc, PhD Toronto - Assistant Professor

**Peter J. Krell**
BSc, MSc Carleton, PhD Dalhousie - Professor

**Joseph S.L. Lam**
BSc, PhD Calgary - Professor

**Reggie Y.C. Lo**
BSc, PhD Alberta - Professor

**Devakanand Mangroo**
BSc, PhD McMaster - Associate Professor

**Baozhong Meng**
BSc, MSc Hebei Agricultural Univ. (China), PhD Cornell - Assistant Professor

**Rod Merrill**
BSc Lethbridge, PhD Ottawa - Professor

**Lucy M. Mutharia**
BSc, MSc Nairobi, PhD British Columbia - Associate Professor

**Stephen Y.K. Seah**
BSc, MSc National University of Singapore, PhD Sheffield - Assistant Professor

**Frances Sharom**
BSc Guelph, PhD Western Ontario - Professor

**Roselynn M.W. Stevenson**
BSc, PhD Manitoba - Associate Professor

**George van der Merwe**
BSc, MSc, PhD Stellenbosch (South Africa) - Assistant Professor

**Christopher Whitfield**
BSc Newcastle, PhD Edinburgh - Professor and Chair

**Janet M. Wood**
BSc Victoria, PhD Edinburgh - Professor

**MSc Program**

**Admission Requirements**

The minimum requirement for admission to the MSc program is a baccalaureate in an honours science program, or the equivalent, from a recognized university or college. The applicant should have achieved an average standing of at least second class honours (‘B’ or 73%) during the last two undergraduate years. Admission to the program is not restricted to those holding an honours baccalaureate degree in microbiology.

**Admission Process**

There are two parts to the application process (see steps below). Before submitting an application, you are strongly encouraged to view the **Before you Apply** section on the CBS Graduate Opportunities webpage for further details. This is a two-step self-administered application process. First you must complete an online “submission summary” and second, assemble all required documentation (listed below) and forward the complete package to the ADR Office. Laurie Winn, CBS Graduate Admissions Secretary, Room 256, Axelrod Building (moving to Science Complex effective August 1, 2007), University of Guelph, Guelph, Ontario Canada N1G 2W1.

For further information, contact the CBS Graduate Admissions Secretary at lwinn@uoguelph.ca.

**Degree Requirements**

Students must complete at least the minimum university course credit requirements including the departmental seminar requirements. The MSc thesis is intended to give the student training and experience in:

- a comprehensive library search on a specific topic related to the research;
- research techniques;
- the design of experiments in collaboration with the research advisor;
- the interpretation of data, and
- writing for scientific publication.

The thesis research should involve experimentation not previously reported in the literature and should lead to a complete study. Whenever possible, the results should yield publishable data, but this is not an absolute requirement for the completion of an MSc program.

In the case of a student considering transfer from the MSc program to the PhD program, it is important that the research project be one which can be expanded in scope and challenge if the transfer is approved.

**PhD Program**

**Admission Requirements**

Admission to the PhD program normally requires at least honours (‘B’ or a 73% average), in a recognized baccalaureate program as well as a recognized MSc degree. Transfer from the MSc program to the PhD program will be considered for a student who has achieved excellent standing at the honours baccalaureate level, and who has demonstrated a superior performance and particular aptitude for research during the first three semesters of the MSc program. In exceptional cases, students with an ‘A-‘, or a minimum average of 80% standing in a baccalaureate program and a demonstrated aptitude for research may be granted direct entry into the PhD program.

**Admission Process**

There are two parts to the application process (see steps below). Before submitting an application, you are strongly encouraged to view the **Before you Apply** section on the CBS Graduate Opportunities webpage for further details. This is a two-step self-administered application process. First you must complete an online “submission summary” and second, assemble all required documentation (listed below) and forward the complete package to the ADR Office. Laurie Winn, CBS Graduate Admissions Secretary, Room 256, Axelrod Building (moving to Science Complex effective August 1, 2007), University of Guelph, Guelph, Ontario Canada N1G 2W1.

For further information, contact the CBS Graduate Admissions Secretary at lwinn@uoguelph.ca.

**Degree Requirements**

Course requirements are specified by the student's advisory committee and include the seminars. The qualifying examination should be completed no later than the end of the third semester for students entering after completing the MSc degree and the fifth semester for students entering directly after completing a baccalaureate degree. For students transferring from the MSc to the PhD degree, the examination will be completed before the end of the semester following that in which the transfer was approved.

The PhD research project is intended to give the student further, more intensive experience than that of an MSc program. In addition, the student must develop the ability to generate...
innovative research ideas and implement them through carefully designed experiments. The student is expected to develop and demonstrate a high degree of scholarship and expertise in the chosen specialty, and to exert critical judgement. The research must also yield results which, in the opinion of the examination committee, warrant publication in reputable scientific journals appropriate to the area of specialization.

**Interdepartmental Programs**

**MSc (Aquaculture) Interdepartmental Program**
The Department participates in the master of science in aquaculture program. Professor Stevenson is a member of the Aquaculture Interdepartmental Group. Her research and teaching expertise includes aspects of aquaculture; she may serve as advisor for MSc (Aquaculture) students. Please consult the Aquaculture listing for a detailed description of the MSc (Aquaculture) interdepartmental program.

**Biophysics MSc/PhD Program**
Several members of the Microbiology graduate faculty also participate in the graduate program in Biophysics. Professors Beveridge, Brauer, Coppolino, Dawson, Graether, Keates, Kimber, Mangroo, Merrill, Sharom, Whitfield and Wood are members of the Biophysics Interdepartmental Group. These faculty members' research and teaching expertise includes aspects of biophysics; they may serve as advisors for MSc and PhD students in biophysics. Please consult the Biophysics listing for a detailed description of the graduate programs offered by the Biophysics Interdepartmental Group.

**Courses**

**Physiology, Structure and Genetics**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>MICR*6423</td>
<td>Advanced Microbial Physiology</td>
<td>0.50</td>
</tr>
<tr>
<td>MICR*6070</td>
<td>Bacterial Structures and Virulence</td>
<td>0.50</td>
</tr>
<tr>
<td>MICR*6130</td>
<td>Molecular Biology of Viruses</td>
<td>0.50</td>
</tr>
<tr>
<td>MICR*6500</td>
<td>Microbial Genetics</td>
<td>0.50</td>
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**Virology**

<table>
<thead>
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<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>MICR*6130</td>
<td>Molecular Biology of Viruses</td>
<td>0.50</td>
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**Pathogenesis**

<table>
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<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>MICR*6070</td>
<td>Bacterial Structures and Virulence</td>
<td>0.50</td>
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</table>

**General**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICR*6950</td>
<td>Selected Topics in Microbiology</td>
<td>U 0.50</td>
</tr>
<tr>
<td>MICR*6540</td>
<td>Introductory Seminar</td>
<td>F,W,S 0.25</td>
</tr>
<tr>
<td>MICR*6590</td>
<td>Advanced Seminar</td>
<td>F,W 0.25</td>
</tr>
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</table>

**Additional courses within the Department of Molecular and Cellular Biology can be found under the course descriptions for the Botany graduate program and the Molecular Biology and Genetics graduate program.**
Molecular Biology and Genetics

The Molecular Biology and Genetics program offers MSc and PhD degrees. The four major areas of emphasis and the faculty associated with those areas are:

- **Molecular Biology** -- Bag, Baker, Bendall, Colasanti, Jones, Lu, Mosser, Nazar, Phillips, Rothstein, Wildeman, Yankulov
- **Genetics** -- Baker, Bendall, Colasanti, Jones, Robb, Rothstein
- **Cell Biology** -- Bag, Bendall, Harauz, Jones, Lu, Mosser, Nazar, Robb, Wildeman
- **Biochemistry** -- Baker, Brauer, Coppolino, Dawson, Graether, Harauz, Josephy, Keates, Kimber, Mangroo, Merrill, Mosser, Sharom

Interdepartmental programs are available for students wishing to specialize in biophysics, plant genetics and toxicology.

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Mark D. Baker
BSc Laurentian, MSc, PhD Waterloo - Professor

Andrew J. Bendall
BSc, MSc Australian National, PhD Macquarie - Assistant Professor

Joseph L. Colasanti
BSc, PhD Western Ontario - Assistant Professor

George Harauz
BASC, MSc, PhDToronto - Professor

Nina Jones
BSc Guelph, PhD Toronto - Assistant Professor

Ray Lu
BSc Wuhan (China), MSc Beijing Medical, PhD Saskatchewan - Assistant Professor

Jaideep Mathur
BSc, MSc Lucknow (India), PhD Gorakhpur (India) - Associate Professor

Richard D. Mosser
BSc, PhD Waterloo - Associate Professor

Ross N. Nazar
BSc, PhD Toronto - Professor

E. Jane Robb
BSc York, PhD British Columbia - Professor

Steven Rothstein
BA Swarthmore College, PhD Wisconsin - Professor

Alun G. Wildeman
BSc, MSc Saskatchewan, PhD Guelph - Professor

Krassimir (Joseph) Yankulov
BSc Sophia, PhD ICRF London - Associate Professor

**MSc Program**

**Admission Requirements**

The minimum requirement for admission is a baccalaureate in an honours science program, or the equivalent, from a recognized university or college. The applicant must have achieved an average standing of at least second-class honours (‘B’ standing) in the work of the last two undergraduate years.

**Admission Process**

There are two parts to the application process (see steps below). Before submitting an application, you are strongly encouraged to view the “Before you Apply” section on the CBS Graduate Opportunities webpage for further details. This is a two-step self-administered application process. First you must complete an online “submission summary” and second, assemble all required documentation (listed below) and forward the complete package to the ADR Office, Laurie Winn, CBS Graduate Admissions Secretary, Room 256, Axelrod Building (moving to Science Complex effective August 1, 2007), University of Guelph, Guelph, Ontario Canada N1G 2W1.

For further information, contact the CBS Graduate Admissions Secretary at lwinn@uoguelph.ca.

**PhD Program**

**Admission Requirements**

Admission to doctoral programs normally requires at least high second-class honours as well as a recognized master of science degree. Direct admission of a BSc graduate to the PhD program will only be considered in the Department if the student has an average of 80% or greater in their last two undergraduate years.

**Admission Process**

There are two parts to the application process (see steps below). Before submitting an application, you are strongly encouraged to view the “Before you Apply” section on the CBS Graduate Opportunities webpage for further details. This is a two-step self-administered application process. First you must complete an online “submission summary” and second, assemble all required documentation (listed below) and forward the complete package to the ADR Office, Laurie Winn, CBS Graduate Admissions Secretary, Room 256, Axelrod Building (moving to Science Complex effective August 1, 2007), University of Guelph, Guelph, Ontario Canada N1G 2W1.

For further information, contact the CBS Graduate Admissions Secretary at lwinn@uoguelph.ca.

**Degree Requirements**

In addition to a research thesis, three courses (1.5 credits) including the Research Topics Course, MBG*6080, are normally required for the MSc degree. Students must also take part in Seminars in Molecular Biology and Genetics, MBG*6000, and present a formal seminar on their thesis research at the end of their program.

**PhD Program**

**Admission Requirements**

Admission to doctoral programs normally requires at least high second-class honours as well as a recognized master of science degree. Direct admission of a BSc graduate to the PhD program will only be considered in the Department if the student has an average of 80% or greater in their last two undergraduate years.

**Admission Process**

There are two parts to the application process (see steps below). Before submitting an application, you are strongly encouraged to view the “Before you Apply” section on the CBS Graduate Opportunities webpage for further details. This is a two-step self-administered application process. First you must complete an online “submission summary” and second, assemble all required documentation (listed below) and forward the complete package to the ADR Office, Laurie Winn, CBS Graduate Admissions Secretary, Room 256, Axelrod Building (moving to Science Complex effective August 1, 2007), University of Guelph, Guelph, Ontario Canada N1G 2W1.

For further information, contact the CBS Graduate Admissions Secretary at lwinn@uoguelph.ca.

**Degree Requirements**

In addition to a research thesis, three courses (1.5 credits) including the Research Topics Course, MBG*6080, and Seminars in Molecular Biology and Genetics, MBG*6000. Students must present a formal seminar on their thesis research at the end of their program. For a PhD degree following a BSc degree, four courses (2.0 credits) including the research topics course and the seminar course are required.

**Interdepartmental Programs**

**Biophysics MSc/PhD Program**

The Department participates in the MSc/PhD programs in biophysics. Professor Frances Sharom is a member and Chair of the Biophysics Interdepartmental Group (BIG). Please consult the Biophysics listing for a detailed description of the graduate programs offered by the Biophysics Interdepartmental Group (BIG). Additional department members who participate in the BIG program are Manfred Brauer, George Harauz, Robert Keates, Dev Mangroo, and Rod Merrill.

**Courses**

**Molecular Biology**

**MBG*6020 Topics in Molecular Biology and Biotechnology** W [0.50]

This course will review recent publications in molecular genetics and developmental biology, and provide opportunity for discussion of how recombinant DNA technology is being used in basic research and in biotechnology. This course is offered yearly.

**MBG*6050 Recombinant DNA Technology** S [0.50]

A laboratory course including DNA and vector purification, preparation of genomic libraries and subcloning using plasmid vectors, PCR, and Southern blotting. Please contact the department for detailed information.

**MBG*6110 Protein Structural Biology and Bioinformatics** W [0.50]

This course will explore the relationship between protein sequences and structure. Students will gain hands-on experience with web-based resources and tools, particularly methods relating to protein structural prediction.

**MBG*6210 Structure and Function of Biological Membranes** F [0.50]

This course covers multidisciplinary investigations of the basic structure of membranes, and their role in eukaryotic and prokaryotic cell biology. Topics will include structural biology of membrane proteins, experimental approaches for studying membranes, membrane transport systems, import-export systems and membrane trafficking.

**Cell Biology and Genetics**

**MBG*6060 Topics in Cell Biology and Genetics** F [0.50]

This course will review recent publications in transmission genetics, chromosome structure and recombination, and provide opportunity for discussion of cell biology topics where advances in genetics are having an impact. This course is offered yearly.

**MBG*6100 High Resolution Microscopy for Molecular Biologists** W [0.50]

A laboratory course to acquaint students with high resolution light and electron microscopy technology common to molecular biologists and geneticists. The course includes hybridization and immunological probing techniques being applied to the cellular apparatus for gene expression as well as technology used with purified DNA and nucleoprotein complexes. This course is offered yearly.
### General

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor Availability</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBG*6000</td>
<td>Seminars in Molecular Biology and Genetics F,W</td>
<td>[0.00]</td>
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<tr>
<td></td>
<td>A forum for topical discussions in molecular biology and genetics. Students in the MSc and PhD programs in molecular biology and genetics are required to register in this course for four and six semesters, respectively.</td>
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<tr>
<td>MCB*6010</td>
<td>Advanced Topics in Biochemistry U [0.50]</td>
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<tr>
<td></td>
<td>This course provides opportunities for graduate students to study special topics in contemporary biochemical research under the guidance of graduate faculty members with pertinent expertise. Proposed course descriptions are considered by the Department of Molecular and Cellular Biology on an ad hoc basis, and the course will be offered according to demand.</td>
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<tr>
<td>MBG*6080</td>
<td>Research Topics Course F,W,S [0.50]</td>
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<td></td>
<td>This course will require that students research and write a proposal for the work they plan to pursue for their thesis topic. It must be taken within the first two semesters of a graduate program, and will be under the supervision of the student's advisory committee. Students will present a seminar on this literature review and proposal as part of their participation in this course.</td>
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</tbody>
</table>

Additional courses within the Department of Molecular and Cellular Biology can be found under the course descriptions for the Botany graduate program and the Microbiology graduate program.
Pathobiology

The Department of Pathobiology offers programs in Veterinary Pathology, Comparative Pathology, Veterinary Infectious Diseases, and Immunology. There are four graduate degree programs. The department offers programs of study leading to MSc and PhD degrees and a Graduate Diploma. The department also participates in the inter-departmental Doctor of Veterinary Science (DVSc) program.

Fields of Study

The Department of Pathobiology provides graduate programs in the following fields:

- **Comparative Pathology**
  - Avian pathology: Hunter, Smith; Fish pathology: Lumsden; Zoo animal/wildlife pathology: Barker, Hunter, Jardine, Smith; Laboratory animal medicine: Turner.
- **Immunology**: Mallard, Sharif, Shewen.
- **Veterinary Infectious Diseases**
  - Veterinary bacteriology: Boerlin, MacInnes, Prescott; Veterinary parasitology: Barta, Peregrine; Veterinary Virology: Nagy.
- **Veterinary Pathology**
  - Anatomic pathology: Barker, Brooks, Caswell, Foster, Hayes; Clinical pathology: Bienzle, Jacobs, Wood.

The DVSc is offered in applied areas of microbiology, immunology or pathology. The diploma program is offered in applied areas of pathology.

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Graduate Secretary - Admissions
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- Ian K. Barker
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- John R. Barta
  BSc, PhD Toronto - Professor
- Dorothee Bienzle
  DVM, MSc Guelph, PhD McMaster, Dipl ACVP - Associate Professor
- Patrick Boerlin
  DVM, PhD Bern - Associate Professor
- Andrew S. Brooks
  BA Queen's, DVM Guelph, PhD Guelph, Dipl ACVP - Assistant Professor
- Jeff Caswell
  DVM, DVSc Guelph, PhD Saskatchewan, Dipl ACVP - Associate Professor
- Robert A. Foster
  BVSc Queensland, PhD James Cook Univ. of North Queensland, MRCVS, Dipl ACVP - Associate Professor
- M. Anthony Hayes
  BVSc Melbourne, PhD Saskatchewan, Dipl ACVP - Professor
- D. Bruce Hunter
  DVM, MSc Saskatchewan - Associate Professor
- Robert M. Jacobs
  BSc Toronto, DVM, PhD Guelph, Dipl ACVP - Professor
- Clair Jardine
  BSc Guelph, MSc British Columbia, DVM Western College of Veterinary Medicine, PhD Saskatchewan - Assistant Professor
- John S. Lumsden
  BSc, DVM, MSc, PhD Guelph - Associate Professor
- Janet L. MacInnes
  BSc Victoria, PhD Western Ontario - Associate Professor
- Bonnie A. Mallard
  BSc, MSc, PhD Guelph - Professor
- Éva Nagy
  DVM, PhD, DSc Budapest - Professor
- Andrew S. Peregrine
  BVMS(Hons.), PhD, DVM Glasgow - Associate Professor
- John F. Prescott
  MA, VetMB, PhD Cambridge - Professor and Chair
- Shayan Sharif
  DVM Tehran, PhD Guelph - Associate Professor
- Patricia E. Shewen
  BSc, DVM, MSc, PhD Guelph - Professor
- Dale A. Smith
  DVM, DVSc Guelph - Professor
- Patricia V. Turner
  BSc McMaster, MSc Dalhousie, DVM, DVSc Guelph, Dipl ACLAM - Associate Professor
- R. Darren Wood
  DVM Prince Edward Island, DVSc Guelph - Associate Professor

MSc Program

The primary objective of the MSc program is to provide students with training in conceptual and laboratory aspects of research, combined with advanced training in a field of knowledge relating to manifestations, basic mechanisms and host resistance to diseases of vertebrates. DVSc (or equivalent) graduates may obtain some of the practical experience required for specialty certification in veterinary anatomic pathology, clinical pathology, microbiology or parasitology.

Admission Requirements

Applicants should have either a DVM (or equivalent) degree with at least a B’ average over the four years of the program, or an honour's degree in biological sciences with at least a B’ average during the final 2 years. In either case, performance in relevant biomedical science courses, (e.g. microbiology, immunology, biochemistry, molecular biology, etc) at a level above the minimum ‘B’ average is normally expected. Admission requires the prior identification of a faculty advisor and a source of financial support for the student. Supportive letters of reference, based on sound knowledge of the applicant, are essential. Applicants should submit a one-page statement of research interests and career goals in order to assist in the identification of a faculty advisor who has the facilities and funding necessary to support the thesis research, and who can provide a stipend if the student is not independently supported. Applications may be submitted at any time.

Students may be admitted in the fall, winter or summer semesters, with a preference for the fall.

Degree Requirements

Students must complete at least 1.5 credits of prescribed courses with at least a B'-average, and must satisfactorily write and defend a research thesis. Prescribed courses and additional courses are selected by the student in consultation with the advisor and advisory committee based on the student's background, research and career objectives. The departmental Graduate Seminar course is prescribed for all MSc students. The thesis research is planned by the student in consultation with the advisor. Research plans and progress must be approved by the advisory committee. The thesis defence includes a seminar presentation and a final oral examination by a committee of graduate faculty members. See also the MSc Degree Regulations of the Faculty of Graduate Studies.

PhD Program

The PhD program is designed primarily for students whose career aspirations are towards the independent research on the manifestations, basic mechanisms and host resistance to diseases of vertebrates. The primary objective is to provide advanced training in conceptual and laboratory aspects of independent research, combined with advanced training in one or more appropriate fields of knowledge. The major emphasis is on the generation and critical evaluation of scientific knowledge relating to the causes, mechanisms and/or consequences of diseases affecting a particular species, organ system or biological process or to the understanding of host resistance and basic mechanisms of health or disease in vertebrates. DVM (or equivalent) graduates may obtain some of the practical experience required for specialty certification in veterinary anatomic pathology, clinical pathology, microbiology or parasitology.

Admission Requirements

The usual requirement for admission to the PhD program is the completion of an approved MSc degree with a minimum 'B+' average and strong supportive letters from referees familiar with the background of the applicant. Performance in relevant biomedical science courses, (e.g. microbiology, immunology, biochemistry, molecular biology, etc) at a level above the 'B+' average is normally expected. Students may apply for admission into the PhD program before completing the MSc program, providing that they have a minimum A average and a demonstrated capacity for independent research. Some students with demonstrated potential for independent research and a superior academic record during their baccalaureate or DVM programs may be admitted directly into the PhD program. Admission requires the identification of a faculty advisor and a source of financial support for the student. If these have not been arranged by the applicant, a statement of the applicant's interests and objectives and supportive letters of reference are required to assist with the identification of an appropriate faculty advisor and potential sources of funds for research and provision of a stipend for the student. Applications may be submitted at any time. Initial enrolment can be in the fall, winter or summer semesters, with a preference for the fall.

Degree Requirements

Students must have completed the department's graduate seminar course, and have obtained at least a B’-average in all courses prescribed by the advisory committee. There are no other specific course requirements. Prescribed courses and additional courses are selected.
Students are required to satisfactorily complete a qualifying examination before the end of the fifth semester if they possess an MSc degree, or before the end of the seventh semester if they possess only an honours baccalaureate or DVM degree. The qualifying examination is conducted by a committee of graduate faculty members with expertise in the areas of study, and includes written and oral components. The qualifying examination covers a breadth of knowledge of topics related to the student's research area, and depth of knowledge within this research area. To successfully complete the examination, students must have a broad general understanding of one of the departmental fields of study, and a current and in-depth understanding of one or two additional areas. The advisory committee identifies selected areas of study by the end of the second semester. In addition, the advisory committee is required to confirm that the student has demonstrated both ability and promise in research. This is based on performance on the research project, and on the writing of a research proposal on a subject proposed by the student and approved by the advisory committee. PhD students in semesters six to nine are required to make a 25 minute presentation as part of the Departmental Seminar Series.

The thesis research is planned by the student in consultation with the advisor. Research plans and progress must be approved by the advisory committee. The program is completed with the satisfactory presentation and defence of a thesis, which includes a seminar presentation and a final oral examination by a committee that includes an external examiner and several members of the graduate faculty.

See also the PhD Degree Regulations of the Faculty of Graduate Studies.

**DVSc Program**

The Department of Pathobiology participates in the DVSc program which provides a balance of advanced training in a discipline in veterinary medicine, combined with a thesis-research project. The program emphasizes diagnostic and health management aspects of veterinary anatomic pathology, veterinary clinical pathology, veterinary clinical microbiology, clinical immunology, laboratory animal science, wildlife and zoo animal pathology, avian medicine and pathology, and fish pathology. The research project addresses an applied aspect of a significant disease problem in vertebrates. The program provides practical training towards specialty certification in veterinary anatomic pathology, clinical pathology, veterinary clinical microbiology or veterinary parasitology. Refer to the Veterinary Science section of the calendar for more information.

**Admission Requirements**

Applicants require a DVM (or equivalent) degree with high academic standing from a program that provides eligibility for the practice of veterinary medicine in Ontario. Alternatively, applicants with a DVM (or equivalent) degree can be admitted after completion of an acceptable graduate diploma, MSc, or PhD degree with an upper ‘B’ average. Admission requires the identification of a faculty advisor and a source of personal support for the student. If these have not been arranged by the applicant, a statement of the applicant's interests and objectives and supportive letters of reference are required to assist with the identification of an appropriate faculty advisor and potential sources of funds for research and student stipend. Several stipends for DVSc candidates are available intermittently for training in some disciplines serving the Veterinary Teaching Hospital. As these funds become available, stipends are awarded to the most qualified applicant(s) based on completed applications for admission to the DVSc program. Applications may be submitted at any time. Initial enrolment can be in the fall, winter or summer semesters.

**Degree Requirements**

The degree requires a minimum of nine semesters of full-time study; completion of department's graduate seminar course, the completion of at least 2.5 credits in other courses prescribed by the student's advisory committee with an overall average of at least 'B-', and satisfactory completion of a qualifying examination, thesis and final oral examination. See also the DVSc Degree Regulations of the Faculty of Graduate Studies.

**Graduate Diploma Program**

The objective of the diploma program is to provide advanced practical training in a field of veterinary pathology to veterinarians working in industry, government or in private practice. The program emphasizes practical and course-based applied training in anatomic pathology, clinical pathology, avian medicine and pathology, laboratory animal science, or wildlife and zoo animal pathology.

**Admission Requirements**

Applicants require a DVM (or equivalent) degree with acceptable academic standing. Admission requires the prior identification of a faculty advisor and a source of personal support for the student.

**Degree Requirements**

The diploma requires three semesters of full-time study, and satisfactory completion of at least 1.5 credits in applied pathology courses and 0.5 credits in other graduate courses, including the graduate seminar course. The remaining credits may be in the defined area of study, as prescribed by the faculty advisor. Diploma students must satisfactorily pass a final oral comprehensive examination on general knowledge in the field of study. It will be conducted by faculty members in the Department of Pathobiology. There is no thesis, but students are required to write a paper that the advisor considers ready for submission to a peer-reviewed scientific journal.

See also the Graduate Diploma Regulations of the Faculty of Graduate Studies.

### Courses

#### General

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>PABI*6600</td>
<td>Applied Avian Pathology I</td>
<td>0.50</td>
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<tr>
<td>PABI*6620</td>
<td>Applied Avian Pathology II</td>
<td>0.50</td>
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<tr>
<td>PABI*6621</td>
<td>Comparative Veterinary Pathology I</td>
<td>0.50</td>
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<tr>
<td>PABI*6622</td>
<td>Comparative Veterinary Pathology II</td>
<td>0.50</td>
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<tr>
<td>PABI*6630</td>
<td>Applied Comparative Pathology I</td>
<td>0.50</td>
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<tr>
<td>PABI*6640</td>
<td>Applied Comparative Pathology II</td>
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<tr>
<td>PABI*6650</td>
<td>Applied Comparative Pathology III</td>
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<tr>
<td>PABI*6700</td>
<td>Laboratory Animal Science U</td>
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<td>PABI*6710</td>
<td>Applied Laboratory Animal Science I</td>
<td>0.50</td>
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<tr>
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<td>Applied Laboratory Animal Science II</td>
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<tr>
<td>PABI*6730</td>
<td>Applied Laboratory Animal Science III</td>
<td>0.50</td>
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<tr>
<td>PABI*6740</td>
<td>Avian Diseases W</td>
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#### Comparative Pathology

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<tr>
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<td>0.50</td>
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<tr>
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<tr>
<td>PABI*6740</td>
<td>Avian Diseases W</td>
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Detailed study of recent concepts of preventive medicine, diagnosis and therapeutics as applied to clinical recognition and control of avian diseases.
**Immunology**

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<tbody>
<tr>
<td>PABI*6100</td>
<td>Immunobiology</td>
<td>0.50</td>
<td>Major areas of immunology, including initiation, regulation, receptors, genetics, immune system development and function.</td>
</tr>
<tr>
<td>PABI*6190</td>
<td>Topics in Immunology</td>
<td>0.50</td>
<td>Aspects of immune and non-specific host resistance, diagnostic immunology and immune-mediated disease.</td>
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**Veterinary Infectious Diseases**

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<tr>
<td>PABI*6000</td>
<td>Bacterial Pathogenesis</td>
<td>0.50</td>
<td>An overview of key concepts in bacterial pathogenesis with emphasis on veterinary and zoonotic pathogens.</td>
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<tr>
<td>PABI*6180</td>
<td>Clinical Bacteriology</td>
<td>0.50</td>
<td>Current techniques and approaches in diagnostic bacteriology.</td>
</tr>
<tr>
<td>PABI*6330</td>
<td>Viral Diseases</td>
<td>0.50</td>
<td>A study of important viral diseases of animals, with emphasis on etiology, host responses, diagnosis and control.</td>
</tr>
<tr>
<td>PABI*6350</td>
<td>Molecular Epidemiology of Bacterial Diseases</td>
<td>0.50</td>
<td>This is a basic introduction to molecular epidemiology of bacterial diseases. It provides an understanding of molecular epidemiology methodologies and of their use for improving our understanding of infectious diseases epidemiology and control.</td>
</tr>
<tr>
<td>MICR*6070</td>
<td>Bacterial Structures and Virulence</td>
<td>0.50</td>
<td>A study of the roles of bacterial surface structures (LPS, capsules, flagella, fimbriae, outer membrane proteins) in the virulence of bacteria. (Jointly offered by the Departments of Molecular and Cellular Biology, and Pathobiology)</td>
</tr>
<tr>
<td>MICR*6130</td>
<td>Molecular Biology of Viruses</td>
<td>0.50</td>
<td>Replication strategies of virus genomes including prototypes of different animal, plant and (some) bacterial virus families; mechanism and control of viral gene expression; tumour virology; genetically engineered virus vaccines.</td>
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**Veterinary Pathology**

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<tr>
<td>PABI*6030</td>
<td>Applied Clinical Pathology I</td>
<td>0.50</td>
<td>Preparation and description of materials, and interpretation of data involved in hematology, cytology, and clinical chemistry from clinical cases. (Intended for students majoring in clinical pathology)</td>
</tr>
<tr>
<td>PABI*6040</td>
<td>Applied Clinical Pathology II</td>
<td>0.50</td>
<td>A continuation of PABI*6030 with greater depth in the interpretation of data involved in hematology, cytology and clinical chemistry from clinical cases. (Intended for students majoring in clinical pathology)</td>
</tr>
<tr>
<td>PABI*6041</td>
<td>Applied Clinical Pathology III</td>
<td>0.50</td>
<td>A continuation of PABI*6040 with greater depth in the interpretation of data involved in hematology, cytology and clinical chemistry from clinical cases. (Intended for students majoring in clinical pathology)</td>
</tr>
<tr>
<td>PABI*6080</td>
<td>Diagnostic Pathology I - Domestic Animals</td>
<td>0.50</td>
<td>An introductory course of diagnostic pathology with emphasis on the common and uncommon diseases of the whole body and respiratory, urinary, and digestive (including liver and pancreas) systems.</td>
</tr>
<tr>
<td>PABI*6090</td>
<td>Diagnostic Pathology II - Domestic Animals</td>
<td>0.50</td>
<td>An intermediate course that builds on the skills acquired in PABI*6080 and further enhances diagnostic veterinary pathology skills to include disease of the nervous, endocrine and musculoskeletal systems.</td>
</tr>
</tbody>
</table>
Philosophy

Administrative Staff

Chair
Andrew Bailey (347 MacKinnon, Ext. 56389)
abaily@uoguelph.ca

Graduate Co-ordinator
Omid Payrow (356 MacKinnon, Ext. 53201)
oshabani@uoguelph.ca

Graduate Secretary
Pam Speers (348 MacKinnon, Ext. 53272)
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Graduate Faculty

Andrew Bailey
BA, MA Oxford, PhD Calgary - Associate Professor

Donald Dedrick
BA, MA Carleton, PhD Toronto - Associate Professor (cross-appointed with Department of Psychology)

Peter Eardley
BA McGill, MA, PhD Toronto - Assistant Professor

Karen L. Freedman
BA, MA Manitoba, PhD Toronto - Assistant Professor

Jean Harvey
BA Wales, MA Simon Fraser, PhD British Columbia - Associate Professor

Karen L. Houle
BSc, MA, PhD Guelph - Assistant Professor

Jay Lampert
BA, MA, PhD Toronto - Associate Professor

Peter Loptson
BA York, MA, PhD Pittsburgh - Professor

Mark McCullagh
BA Toronto, PhD Pittsburgh - Associate Professor

Jeffrey A. Mitscherling
BA California (Santa Barbara), MA McMaster, PhD Guelph - Professor

Jay A. Newman
BA Brooklyn, MA Brown, PhD York, FRSC - Professor

Omid Payrow Shabani
BA, MA Carleton, PhD Ottawa - Associate Professor

John Russon
BA Regina, MA, PhD Toronto - Professor

Patricia Sheridan
BA McGill, MA Concordia, PhD Western - Assistant Professor

Andrew Wayne
BSc Toronto, MA, PhD California (San Diego) - Associate Professor and Chair

Karen Wendling
BA Michigan State, MA, PhD Toronto - Associate Professor

MA Program

The Philosophy Department includes a wide range of expertise which allows students accepted into the MA program to both extend their philosophical background at the graduate level and to concentrate their research project in any of a number of different areas such as the history of philosophy, ethics, social and political philosophy, feminist philosophy, philosophy of religion, epistemology, philosophy of mind, metaphysics, philosophy of science. There is also a diversity of approaches within the department. There is faculty expertise in Continental, analytic, and other philosophical traditions and approaches. It is primarily a research degree and the program will involve either an MA thesis or the smaller Guided Research Project (together with a few more courses than with the thesis option).

Admission Requirements

A four-year bachelor's degree from a recognized university. Normally this will include at least a major in philosophy, although the program is also open to students who may not have had a substantial number of philosophy undergraduate courses but who provide evidence of philosophical ability. In all cases, in order to be considered for admission to the MA program, the department requires that the average grade over the last 10.00 credits of studies (i.e., a normal two years of full-time studies on the University of Guelph system) be at least 75%. All applicants are required to submit a sample of writing. Further details can be found on the Philosophy Department website (http://www.uoguelph.ca/philosophy/grad.shtm).

Degree Requirements

All students must complete the MA Research Seminar and complete either a thesis of between 20,000 and 30,000 words or a research project of between 10,000 and 15,000 words. Candidates by thesis must take at least four semester-long courses. Candidates by research project must take at least eight semester-long courses. Candidates with a degree other than philosophy will be assigned courses in accordance with their needs and background up to a maximum of six additional semester courses.

PhD Program

The University of Guelph offers a program leading to a PhD in philosophy. The aim of the PhD program is to develop philosophers who are well rounded in the traditional areas of study and who have achieved a high level of expertise in their special fields of research. (The department currently has a PhD program jointly with McMaster and Wilfrid Laurier Universities. With the approval of the Senate of the University, it has applied to the Ontario Council on Graduate Studies for permission to have a stand-alone PhD program. The department can admit students to the new PhD program once it receives approval from the Ontario Council on Graduate Studies). Please contact the department’s Graduate Co-ordinator for further information.)

The program offers supervision in most of the traditional areas of philosophy but the special strengths of the program are in: 1) Continental, Social and Political Philosophy; (2) History of Western Philosophy; (3) Philosophy of Science, Mind and Language.

Admission Requirements

Admission to the program is restricted to those who have an MA in philosophy, or an outstanding record in undergraduate studies in philosophy.

Degree Requirements

Students normally will be required to take six courses in philosophy including the doctoral research seminar (PHIL*6960). In special circumstances students may take as few as four courses in philosophy. Students must also demonstrate knowledge in at least five designated fields of study. This may be done by course work, by examination, by thesis or by a suitable combination of these. Students must pass an Oral Qualifying Examination by the end of their fifth semester in the program. Students in the program may be required to demonstrate competence in one or more skills which their advisory committee decides, in consultation with the program officer, is needed for their dissertation (e.g. a language other than English). PhD candidates must submit a thesis of not more than 90,000 words (300 pages).

Courses

Except where specified, the courses listed below may be offered in any semester, subject to student demand and the availability of an instructor.

Historical

PHIL*6310 Plato U [0.50]
A study of some of the major works of Plato.

PHIL*6311 Aristotle U [0.50]
A study of some of the major works of Aristotle.

PHIL*6320 Medieval Philosophy U [0.50]
A close examination of particular problems and texts of the medieval period

PHIL*6340 Modern Philosophy U [0.50]
An examination of major texts, from Descartes to Mill.

PHIL*6500 John Locke U [0.50]
A critical examination of the works of John Locke.

PHIL*6530 Kant U [0.50]
A critical examination of the works of Immanuel Kant.

PHIL*6700 Survey of Ancient Philosophy U [0.50]
A survey of modern philosophy from Hobbess to Hume for students in the philosophy MA program without a BA in philosophy.

PHIL*6710 Survey of Early Modern Philosophy U [0.50]
A survey of modern philosophy from Hobbess to Hume for students in the philosophy MA program without a BA in philosophy.

PHIL*6810 Survey of Late Modern Philosophy U [0.50]
A survey of modern philosophy from Kant to the late 19th century for students in the philosophy MA program without a BA in philosophy.

Ethics/Value Theory

PHIL*6000 Value Theory U [0.50]
A critical examination of some selected contemporary works in value theory or aesthetics.

PHIL*6230 Ethics U [0.50]
A critical examination of some selected contemporary works or problems in ethical theory.

PHIL*6240 Biomedical Ethics U [0.50]
A critical examination of some selected contemporary works or problems in biomedical ethics.
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<tr>
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<tbody>
<tr>
<td>PHIL*6600</td>
<td>Social and Political Philosophy U [0.50]</td>
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<tr>
<td></td>
<td>A critical examination of some selected contemporary works or central problems in the field of social philosophy.</td>
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<tr>
<td>PHIL*6760</td>
<td>Science and Ethics U [0.50]</td>
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<tr>
<td></td>
<td>A consideration of the problems which arise in the conjunction of science and ethics.</td>
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**Metaphysics/Epistemology**

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<tr>
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<th>Credit Hours</th>
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<tr>
<td>PHIL*6110</td>
<td>Philosophy of Religion U [0.50]</td>
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<td></td>
<td>A critical examination of some selected major works or central problems in the philosophy of religion.</td>
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<tr>
<td>PHIL*6120</td>
<td>Philosophy of Mind U [0.50]</td>
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<tr>
<td></td>
<td>A study of contemporary theories of mind and philosophies of psychology.</td>
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<tr>
<td>PHIL*6140</td>
<td>Continental Theory I U [0.50]</td>
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<td></td>
<td>A study of the historical and contemporary origins of existentialism, phenomenology and post-modernism, concentrating on one or several of the classic texts.</td>
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<tr>
<td>PHIL*6150</td>
<td>Continental Theory II U [0.50]</td>
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<tr>
<td></td>
<td>A study of the historical and contemporary origins of existentialism, phenomenology and post-modernism, concentrating on texts not covered in PHIL*6140 in the same year.</td>
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<tr>
<td>PHIL*6200</td>
<td>Problems of Contemporary Philosophy U [0.50]</td>
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<td></td>
<td>A study of a particular set of problems in contemporary philosophy.</td>
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<tr>
<td>PHIL*6210</td>
<td>Metaphysics U [0.50]</td>
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<td></td>
<td>A critical examination of some selected major works or central problems in metaphysics.</td>
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<tr>
<td>PHIL*6220</td>
<td>Epistemology U [0.50]</td>
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<tr>
<td></td>
<td>A critical examination of some selected major works or central problems in epistemology.</td>
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**Philosophy of Science**

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<tbody>
<tr>
<td>PHIL*6720</td>
<td>History of the Philosophy of Science U [0.50]</td>
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<tr>
<td></td>
<td>A survey of the history of the philosophy of science from the Presocratics to the Positivists.</td>
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<tr>
<td>PHIL*6730</td>
<td>Contemporary Philosophy of Science U [0.50]</td>
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<td></td>
<td>An examination of the contemporary discipline of the philosophy of science.</td>
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<tr>
<td>PHIL*6740</td>
<td>Philosophy of Biology U [0.50]</td>
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<tr>
<td></td>
<td>A general introduction to the history and philosophy of biology.</td>
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<tr>
<td>PHIL*6750</td>
<td>Philosophy of Social Science U [0.50]</td>
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<tr>
<td></td>
<td>A critical examination of issues in the philosophy of social science</td>
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**General**

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<tr>
<td>PHIL*6060</td>
<td>Logic U [0.50]</td>
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<td>A course designed to bring the individual student to the level of competence in logical techniques and theory required for graduate studies.</td>
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<tr>
<td>PHIL*6770</td>
<td>Special Research Paper I U [0.50]</td>
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<td>A research course in a topic of the student's choice, guided by an individual faculty member.</td>
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<tr>
<td>PHIL*6780</td>
<td>Special Research Paper II U [0.50]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A research course in a topic of the student's choice, guided by an individual faculty member.</td>
<td></td>
</tr>
<tr>
<td>PHIL*6900</td>
<td>Reading Course U [0.50]</td>
<td></td>
</tr>
<tr>
<td>PHIL*6930</td>
<td>Selected Topics I U [0.50]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Topics in this course will vary from offering to offering.</td>
<td></td>
</tr>
<tr>
<td>PHIL*6940</td>
<td>Selected Topics II U [0.50]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Topics in this course will vary from offering to offering.</td>
<td></td>
</tr>
<tr>
<td>PHIL*6950</td>
<td>MA Seminar U [0.50]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A seminar course in which students work on developing research papers in topics of their own choice. This course must be taken by all MA students. Students must register for this course in both fall and winter semesters.</td>
<td></td>
</tr>
<tr>
<td>PHIL*6960</td>
<td>PhD Graduate Seminar U [0.50]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A seminar course in which students work on developing research papers in topics of their own choice. Students must register for this course in both fall and winter semesters. PhD students must do at least one and may do two graduate seminar courses during their programs.</td>
<td></td>
</tr>
<tr>
<td>PHIL*6990</td>
<td>Guided Research Project U [1.00]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A guided research project undertaken by students doing an MA by course work, under the supervision of a faculty member.</td>
<td></td>
</tr>
</tbody>
</table>
Physics
The Departments of Physics at the Universities of Guelph and Waterloo offer a joint program leading to MSc and PhD degrees. The Guelph-Waterloo Physics Institute consists of members from both university departments and is administered by a joint co-ordinating committee. Students interested in graduate work in physics at either university should consult the application requirements and the on-line application procedures available from the web-site http://gwp.on.ca. Students are ultimately registered at the university at which their advisor is located. A student comes under the general regulations of the university at which he or she is registered, and the degree is granted by that university.

Administrative Staff
Graduate teaching and research in physics at the University of Guelph are operated through the Guelph-Waterloo Physics Institute.

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Fotini Markopoulou
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James Martin

Three options are available for the MSc degree: industrial and applied physics, subatomic physics, and quantum computing.

### MSc Program

**Admission Requirements**

Application for admission should be made as early as possible on forms. The admission requirements are as follows:

- An honours BSc degree in physics (or equivalent) with at least a B standing (75%) from a recognized university.
- Three letters of reference, two of which normally are from academic sources.
- Proof of competency in English (for applicants whose prior education was in a language other than English). See the University regulations on English Language Proficiency Certification.

- GRE Physics Subject Test score for all applicants who have completed their post-secondary education outside of Canada.

Successful applicants are encouraged to start their graduate studies in May or September, but a January starting date is possible. Academic transcripts and other supporting documents should be forwarded as soon as they become available. Admission to the program cannot be granted until all requirements have been met and all documents submitted.

Applications are considered by the Admissions Committee. It should be noted that students will normally be admitted only if an advisor can be found to oversee their research. Since there are a limited number of openings each year, applicants are advised to state alternative areas of research on the preference form supplied (see web-site http://gwp.on.ca/).

### MSc Co-operative Option

In addition to the admission requirements described above, admission to the co-op option is restricted to Canadian citizens and permanent residents.

### Degree Requirements

#### Research-Based MSc Option

Four one-term courses (at least 2.0 course credits) acceptable for graduate credit and a thesis based on original research are required. The subject of research must be approved by the candidate's advisory committee and the thesis must be read and approved by the advisory committee. One of the four courses may be an undergraduate course approved by the student's advisory committee and the graduate co-ordinator. If it is a physics course, it must be at the fourth-year level.

For all students (except those in biophysics**), the four courses must include at least one of Quantum Mechanics 1 (PHYS*7010), Statistical Physics 1 (PHYS*7040), and Electromagnetic Theory (PHYS*7060). A MSc student in this program who shows a particular aptitude for research and has a superior record in fourth-year undergraduate and three one-term graduate courses may be permitted, upon recommendation of the advisor and with the approval of the co-ordinating committee, to transfer into the PhD program without completing an MSc thesis.

### MSc Co-operative Option

Students enter the co-op MSc program in September. The first term of the program is spent taking two courses (for all except those in biophysics**), one of these courses must be chosen from PHYS*7010, PHYS*7040 and PHYS*7060) and performing the duties of a regular teaching assistant. During this term, the student will discuss work-term prospects with the Guelph and Waterloo personnel responsible for co-op activities and conduct interviews with potential employers. Satisfactory performance in this phase of the program allows the student to spend the next two terms working in an industrial or government laboratory. Upon completion of the work terms, the student must submit a work report as described below.

The student must complete a minimum of two additional graduate courses and complete a research project under the supervision of a faculty member in accordance with the regular thesis requirements of the MSc degree program, as outlined by the Faculty of Graduate Studies.

**Exception:** In place of the core physics course biophysics students may choose any course approved by the student's advisory committee and the graduate co-ordinator.

### Course-Based MSc Option

Eight one-term courses acceptable for graduate credit, including a project course summarized in a report, are required. The project must be approved by the candidate's advisor and the report read and approved by the advisor and one other faculty member. These courses must include the core courses Quantum Mechanics 1 (PHYS*7010), Statistical Physics 1 (PHYS*7040), and Electromagnetic Theory (PHYS*7060). [Exception: biophysics students taking the course-based MSc option are required to take only one of the core courses PHYS*7010, PHYS*7040, and PHYS*7060.] This program is recommended for those planning careers requiring a broad non-specialized knowledge of physics (for example, high school teaching).

### PhD Program

Two options are available for the PhD degree:

- A research-based option in which the student is required to complete four one-semester courses (2.0 credits) and a thesis.
- A co-operative option in which the student spends two semesters working in a government or industrial laboratory. The student is required to complete four one-semester courses (2.0 credits) and a thesis.

### Admission Requirements

A MSc degree in physics from an approved university or college with at least a B standing (75%) is normally required for entrance into the PhD program. Other requirements are the same as those described above for the MSc program (see web-site http://gwp.on.ca/).

### PhD Co-operative Option

In addition to the admission requirements described above, admission to the co-op option is restricted to Canadian citizens or permanent residents.
**Degree Requirements**

Four one-term courses not including any already taken for MSc credit are required; courses taken during the MSc program and in excess of those required will, however, be allowed for PhD credit. By the end of the first year of the program, all three of Quantum Mechanics 1 (PHYS*7010), Statistical Physics 1 (PHYS*7040) and Electromagnetic Theory (PHYS*7060) should be completed. (Exception: Biophysics students must have taken at least one of Quantum Mechanics 1 (PHYS*7010), Statistical Physics 1 (PHYS*7040), and Electromagnetic Theory (PHYS*7060) by the completion of the first year of the PhD program.) One of the required courses may be an undergraduate course outside the student’s main field of study and must be approved by the student’s advisory committee and the graduate co-ordinator. No undergraduate course in physics may be taken for credit.

After two or three terms in the program, PhD candidates are required to pass a qualifying examination. This is an oral examination of approximately two hours’ duration before a committee that includes representation from the student's advisory committee. It is designed to test the student's knowledge of the fundamentals and applications of physics related to the thesis topic. PhD students must meet their advisory committee members at least once a year to present a written and oral report on their progress. Candidates must present a thesis embodying the results of original research conducted by them on an advanced topic. The thesis is defended before a committee which may also examine the student’s knowledge of related material.

**PhD Co-operative Option**

Students normally enter the co-op PhD program in September, following completion of their MSc degree. The student first spends one or two academic terms on campus, taking a minimum of two courses per term and performing the regular duties of a teaching assistant. During this time, the student will discuss work term prospects with the Guelph and Waterloo personnel responsible for co-op activities and conduct interviews with potential employers. After satisfactory performance in the academic term(s), the student spends a full year in an industrial or government laboratory.

Students must complete all three of the core courses PHYS*7010, PHYS*7040 and PHYS*7060 by the end of their first two academic terms in the program. (Exception: Biophysics students must take at least one of the three core courses.) A total of four graduate courses (2.0 credits) are required (excluding those already taken for MSc credit). The student is required to pass a qualifying examination and complete, under the supervision of a faculty member, a research project on an advanced topic. A thesis embodying the results of original research conducted by the student must be presented and defended before a committee.

**Interdepartmental Programs**

**Biophysics Interdepartmental Group**

The Department of Physics participates in the MSc/PhD programs in biophysics. Professors Brown, Davis, Dutcher, Gray, Jeffrey, Kycia and Ladizhansky are members of the Biophysics Interdepartmental Group (BIG). These faculty members’ research and teaching expertise includes aspects of biophysics; they may serve as advisors for MSc and PhD students in biophysics. Please consult the Biophysics listing for a detailed description of the graduate programs offered by the Biophysics Interdepartmental Group.

**Courses**

* Courses offered annually. Other courses are offered on an alternate year basis and as requested.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHYS*7010</strong> Quantum Mechanics 1</td>
<td>U [0.50]</td>
<td>Review of formalism of nonrelativistic quantum mechanics including symmetries and invariance. Approximation methods and scattering theory. Elementary quantum theory of radiation. Introduction to one-particle relativistic wave equations.</td>
</tr>
<tr>
<td><strong>PHYS*7020</strong> Quantum Mechanics II</td>
<td>U [0.50]</td>
<td>Concepts of relativistic quantum mechanics, elementary quantum field theory, and Feynman diagrams. Application to many-particle systems. <strong>Prerequisite(s):</strong> PHYS*7010 or equivalent</td>
</tr>
<tr>
<td><strong>PHYS*7040</strong> Statistical Physics 1</td>
<td>U [0.50]</td>
<td>Statistical basis of thermodynamics; microcanonical, canonical and grand canonical ensembles; quantum statistical mechanics, theory of the density matrix; fluctuations, noise, irreversible thermodynamics; transport theory; application to gases, liquids, solids.</td>
</tr>
<tr>
<td><strong>PHYS*7050</strong> Statistical Physics II</td>
<td>U [0.50]</td>
<td>Phase transitions. Fluctuation phenomena. Kubo's theory of time correlation functions for transport and spectral properties; applications selected from a variety of topics including linearized hydrodynamics of normal and superfluids, molecular liquids, liquid crystals, surface phenomena, theory of the dielectric constant, etc. <strong>Prerequisite(s):</strong> PHYS*7040 or equivalent.</td>
</tr>
<tr>
<td><strong>PHYS*7060</strong> Electromagnetic Theory</td>
<td>U [0.50]</td>
<td>Solutions to Maxwell's equations; radiation theory, normal modes; multipole expansion; Kirchhoff's diffraction theory; radiating point charge; optical theorem. Special relativity, transformation laws for the electromagnetic field; line broadening. Dispersion, Kramers-Kronig relations. Magnetohydrodynamics and plasmas.</td>
</tr>
<tr>
<td><strong>PHYS*7070</strong> Applications of Group Theory</td>
<td>U [0.50]</td>
<td>Introduction to group theory; symmetry, the group concept, representation theory, character theory. Applications to molecular vibrations, the solid state, quantum mechanics and crystal field theory.</td>
</tr>
<tr>
<td><strong>PHYS*7110</strong> Scattering Theory</td>
<td>U [0.50]</td>
<td>Review of potential theory of scattering. Applications chosen from elastic- and inelastic-neutron X-ray, light, charged-particle, and atomic and molecular beam scattering.</td>
</tr>
<tr>
<td><strong>PHYS*7200</strong> Quantum Mechanics for Cosmology</td>
<td>U [0.50]</td>
<td>Review of relativistic quantum mechanics and classical field theory. Quantization of free quantum fields (the particle interpretation of field quants). Canonical quantization of interacting fields (Feynman rules). Application of the formalism of interacting quantum fields to lowest-order quantum electrodynamic processes. Radiative corrections and renormalization. <strong>Prerequisite(s):</strong> PHYS*7010 or equivalent.</td>
</tr>
<tr>
<td><strong>PHYS*7150</strong> Nuclear Physics</td>
<td>U [0.50]</td>
<td>Static properties of nuclei; alpha, beta, gamma decay; two-body systems; nuclear forces; nuclear reactions; single-particle models for spherical and deformed nuclei; shell, collective, interacting boson models.</td>
</tr>
<tr>
<td><strong>PHYS*7170</strong> Intermediate and High Energy Physics</td>
<td>U [0.50]</td>
<td>Strong, electromagnetic and weak interactions. Iosip, strangeness, conservation laws and symmetry principles. Leptons, hadrons, quarks and their classification, formation, interactions and decay.</td>
</tr>
<tr>
<td><strong>PHYS*7670</strong> Introduction to Quantum Information Processing</td>
<td>F [0.50]</td>
<td>Quantum superposition, interference, and entanglement. Postulates of Quantum Mechanics. Quantum computational complexity. Quantum Algorithms. Quantum communication and cryptography. Quantum error correction. Implementations.</td>
</tr>
<tr>
<td><strong>PHYS*7810</strong> Fundamentals of Astrophysics</td>
<td>U [0.50]</td>
<td>The fundamental astronomical data: techniques to obtain it and the shortcomings present. The classification systems. Wide- and narrow-band photometric systems. The intrinsic properties of stars: colours, luminosities, masses, radii, temperatures. Variable stars. Distance indicators. Interstellar reddening. Related topics.</td>
</tr>
<tr>
<td><strong>PHYS*7850</strong> Quantum Field Theory for Cosmology</td>
<td>U [0.50]</td>
<td>Introduction to scalar field theory and its canonical quantization in flat and curved spacetimes. The flat space effects of Casimir and Unruh. Quantum fluctuations of scalar fields and of the metric on curved space-times and application to inflationary cosmology. Hawking radiation. <strong>Prerequisite(s):</strong> PHYS*7010</td>
</tr>
<tr>
<td><strong>PHYS*7860</strong> General Relativity</td>
<td>U [0.50]</td>
<td>Introduction to the differential geometry of Lorentzian manifolds. The principles of general relativity. Causal structure and cosmological singularities. Cosmological space-times with Killing vector fields. Friedmann-Lemaître cosmologies, scalar vector and tensor perturbations in the linear and nonlinear regimes. De Sitter space-times and inflationary models.</td>
</tr>
</tbody>
</table>
PHYS*7780 Selected Topics in Astronomy U [0.50]
Offered on demand

PHYS*7780 Selected Topics in Astrophysics U [0.50]
Offered on demand

Atomic and Molecular

PHYS*7100 Atomic Physics U [0.50]
Emphasis on atomic structure and spectroscopy. Review of angular momentum, rotations, Wigner-Eckart theorem, n-j symbols. Energy levels in complex atoms, Hartree-Fock theory, radiative-transitions and inner-shell processes. Further topics selected with class interest in mind, at least one of which is to be taken from current literature.

PHYS*7130 Molecular Physics U [0.50]
Angular momentum and the rotation of molecules; introduction to group theory with application to molecular vibrations; principles of molecular spectroscopy; spectra of isolated molecules; intermolecular interactions and their effects on molecular spectra; selected additional topics (e.g., electronic structure of molecules, experimental spectroscopic techniques, neutron scattering, correlation functions, collision induced absorption, extension of group theory to molecular crystals, normal co-ordinate analysis, etc.).

Condensed Matter

PHYS*7200 Liquid State Physics U [0.50]
Physical properties of atomic liquids; distribution functions and equilibrium properties, elementary perturbation theories and integral equation theories; simple metals, simple computer simulation; viral expansions and thermodynamic derivatives of g(r); experimental determination of g(r).

PHYS*7310 Solid State Physics I U [0.50]
Phonons, electron states, electron-electron interaction, electron-ion interaction, static properties of solids.

PHYS*7320 Solid State Physics II U [0.50]
Transport properties; optical properties; magnetism; superconductivity; disordered systems.

PHYS*7330 Selected Topics in Theoretical Condensed Matter Physics U [0.50]

PHYS*7350 Photoconductivity and Luminescence U [0.50]

PHYS*7360 Optical Properties of Semiconductors U [0.50]
Reflection and refraction of electromagnetic waves at dielectric and conducting interfaces. Dispersion, absorption processes, photo effects, magneto-optical effects, emission of radiation.

PHYS*7650 Quantum Theory of Solid Surfaces U [0.50]
Brief historical review. Molecular orbital approach to surface and chemisorption states. Use of Kronig-Penny, Mathieu potential and Nearly-Free-Electron models. Crystal composition, next-nearest-neighbour interactions, sp-hybridization and applied-field effects on surface states will be discussed.

Biophysics

PHYS*7510 Cellular Biophysics U [0.50]
The physics of cellular structure and function; membrane theories, diffusion and active transport, bioelectric phenomena; intracellular motion, thermodynamics; selected topics of current interest and seminar.

PHYS*7520 Molecular Biophysics U [0.50]
Physical methods of determining macromolecular structure: energetics, intramolecular and intermolecular forces, with application to lamellar structures, information storage, DNA and RNA, recognition and rejection of foreign molecules.

PHYS*7530 Radiation Biophysics U [0.50]
Plant Agriculture

The MSc and PhD programs in Plant Agriculture offer specialization in the fields of crop management and physiology, crop breeding and genetics and crop biotechnology. Crop management and physiology is adaptation of scientific principles to improve performance of field and horticultural crops in a number of different types of environment. Research areas include closed environment production systems, plant water relations, plant growth regulations, optimization of yield and quality and post harvest physiology and biochemistry, breeding methodology, germplasm development and phytoremediation. Crop breeding and genetics includes techniques to develop or improve germplasm using selection procedures, improvement of methodologies in plant breeding and to develop an understanding of genes at the whole plant level. Students may also focus on plant propagation and plant cell and tissue culture. Crop biotechnology emphasizes the use of molecular biology techniques such as transformation, RFLP and RAPD's to develop novel germplasm and study gene function.

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John O'Sullivan
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Gopi Paliyath

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K. Peter Pauls
BSc, MSc, PhD Waterloo - Professor

Manish Raizada
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Istvan Rajcan
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Danny L. Rinker
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Darren E. Robinson
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Praveen K. Saxena
BSc Meerut, MSc Lucknow, PhD Delhi - Associate Professor

Arthur W. Schaufusma
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Barry J. Shelp
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Peter Sikkema
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Judith Strommer
BS, MS Chicago, PhD California - Associate Professor

Jayasankar Subramanian
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J. Alan Sullivan
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Clarence J. Swanton
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Francois Tardif
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Matthijs Tollenaar
IR. Wageningen, PhD Guelph - Professor

Rene C. Van Acker
BSc, MSc Guelph, PhD Reading - Professor and Chair

David J. Wolny
BSc Rutgers, MS, PhD Wisconsin - Associate Professor

MSc Program

The Department of Plant Agriculture offers an MSc program in the fields of crop management and physiology, crop breeding and genetics and crop biotechnology. Students will conduct basic and/or applied research on topics within these fields.

Admission Requirements

Applicants should have a baccalaureate degree in an honours plant science/biology program, or the equivalent, from a recognized university or college with an average academic standing of at least 'B' during the last two years of full-time study (or equivalent).

To assist in identifying a suitable thesis advisor(s), applicants should submit a short statement of research interests. Supportive letters of reference are essential and should outline the applicant's strengths and weaknesses. Students may be admitted into the fall, winter or summer semesters. The University of Guelph requires that applicants from some foreign institutions have an MSc (or equivalent) degree before they are considered for admission to the University of Guelph's MSc program.

Degree Requirements

A program of prescribed courses (at least 1.5 credits of 6000 level courses) and additional courses (if any) is established with the student's advisory committee. All MSc candidates must complete a thesis. Students are required to participate in the seminar (PLNT*6500) and in one Departmental Colloquium course. In addition, a thesis seminar will be presented in conjunction with the final oral examination and thesis defence. Students are encouraged to participate in the Annual Poster Day sponsored by the Department.

PhD Program

The Department of Plant Agriculture offers a PhD program in the fields of crop management and physiology, crop breeding and genetics and crop biotechnology.

Admission Requirements

The usual requirement for admission into the PhD program is a MSc degree by thesis in a field appropriate to their proposed area of specialization with a minimum 'B' average and supportive letters of reference. On rare occasions direct admission to the PhD program will be permitted to applicants holding an honours baccalaureate degree who have demonstrated extraordinary academic and research capabilities. It is also possible for a student to transfer from the MSc program without completing the requirements for that degree provided the student has an excellent academic record and has demonstrated a strong aptitude for research which can be expanded to the doctoral level. Applicants should submit a statement of research interests, background experiences, and career goals to assist in the identification of a faculty adviser who has the resources necessary to support
Crop Breeding, Genetics, and Biotechnology

PLNT*6100 Advanced Crop Breeding F [0.25]
The practical application of genetic theory and biological limitations to improving plant populations as germplasm and for cultivar development will be presented and discussed. Sources of variation, selection methods, genotype evaluation and cultivar multiplication will be addressed in lectures and discussions.

PLNT*6120 Protein and Oilled Crop Breeding F [0.25]
This course will address both theoretical and practical aspects of protein and oilseed crop breeding. Current and emerging breeding methodologies to achieve major agronomic and compositional goals will be examined from the perspective of theoretical, technical and financial efficiencies.

PLNT*6130 Corn Breeding W [0.25]
Principles of corn breeding with emphasis on germplasm enhancement and methods of improving breeding populations as sources of inbred lines for hybrid programs and for direct use as improved varieties.

PLNT*6150 Plant Breeding -The Profession W [0.25]
The course will address professional aspects of plant breeding including: legal/regulatory issues, ethical issues related to germplasm, and rights and responsibilities related to intellectual property under UPOV and World Patent Organization conventions.

PLNT*6160 Quantitative Genetic Variation in Crop Populations F [0.25]
Fundamentals of quantitative genetics. Topics will include gene and genotype frequencies, forces affecting equilibrium, small population size, inbreeding, means, variances, covariances and resemblance among relatives. Lecture topics will be expanded through discussion of classic and current papers.

PLNT*6250 Colloquium in Genetics, Biotechnology and Plant Breeding F,W [0.25]
An open discussion course designed to review and critically analyse contemporary issues in plant genetics, biotechnology and breeding.

PLNT*6260 Advanced Crop Genetics W [0.50]
A lecture and discussion course on some of the recent advances in genetics as they pertain to crop improvement. Topics will include: the molecular basis of selected agronomic traits, molecular marker assisted selection, isolation of plant genes and plant transformation systems.

Crop Physiology and Management

PLNT*6100 Physiology of Crop Yield W [0.50]
Physiological and environmental principles as they relate to the growth of crop plants and communities. Plant and environmental characteristics determining transpiration, photosynthesis, leaf growth and reproductive growth and development. Simulation of plant growth. 

PLNT*6110 Postharvest Physiology W [0.50]
Discussion of the physiological effects of controlled and supplemental environments or treatments on horticultural crops. Emphasis is on current problems and research. 

PLNT*6220 Advanced Studies in Pomology W [0.50]
Discussion of current problems and research on fruit crop production and physiology. 

PLNT*6230 Colloquium in Crop Physiology and Management F,W [0.25]
An open discussion and/or workshop course designed to review and critically analyze contemporary issues in crop physiology and management. The fall course is generally devoted to computer simulation of crop growth and development.

PLNT*6240 Colloquium on Weed Management in Agrosystems W [0.25]
An open discussion course designed to review and critically analyze contemporary issues in plant ecology and their relevance to practical weed management systems.

PLNT*6290 Physiological Genetics of Higher Plants F [0.50]
A lecture and discussion course examining classical and molecular genetic investigations for understanding the genetic basis and regulation of physiological processes in plants. 

PLNT*6490 Colloquium in Physiology of Ornamental Crops F [0.25]
Current topics in the area of floriculture, turfgrass, and woody plant physiology. 

The MSc/PhD program in toxicology.

Toxicology MSc/PhD Collaborative Program

The Department of Plant Agriculture participates in the MSc/PhD program in toxicology. Please consult the Toxicology listing for a detailed description of the MSc/PhD collaborative program.

Degree Requirements

The major emphasis in the PhD program is on research and the preparation of an acceptable thesis. There are no specific course requirements except for the seminar and colloquia as outlined below. However, it is usual for most students, in consultation with their advisory committee, to select prescribed studies and additional courses in preparation for the qualifying examination and thesis research. The qualifying examination is in two parts (written and oral) and evaluates the student’s knowledge of their field of specialization and related topics. The qualifying examination will be taken no later than the fifth semester or seventh semester if the student has transferred from the MSc program or has been admitted directly to the PhD program with only a BSc. In addition, the advisory committee is required to submit a written evaluation of the student’s performance in research and the student’s potential as a researcher. Upon completion of the qualifying examination, the student becomes a candidate for the PhD degree.

Students are required to participate in the Seminar (PLNT*6400). PhD students will complete a second seminar (PLNT*6410) on their thesis research no later than semester 6. In addition, a thesis seminar will be presented in conjunction with the final oral examination and thesis defence. Students are required to participate in two Departmental Colloquium courses offered by the Department. Students are encouraged to participate in the Annual Poster Day sponsored by the Department. The PhD program is completed by the submission and successful defence of an acceptable thesis.

Interdepartmental Programs

Toxicology MSc/PhD Collaborative Program

The Department of Plant Agriculture participates in the MSc/PhD program in toxicology. Please consult the Toxicology listing for a detailed description of the MSc/PhD collaborative program.

Courses

PLNT*6070 MSc Issues in Food Safety Risk Analysis S [0.50]
This course is based on the principles of risk analysis - assessment, management and communication - their application to food safety, agricultural biotechnology and food policy development

PLNT*6090 Food Safety Policy W [0.50]
This course will examine the interplay between science, risk, economics and politics that lead to food safety policy development. Students will be introduced to national and international approaches to food safety policy, as well as in-depth case studies. Lectures, readings and resource material will focus on real-life development of food safety policy, drawing on the experience of a number of distinguished lecturers who have participated in a broad range of food safety policy developments.

PLNT*6050 Principles and Application of Plant Tissue Culture F [0.50]
The course involves lecture and discussions of fundamental and applied aspects of plant tissue culture. Topics will include the role of tissue culture in understanding plant development, physiology and genetics, and its commercial applications in horticulture and forestry.

PLNT*6170 Statistics in Plant Agriculture W [0.50]
The application of statistical techniques to research in plant agriculture. SAS will be the software used to perform data analysis. Emphasis will be placed on statistical principles, the design of experiments, the testing of hypotheses, and communication of findings to other scientists.

PLNT*6400 Seminar F,W [0.25]
All graduate students present a departmental seminar on their research proposal no later than the second semester. PhD students present an additional seminar on their thesis research before the end of the sixth semester (or the equivalent). Each student is expected to participate in the seminars of colleagues and faculty.

PLNT*6410 Advanced Seminar F-W [0.25]
PhD students present a seminar on their research to date before the end of the sixth semester (or the equivalent). Each student is expected to participate in the seminars of colleagues and faculty.

Prerequisite(s): PLNT*6400
PLNT*6500 Applied Bioinformatics W [0.50]

The goal of this course is to provide an introductory understanding of the databases and methods used in computational molecular biology research. Topics covered will include: reviewing major molecular databases and their structures, constructing sequence alignments, constructing phylogenics, and finding motifs and genes in biological sequences. Lab sessions will include an introduction to Unix and Perl for the biologist and hands-on use of several molecular data analysis programs.

Prerequisite(s): Undergraduate level statistics class (such as STAT*2040 or STAT*2100) and undergraduate level molecular biology class (such as MBG*2020).
Political Science

Administrative Staff

Chair
Byron Sheldrick (525 MacKinnon, Ext. 56503)
sheldrir@uoguelph.ca

Graduate Co-ordinator
Janine Clark (540 MacKinnon, Ext. 52927)
jclark@uoguelph.ca

Graduate Secretary
Shelagh Daly (524 MacKinnon, Ext. 56973)
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Graduate Faculty

William Christian
BA, MA Toronto, PhD London School of Economics - Professor

Janine Clark
MES Waterloo, MA Carleton, PhD Toronto - Associate Professor

Carol L. Daua
BA McMaster, MA Guelph, PhD Toronto - Assistant Professor

Jordi Diez
BA Toronto, MA Essex, PhD Toronto - Assistant Professor

Fred Eidlin
BA Dartmouth, MA Indiana, PhD Toronto - Professor

Candace Johnson
BA Toronto, MA, PhD Dalhouse - Associate Professor

Craig A. Johnson
BA Queen’s, MA Toronto, PhD London School of Economics - Associate Professor

Maureen Mancuso
BA McMaster, MA Carleton, DPhil Oxford - Professor, Provost and Vice-President Academic

Tim A. Mau
BA, MA Guelph, PhD Oxford - Assistant Professor

Judith McKenzie
MES Waterloo, MA, PhD Toronto - Associate Professor

Troy Riddell
BA, MA Calgary, PhD McGill - Associate Professor

Byron M. Sheldrick
BA Carleton, LLB Toronto, MA, PhD York - Associate Professor and Chair

Ian S. Spears
BA Toronto, MA Queen’s, PhD McGill - Associate Professor

R. Brian Woodrow
BA, MA, PhD Toronto - Professor

Kenneth B. Woodsid
BA Toronto, MA, PhD Chicago - Professor

MA Program

The Department of Political Science offers three programs of study leading to the MA degree. Graduate students in the Department of Political Science are accepted into one of the following programs: 1) the General MA in Political Science; 2) the Collaborative MA Program in International Development Studies (CIDS); or 3) the Guelph-McMaster Collaborative MA Program in Public Policy and Administration (The G-M Program).

Each of these MA programs has separate course requirements. Students in the General MA and Collaborative MA Program in International Development Studies may pursue a thesis option or a major research paper option, both of which are research-based. Students in the Guelph-McMaster program are required to undertake a major research paper. The MA program can be completed in three semesters.

Application Procedure

All students must apply directly to the Department of Political Science. Graduate students are admitted each fall semester. The deadline for all applications is February 1 each year. All applications must be submitted on-line. Complete instructions can be found at http://www.uoguelph.ca/graduatestudies/admission.htm

NOTE: This is a self-administered application process. Please have all materials (reference letters, transcripts, application form, statement of research) returned to you upon sending materials in one envelope to the Graduate Secretary, Department of Political Science.

Admission Requirements

The department requires an Honours BA degree (4 years) in political science (or its equivalent) with at least a B' average (second-class standing) for consideration for admission to the program. A methodology course equivalent to The Systematic Study of Politics, POLS*650, in the Department of Political Science undergraduate program, is necessary for admission to the graduate program. Students not satisfying this requirement may be admitted with the provision that it be satisfied by completing the requisite extra course.

Degree Requirements

Departmental Program - Guelph MA Program in Political Science

The University of Guelph’s Department of Political Science has a large, academically diverse faculty with extensive research-oriented expertise. We offer strong scholarly representation in two main fields: Governance and Public Policy; and Comparative Politics. Within these two fields, the faculty’s research and supervisory expertise further is concentrated in, but not limited to, the following thematic areas: Social Policy; Environmental Policy; International Trade Policy; Criminal Justice Policy; Politics of Development; and Women, Gender and Politics. The program’s structure and the diverse interests of its members have resulted in a very broad range and diversity of course offerings. Graduates of the General MA in Political Science are engaged in a wide range of careers in academia, government and industry.

In order to fulfill the requirements of the General MA in Political Science, students must complete the requirements of either the thesis or the major paper options.

Thesis Option

In order to satisfy the degree requirements, the student will complete five courses plus a Pro-Seminar and a thesis, as described below for a total of 2.75 credits.

One professional development and orientation course:

POLS*6900 [0.25] Pro-Seminar

One methodology course:

POLS*6940 [0.50] Qualitative Research Design and Methods or an appropriate equivalent from another department.

One core course:

POLS*6600 [0.50] Comparative Approaches to Political Science

Three departmental courses or, in consultation with the graduate advisor, courses outside the department.

With the permission of the Graduate Committee, complete and successfully defend a thesis of no more than 20,000 words.

Major Research Paper Option

In order to satisfy the degree requirements, the student will complete six courses plus a Pro-Seminar and two course equivalents of major paper research, as described below, for a total of 4.25 credits.

One professional development and orientation course:

POLS*6900 [0.25] Pro-Seminar

One methodology course:

POLS*6940 [0.50] Qualitative Research Design and Methods or an approved equivalent from another department.

One core course:

POLS*6600 [0.50] Comparative Approaches to Political Science

Four departmental courses or, in consultation with the graduate advisor, courses outside the department.

With the permission of the Graduate Committee, graduate students complete and successfully defend a Major Research Paper of approximately 10,000 words.

Complete a major research paper of approximately 10,000 words:

POLS*6970 [1.00] Major Paper

Interuniversity MA Program - Guelph-McMaster Collaborative MA Program in Public Policy and Administration

The collaborative program in public policy and administration is an initiative on the part of the Departments of Political Science at the University of Guelph and McMaster University to co-ordinate their involvement in this particular field. The program successfully melds policy studies and administrative studies into a unique program of study in Canada. Students can avail themselves of core courses that may be offered at either institution. Up to 50% of courses can be taken at each university. The program term is one year. All the courses are grounded within the discipline of political science, while giving attention and regard to the contribution of related disciplines - such as economics, law and sociology.

Graduates enjoy successful careers in the public services of Canada, Ontario and other provinces, as well as local governments, and pursue careers in the private sector as well as the non-profit sector. A number of graduates have pursued PhD's and now teach in universities and colleges.

Course of Study

The fall and winter semesters are devoted to completing the course requirements: four core courses and 2 specialized electives. The summer semester differs for students who are formally enrolled at Guelph and those formally enrolled at McMaster.

Degree Requirements

In order to satisfy the degree requirements, the student will complete six courses plus a Pro-Seminar and two course equivalents of major paper research as described below for a total of 4.25 credits.

One professional development and orientation course:

POLS*6900 [0.25] Pro-Seminar

One methodology course:

POLS*6940 [0.50] Qualitative Research Design and Methods
### Three core courses:
- **POLS*6950 [0.50]** Specialized Topics in Political Studies
- **POLS*6630 [0.50]** Approaches to Public Policy
- **POLS*6640 [0.50]** Canadian Public Administration: Public Sector Management

### Degree Requirements

In order to fulfill the requirements of the CIDS MA, students must complete the requirements of either the thesis or the major research paper options.

#### Thesis Option

In order to satisfy the degree requirements, the student will complete seven courses plus a Pro-Seminar and a thesis, as described below, for a total of 3.75 credits.

One professional development and orientation course:
- **POLS*6900 [0.25]** Pro-Seminar

One methodology course:
- **POLS*6940 [0.50]** Qualitative Research Design and Methods or an equivalent course from another department.

One core course:
- **POLS*6730 [0.50]** The Politics of Development and Underdevelopment

Five CIDS core courses 2.50 See the Collaborative International Development Program entry in this calendar. POLS*6730 will count as both a Political Science requirement and a CIDS requirement. With the permission of the Graduate Committee, graduate students complete and successfully defend a thesis of no more than 20,000 words.

#### Major Research Paper Option

In order to satisfy the degree requirements, the student will complete eight courses plus Pro-Seminar and two course equivalents of major paper research as described below for a total of 5.25 credits.

One professional development and orientation course:
- **POLS*6900 [0.25]** Pro-Seminar

One methodology course:
- **POLS*6940 [0.50]** Qualitative Research Design and Methods or an approved equivalent from another department.

One core course:
- **POLS*6730 [0.50]** The Politics of Development and Underdevelopment

Five CIDS core courses 2.50 See the Collaborative International Development Program entry in this calendar. POLS*6730 will count as both a Political Science requirement and a CIDS requirement. With the permission of the Graduate Committee, graduate students complete and successfully defend a Major Research Paper of approximately 10,000 words.
- **POLS*6970 [1.00]** Major Paper

### Interdepartmental MA Programs - Collaborative International Development Studies MA/MSc Program

The Department of Political Science participates in the MA Collaborative International Development Studies (CIDS) program. Please consult the International Development Studies listing for a detailed description of the MA collaborative program including the special additional requirements for each of the participating departments.

CIDS graduates hold positions in government in Canada and abroad with NGOs, international organizations and private consultancies. Many also enter PhD programs.

### Courses

#### POLS*6000 Comparative Approaches to Political Science U [0.50]

In this course, the students examine the main theoretical frameworks and debates in political science and the ways in which these conceptual approaches guide empirical analysis and explain political behaviour. Examples include neo-institutionalism, political culture, Marxism, feminism and identity based approaches.

#### POLS*6050 Gender and Politics U [0.50]

This course will survey theoretical approaches to gender, primarily feminist analysis. Through selected readings, students will be introduced to gender as an approach to examining current political problems such as social policy, security or development.
POLS*6950 Specialized Topics in Political Studies U [0.50]
This course is intended to be an elective course for students wishing to pursue an area of investigation not covered in the other courses offered by the department. This course may also be chosen by students who want to further pursue a subject area to which they were introduced in a previous course.

POLS*6960 Directed Readings U [0.50]
This is an elective course for students wishing to pursue an area of investigation not covered in other courses offered by the department. This course may also be chosen by students who want to further pursue a subject area to which they were introduced in a previous course.

POLS*6970 Major Paper U [1.00]
The major paper is an extensive research paper for those who do not elect to complete a thesis. It may be taken over two semesters. The length of the major paper is not to exceed 10,000 words.

Students should also consult the fourth year undergraduate course selection. Graduate students, with the approval of the instructor and the Graduate Coordinator, may take a fourth year undergraduate course in the Political Science Department. This course is taken as POLS*6950 Specialized Topics. Course requirements are modified so that they are comparable to other courses offered at the graduate level.

Courses at McMaster University available to students in the collaborative MA program
Descriptions of all McMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
The Department of Population Medicine is an international leader in promoting the optimal health and productivity of animal populations, ensuring the safety of foods of animal origin and preventing animal-related disease in humans. Our research mission is to discover and disseminate knowledge regarding the management of health and productivity of animal populations, and the interrelationships of animals with humans and the environment. In support of this mission we rely principally on our expertise in field-based quantitative observational studies and clinical trials. Our teaching/learning mission is to guide students as they obtain an essential knowledge base and develop the necessary communicative, quantitative and problem-solving skills to integrate and apply this knowledge; and to instill the appropriate attitudes and abilities required for life-long learning.

The department offers programs leading to MSc, PhD and DVSc degrees.

Graduate Faculty

Kenneth G. Bateman
DVM, MSc Guelph - Associate Professor

Olaf Berke
Dipl, Statistics, PhD Dortmund Germany - Assistant Professor

Tracey S. Chenier
DVM, DVSc Guelph, Dip ACT - Assistant Professor

Catherine E. Dewey
DVM, MSc, PhD Guelph - Professor and Chair

Todd F. Duffield
DVM, DVSc, Guelph - Associate Professor

Robert M. Friendship
DVM, MSc Guelph, Dip ABVP - Professor

Cathy J. Gartley
BSc New Brunswick, DVM, DVSc Guelph, Dip ACT - Assistant Professor

Walter H. Johnson
DVM, MVSc Saskatchewan, Dip ACT - Professor

David F. Kelton
DVM, MSc, PhD Guelph, Dip ABVP - Associate Professor

Kenneth E. Leslie
DVM, MSc Guelph - Professor

Kerry D. Lissemore
BSc Toronto, DVM, DVSc Guelph - Associate Professor and Assistant Dean

S. Wayne Martin
DVM, MSc Guelph, MPVM, PhD California - Professor

John J. McDermott
DVM Guelph, MPVM California, PhD Guelph - Professor

Scott A. McEwen
DVM, DVSc Guelph, Dip. ACVP - Professor and Graduate Co-ordinator

Alan H. Meek
DVM, MSc Guelph, PhD Melbourne - Professor

Paula I. Menzies
DVM Guelph, MPVM California - Associate Professor

Suzanne T. Millman
BSc, PhD Guelph - Assistant Professor

David Pearl
BSc McGill, MSc York, DVM, PhD Guelph - Assistant Professor

Peter W. Physick-Sheard
BVSc Bristol, Dip Vet Surg, MSc Guelph, FRCVS (UK) - Associate Professor

Margaret A. Thorburn
BSc Stanford, DVM, MPVM, PhD California - Associate Professor

David Wulf-Gundersen
BA Goshen College (Indiana), DVM Saskatchewan, PhD Guelph - Professor

Jeffrey B. Wilson
DVM, DVSc, PhD Guelph - Associate Professor
Degree Requirements
The major emphasis in the PhD program is on the preparation of an acceptable thesis. There are no specific course requirements other than the Seminar, POPM*6100, which must be completed twice. However, students are expected to have taken POPM*6200 Epidemiology I (F) and POPM*6210 Epidemiology II, or their equivalent, in their MSc program. It is usual for students, in consultation with their advisory committee, to select a suitable program of prescribed studies and additional courses. Course selection takes into account the student's background, research area, career aspirations, and need to prepare for the qualifying examination.

Courses should normally be completed before the qualifying exam is attempted. The written component of the examination is followed by an oral component (two to four hours), usually one week later. MSc holders must complete the qualifying examination by the end of the fifth semester. Students transferring from the MSc program and those who enter the program directly after their honours or DVM degrees (or their equivalents) must complete the examination by the end of the seventh semester. In addition, the advisory committee is required to confirm that the student has demonstrated ability and promise in research. The PhD program is completed by the successful defence of a thesis.

DVSc Program
The Department of Population Medicine participates in the DVSc program. Recognized areas of specializations include ruminant-health management, swine-health management and theriogenology. Admission and degree requirements are outlined in the Policies and Procedures Manual for the DVSc Program. Interested individuals can obtain such information by writing directly to the assistant dean, research and graduate studies, of the Ontario Veterinary College.

Ruminant Health Management
The Department of Population Medicine, Ontario Veterinary College, offers a graduate program leading to the Doctor of Veterinary Science (DVSc) degree in Ruminant Health Management. Candidates must have a DVM or equivalent degree, appropriate clinical experience, cumulative average of at least second-class honours ("B" standing), and be licensed or eligible for licensing to practice veterinary medicine in Ontario. One position is available during most academic years, and it normally starts in May or September. It is a three-year program, which will provide training and experience in applied health management and clinical research. Approximately one-third of the time will involve clinical training, teaching final year veterinary students and service duties (including on-call) with the Ruminant Field Service clinic of the Veterinary Teaching Hospital. The candidate will be required to complete a substantive thesis research project, related to an applied aspect of production medicine. The DVSc degree requirements include successful completion of 2.5 credits of prescribed graduate level courses, and a successful defence of a thesis. A faculty member(s) in the Department of Population Medicine will supervise each candidate for the Ruminant Health Management DVSc position.

Swine Health Management
The Department of Population Medicine, Ontario Veterinary College, offers a graduate program leading to the Doctor of Veterinary Science (DVSc) degree in Swine Health Management. Prerequisites include a DVM or equivalent degree, one or two years of practice experience/internship, cumulative average of at least second-class honours ("B" standing), and eligibility for licensure to practice veterinary medicine in Ontario. One position is available during most academic years, and it normally starts in May or September. It is a three-year program, which will provide training and experience in applied health management and clinical research. Approximately one-third of the time will involve clinical training, teaching final year veterinary students, one-third course work and one-third research. Clinical experience and advanced academic activities will be appropriate for a candidate preparing for board certification in Swine Health Management by the American Board of Veterinary Practitioners. The DVSc degree requirements include successful completion of 2.5 credits of prescribed graduate level courses, and a successful defence of a thesis. A faculty member(s) in the Department of Population Medicine will supervise each candidate for the Swine Health Management DVSc position.

Theriogenology
The Department of Population Medicine offers a graduate program leading to the Doctor of Veterinary Science (DVSc) degree in Theriogenology. Prerequisites include a DVM or equivalent degree, one or two years of practice experience/internship, cumulative average of at least second-class honours ("B" standing), and eligibility for licensure to practice veterinary medicine in Ontario. The DVSc program provides rigorous advanced academic preparation in the discipline of Theriogenology with a view to preparation for Board Certification by the American College of Theriogenologists. The Theriogenology program at the Ontario Veterinary College is multi-species, with emphasis placed on a candidate’s specific areas of interest. The DVSc differs from PhD training by emphasizing the development of both research and applied clinical skills. It is a three-year program, with approximately one-third of the time involving clinical duties within the Veterinary Teaching Hospital, including assisting in teaching of final year veterinary students. The remainder of effort is directed towards a substantive thesis research project in Theriogenology and coursework. The DVSc degree requirements include successful completion of 2.5 credits of prescribed graduate level courses, a qualifying examination and successful defense of a thesis. A faculty member(s) in the Department of Population Medicine will supervise each candidate for the Theriogenology DVSc position.

Interdepartmental Programs

Food Safety and Quality Assurance MSc Collaborative Program
The Department of Population Medicine participates in the MSc program in food safety and quality assurance. Those faculty members whose research and teaching expertise includes aspects of food safety and quality assurance may serve as advisors for MSc students. Please consult the Food Safety and Quality Assurance listing for a detailed description of the MSc collaborative program.

International Studies Collaborative MSc Program
The Department of Population Medicine participates in the International Development Studies MSc program. Those faculty members whose research and teaching expertise includes aspects of international studies may serve as advisors for MSc in International Development Studies students. Please consult the International Development Studies listing for a detailed description of the interdepartmental program.

Courses
*Given in alternate years.

Epidemiology

POPM*6200 Epidemiology I F [0.50]
This course covers concepts, principles and methods of basic and applied epidemiology, including the following topics: sampling, measuring disease frequency, clinical epidemiology, descriptive epidemiology, causal reasoning and design, interpretation and critical appraisal of surveys, observational studies, field trials and critical appraisal.

POPM*6210 Epidemiology II W [0.50]
Advanced study design and analytic methods for the analysis of data from observational studies and surveys.

POPM*6220 Analytical Epidemiology S [0.50]
This course focuses on the advanced analysis of epidemiologic studies. Case control, cohort and survival studies are analysed within the generalized linear-model framework. Links between study objectives, study design and data analysis will be emphasized throughout. Special problems, such as the analysis of correlated data arising from cluster sampling of individuals, are discussed.

Prerequisite(s): POPM*6210 and POPM*6290

POPM*6230 Applied Clinical Research F [0.50]
This course is designed to help clinical researchers design, fund, and analyze their clinical research. Emphasis is placed upon planning a well-designed clinical trial and writing a well-organized grant proposal.

POPM*6250 Project in Epidemiology S [1.00]
Collection and analysis of field data and the preparation of a written report suitable for publication, and oral presentation of the findings to the graduate faculty. This course is part of the MSc program by course work in epidemiology.

POPM*6290 Statistics for the Health Sciences W [0.50]
This course gives an overview of advanced methods for the analysis of data of clustered/correlated data. Special emphasis is on spatial, longitudinal and survival data.

Prerequisite(s): POPM*6200 or STAT*2040 or equivalent

POPM*6300 Epidemiology of Zoonoses W [0.50]
Characterization and distribution of diseases common to people and animals.

Swine Health Management

POPM*6700 Swine Health Management * U [0.50]
Diseases of swine are studied with particular emphasis on preventive medicine and herd-health management.

Theriogenology

POPM*6610 Theriogenology of Cattle * U [0.50]
A lecture/seminar course emphasizing the relationship of nutritional, genetic, endocrine, anatomic, and environmental factors with the reproductive health of cattle. Application of reproductive technologies will also be covered.

POPM*6630 Theriogenology of Horses * U [0.50]
A lecture/seminar course covering the genetic, endocrine, anatomic and environmental factors that affect reproductive performance and health of horses. Breeding management, including recent technologies, and management of the infertile animal will be included.

POPM*6650 Theriogenology of Dogs and Cats * U [0.50]
A seminar/lecture series that includes the theory and management of clinical reproduction for the dog and cat, including use of developing technologies.
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tr>
<td>POPM*6670</td>
<td>Theriogenology of Small Ruminants * U [0.50]</td>
<td>A seminar/laboratory course emphasizing advanced reproductive management of sheep, goats and farmed deer/elk, with the emphasis on a sheep production model. New reproductive technologies will be included.</td>
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<tr>
<td>POPM*6400</td>
<td>Dairy Health Management * S [0.50]</td>
<td>This course stresses a population-based, herd-level approach to dairy herd health management, in which optimizing the efficiency of the dairy enterprise is the overall goal. The biological and economic impacts of disease and management deficiencies on herd performance will be discussed as they relate to design and implementation of herd health programs. The course will emphasize the critical role of record keeping, data analysis and monitoring on program success.</td>
</tr>
<tr>
<td>POPM*6350</td>
<td>Safety of Foods of Animal Origins F [0.50]</td>
<td>The detection, epidemiology, human health risk, and control of hazards in food of animal origin.</td>
</tr>
<tr>
<td>POPM*6100</td>
<td>Seminar F [0.00]</td>
<td>A practical course that utilizes tutorials, workshops, self and peer reviewed assessment to help participants develop skills in public speaking and presentation of scientific data. Each student presents at least one seminar on an approved subject during the departmental seminar series.</td>
</tr>
<tr>
<td>POPM*6950</td>
<td>Studies in Population Medicine U [0.50]</td>
<td>Assigned reading and/or special projects selected to provide in-depth study of topics appropriate to the specialized interests of individual students. Courses offered under this title have included Special Topics in Public Health; Ecology and Health; Systems Approaches; and Animal Welfare. Different offerings are assigned different section numbers.</td>
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Psychology

The Department of Psychology offers two graduate programs. The first is a Master of Arts (MA) in four areas of study: Applied Social Psychology, Clinical Psychology: Applied Developmental Emphasis, Industrial/Organizational Psychology, and Neuroscience & Applied Cognitive Science. The second program is a Doctor of Philosophy (PhD) in the same four areas of study. These areas of study, which are described below, provide training in both research and professional skills, as well as a firm grounding in theory and research in relevant content areas. See the department website at http://www.psychology.uoguelph.ca for additional information.

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Neuroscience and Applied Cognitive Science

http://www.uoguelph.ca/ncs

The Masters and PhD programs in Neuroscience and Applied Cognitive Science provide training for students interested in the integrative functioning of the brain. This program encompasses: basic cognitive processes, behavioural neuroscience, cognitive ergonomics, cognitive neuroscience, developmental and life-span cognition, and foundations of cognitive science. Students in these disciplines have the opportunity to learn about the interdisciplinary work of other students, faculty and outside researchers in the weekly research seminar in Neuroscience and Applied Cognitive Science. Additionally, students take courses specific to their research. A unique feature of this area of study is the practicum that provides students with additional specific training in a research laboratory, hospital, government agency, or non-government agency.

The program involves three components.

1. Preparatory Course Work

Students will acquire knowledge and skills necessary to carry our Neuroscience and Cognitive Science research in academic and/or applied settings. At the Masters level, this will involve a course in Research Design and Statistics, a course in Research Ethics (Animal research ethics or Human research ethics), at least one elective in their specific field of research and the Research Seminar in Neuroscience and Applied Cognitive Science. PhD students take Philosophy and History of Psychology as a Science. Research Seminar in Neuroscience and Applied Cognitive Science, at least two electives and must pass a qualifying exam.

2. Practicum

One of the unique features of University of Guelph's Neuroscience and Applied Cognitive Science masters program is the practicum. Students will complete a practicum in a variety of research settings, including government agencies, hospitals, businesses, and other research laboratories. The practicum may involve learning a new technique in a laboratory other than that of the advisor. Practicum experiences will be tailored to the student's interests, and will enable student to acquire and refine skills and develop professional contacts.

3. Thesis research

Students will carry out an independent research project under the supervision of a faculty supervisor. This will involve a thesis for the Masters program and a Dissertation for the PhD.

Applied Social Psychology

Applied Social Psychology is based on the investigation of social processes and problems of significance to the general community and to specific groups, for example, in the areas of aging, health, law, equity, community services, and gender. The area of Applied Social Psychology has two primary components: first, the pursuit of advanced research, and second, the design and evaluation of interventions and programs that aim to reduce social problems and promote human welfare. The Researcher/Practitioner Course Set emphasizes field research, practicum training, and consulting in community settings. It is designed for students who wish to pursue either an academic/researcher or a practitioner career path (e.g. to work primarily in government, consulting firms, community agencies, foundations, and hospitals). The Researcher Course Set involves training in advanced methodological and analytic techniques and emphasizes involvement in the ongoing research projects of the faculty. This course set is designed for students interested in an academic/research career path.
Clinical Psychology: Applied Developmental Emphasis

The area of Clinical Psychology: Applied Developmental Emphasis concentrates on understanding the development and treatment of psychological disorders experienced by children, youth and families. This includes a focus on the social, emotional, cognitive, and neurobiological features of normal and atypical development; risk and protective factors that influence the nature and progression of atypical development and response to treatment; and approaches to assessment, psychodiagnosis, and intervention. Also considered is the developmental impact of stressful life events such as divorce, illness, poverty, adoption, and death. Training in this field follows an integrated series of courses and practica which contributes to and mutually supports the students’ acquisition of competence as both practitioners and researchers. Students participate in our on-campus clinic, the Centre for Psychological Services, and complete off campus practica in hospitals, schools and mental health settings under the supervision of registered psychologists. This training allows students to enter careers involving clinical and/or research positions in mental health centres, hospitals, schools, and the private sector, as well as careers involving teaching and research in university settings. It also prepares students for registration as psychologists with provincial licensing boards.

Industrial/Organizational Psychology

The objective of study in the area of Industrial/Organizational Psychology is to train future professionals in the area of Industrial/Organizational Psychology following the guidelines established by the Canadian Society for Industrial/Organizational Psychology. Graduate students are expected to obtain a high level of proficiency in both research skills and practice in the core areas of Industrial/Organizational Psychology including personnel selection, organizational behaviour, work attitudes, performance appraisal, and measurement of individual differences. Graduates from this field of study will be in a position to enter careers in a wide range of private and public sector organizations, including universities, consulting firms, industries, and government agencies.

General Admission and Program Requirements

To apply for admission, applicants must view “How to Apply” in the section Prospective Students... Graduate, in the Psychology Department website http://www.psychology.uoguelph.ca. This is a self-administered application. First, students apply online through the Ontario Universities Application Centre (OUAC) and pay an application fee. Second, they assemble the application information described in the psychology website consisting of Letter of Reference forms, all post secondary transcripts, a Departmental Questionnaire, and a copy of the online OUAC application form and forward the complete package to the Graduate Secretary, Department of Psychology, University of Guelph, Guelph, Ontario Canada N1G 2W1. Graduate Record Examination (GRE) General is required for all applicants for MA and PhD programs. Additionally, the Subject (Psychology) test scores are required of all applicants (except in the Neuroscience and Applied Cognitive Science area) for MA and PhD programs. Applicants should request that their GRE scores be sent directly to the Department of Psychology before the departmental application deadline (Dec. 15). Contact the Graduate Secretary, Department of Psychology, at psygssec@psy.uoguelph.ca for additional information.

MA Program

Admission Requirements MA Program

Consideration for admission to the MA program will be given to students with an honours BA or BSc (or its equivalent) in Psychology or a related field of study (e.g. Computer science, neuroscience, and a minimum of a B+ standing). Students are normally expected to have taken courses across the breadth of psychology with some courses in the area to which they are applying. A strong background in methodology and statistics is expected. As well, applicants must have undertaken an Honours thesis research project or senior research project equivalent. Students are admitted to the MA program with the understanding that they intend to proceed to the PhD program.

Degree Requirements MA Program

Neuroscience and Applied Cognitive Science

PSYC*6060 [0.50] Research Design and Statistics
PSYC*6740 [0.50] Research Seminar in Neuroscience and Applied Cognitive Science A
PSYC*6880 [0.25] Ethical Issues in Psychology
OR
UNIV*6600 [0.00] Animal Care Short Course
PSYC*6471 [0.50] Practicum I
At least one of the following electives:
PSYC*6780 [0.50] Foundations of Cognitive Science
PSYC*6790 [0.50] Memory and Cognition
PSYC*6800 [0.50] Neuropsychology
PSYC*6810 [0.50] Neurobiology of Learning
PSYC*6870 [0.50] Human Facets and MA Thesis.

Applied Social Psychology

PSYC*6640 [0.50] Foundations of Applied Social Psychology
PSYC*6830 [0.50] Applied Social Psychology
PSYC*6659 [0.50] Social and Community Intervention

PSYC*6522 [0.50] Research Seminar II
PSYC*6880 [0.25] Ethical Issues in Psychology
PSYC*6060 [0.50] Research Design and Statistics
PSYC*6670 [0.25] Research Methods
PSYC*6471 [0.50] Practicum I
and one elective course to be determined in consultation with the student’s MA Advisory Committee, and MA Thesis.

Clinical Psychology: Applied Developmental Emphasis

PSYC*6060 [0.50] Research Design and Statistics
PSYC*6630 [0.50] Developmental Psychology
PSYC*6000 [0.50] Developmental Psychopathology: Etiology and Assessment
PSYC*6650 [0.50] Models of Child and Adolescent Psychotherapy
PSYC*6690 [0.50] Cognitive Assessment of Children and Adolescents
PSYC*6700 [0.50] Personality and Social Assessment of Children and Adolescents
PSYC*6610 [0.50] Learning Disorders: Research and Clinical Practice
PSYC*6471 [0.50] Practicum I
PSYC*6473 [0.25] Practicum III
PSYC*6880 [0.25] Ethical Issues in Psychology
and MA Thesis.

Industrial/Organizational Psychology

PSYC*7010 [0.50] Personnel I: Foundations of Personnel Decisions
PSYC*7030 [0.50] Organizational Psychology I: Micro and Macro Influences
PSYC*6060 [0.50] Research Design and Statistics
PSYC*6670 [0.50] Research Methods
PSYC*7020 [0.50] Personnel II: Recruitment, Selection, and Placement
PSYC*7070 [0.50] Psychological Measurement
PSYC*6880 [0.25] Ethical Issues in Psychology
PSYC*6380 [0.50] Psychological Applications of Multivariate Analysis
PSYC*7040 [0.50] Organizational Psychology II: Group and Intergroup Processes
PSYC*6471 [0.50] Practicum I
PSYC*7160 [0.25] Applications of Industrial/Organizational Psychology
PSYC*7080 [0.50] Organizational Interventions
PSYC*6840 [0.50] Program Evaluation
and MA Thesis.

PhD Program

Admission Requirements PhD Program

Students must have completed MA requirements in the appropriate field of study (Neuroscience and Applied Cognitive Science; Applied Social Psychology; Clinical Psychology: Applied Developmental Emphasis; Industrial/Organizational Psychology) with a minimum ‘A’ standing to be eligible for admission to the PhD program. These MA requirements are normally met within the department in a two-year course of studies comprising specified course work and a thesis. Students admitted to the PhD program who have completed MA or MSc degrees in other fields of study and/or from other universities may be required to take MA level courses to ensure adequate background preparation for PhD work.

Degree Requirements PhD Program

Neuroscience and Applied Cognitive Science

PSYC*6900 [0.50] Philosophy and History of Psychology as a Science
PSYC*6760 [0.00] Research Seminar in Neuroscience and Applied Cognitive Science B

Two elective courses
The option of taking:
PSYC*6472 [1.00] Practicum II
Qualifying Examination and PhD Thesis.

Applied Social Psychology

PSYC*6900 [0.50] Philosophy and History of Psychology as a Science
PSYC*6380 [0.50] Psychological Applications of Multivariate Analysis
PSYC*6522 [0.50] Research Seminar II
PSYC*6471 [0.50] Practicum I
One of:
PSYC*6270 [0.50] Issues in Family-Related Social Policy
1 elective to be determined in consultation with the student’s PhD Advisory Committee; Qualifying Exam; and PhD Thesis.

Clinical Psychology: Applied Developmental Emphasis

PSYC*6670 [0.50] Research Methods
PSYC*6900 [0.50] Philosophy and History of Psychology as a Science
Courses
Restriction: All courses restricted to Psychology graduate students; all others by permission only.

Departmental Core Courses

PSYC*6060 Research Design and Statistics U [0.50]
This course covers non-parametric and parametric hypothesis testing and estimation, analysis of variance and covariance, and multiple correlation and multiple regression. Current controversial issues are presented.

PSYC*6190 Research Project U [1.00]
This course is an option for students in the applied streams of MA studies who do not plan on proceeding to a PhD program. Under the supervision of a faculty member, students will design and conduct an empirical investigation in their area of emphasis.

PSYC*6380 Psychological Applications of Multivariate Analysis U [0.50]
This course emphasizes the use of multivariate techniques in psychological research. Both predictive (e.g., regression, canonical correlation, discriminant analysis, MANOVA) and reduction (e.g., factor analysis, multidimensional scaling, cluster analysis) techniques are considered in addition to the use of both observed and latent variable structural models.

PSYC*6401 Reading Course I U [0.25]
An independent in-depth study of current theoretical and empirical issues in the student's area of specialization.

PSYC*6402 Reading Course II U [0.50]
An independent in-depth study of current theoretical and empirical issues in the student's area of specialization.

PSYC*6411 Special Problems in Psychology I U [0.25]
A critical examination of current problems relating to conceptual and methodological developments in an area of psychology.

PSYC*6412 Special Problems in Psychology II U [0.50]
A critical examination of current problems relating to conceptual and methodological developments in an area of psychology.

PSYC*6471 Practicum I U [0.50]
Students will gain 2-3 days per week of supervised experience in a setting related to their field of specialization.

PSYC*6472 Practicum II U [1.00]
See PSYC*6471. Students work four to five days a week in the selected setting.

PSYC*6473 Practicum III U [0.25]
See PSYC*6471. This course is intended for students who wish to gain additional practicum experience after completing the requirements for PSYC*6471/PSYC*6472. Students work one day a week in the selected setting.

PSYC*6512 Research Seminar I U [0.25]
An in-depth review of current theoretical and empirical developments in topic areas related to the student's area of specialization.

PSYC*6522 Research Seminar II U [0.50]
An in-depth review of current theoretical and empirical developments in topic areas related to the student's area of specialization. The course requirements may include the completion of an empirical research project.

PSYC*6670 Research Methods U [0.50]
This course emphasizes those techniques most frequently used in applied and field settings. These include: quasi-experimental designs, survey research, interviewing, questionnaire design, observational techniques, and other more qualitative methods.

PSYC*6880 Ethical Issues in Psychology U [0.25]
Relevant issues in the application of professional ethical standards to the practice of psychology, including consultation, field research, intervention, and decision-making. Models are discussed in this half course. Depending on the particular faculty and students involved, discussion emphasizes specific applications to either I/O or applied developmental/social psychology.

PSYC*6890 Legislation and Professional Practice U [0.25]
This companion course to PSYC*6880, Ethics in Psychology, provides an introduction to the Provincial and Federal legislation governing the practice of psychology. Students will become familiar with legislation relevant to professional practice with children and adults in hospital, educational, community, and other settings.

PSYC*6900 Philosophy and History of Psychology as a Science U [0.50]
This doctoral course examines the philosophical and metatheoretical issues involved in the scientific analysis of human experience. Both the historical context of these issues and the status of current metatheoretical debates are covered.

PSYC*7070 Psychological Measurement U [0.50]
Concepts and applications of classical measurement theory, especially reliability and validity of tests and measurements used in applied psychology. Principles of test construction, standardization, norming, administration, and interpretation are discussed, as well as integration of test information and its use in decision making.
Restriction(s): Instructor's signature required

Neuroscience and Applied Cognitive Science

PSYC*6740 Research Seminar in Neuroscience and Applied Cognitive Science A U [0.50]
This course will expose graduate students to some of the major theories, issues and methodologies driving research in the broad field of Neuroscience and Applied Cognitive Science. Students will learn to critically evaluate presentations by researchers as well as to communicate the results of their own research, in both a written and oral format. All first year master's students in NACS are required to enroll in this course.

PSYC*6750 Applications of Cognitive Science W [0.50]
This course surveys applications of cognitive science to the problem of optimizing human performance. Topics of discussion will include human-system interactions (including Human-Computer and Human-Vehicle), education, and cognitive rehabilitation.

PSYC*6750 Research Seminar in Neuroscience and Applied Cognitive Science B U [0.00]
This course will expose graduate students to some of the major theories, issues and methodologies driving research in the broad field of Neuroscience and Applied Cognitive Science. Students will learn to critically evaluate presentations by researchers as well as to communicate the results of their own research, in both a written and oral format. All second year master's and doctoral students in NACS are required to enroll in this course each year of their graduate program.

PSYC*6770 Modelling Mental Processes W [0.50]
This is a course in the nature of models of cognitive phenomena, with emphasis on the evaluation of computational and connectionist models for perception, memory, cognition, and action. It involves practical work: the construction and testing of models using software designed for that purpose.
Prerequisite(s): PSYC*6780
**VIII. Graduate Programs, Psychology**

**Applied Social Psychology**

**PSYC*6780 Foundations of Cognitive Science F [0.50]**
Cognitive Science is an inter-disciplinary field that encompasses cognitive psychology, neuroscience, philosophy, and computer science. The foundational issues and basic methodologies that define cognitive science will be discussed, with specific examples from perception, learning, memory, language, decision-making, and problem solving.

*Restriction(s):* Restricted to Psychology graduate students; all others by permission only

**PSYC*6790 Memory and Cognition U [0.50]**
This course reviews the major theories, issues and methodologies guiding contemporary research in human memory and related aspects of human cognition. Topics include the encoding and retrieval of information, the nature of representations in memory, classifications of memory, and applications to reading and eyewitness testimony.

**PSYC*6800 Neurobiology of Learning U [0.50]**
This course reviews the major theories, issues, and methodologies guiding contemporary research in the neurobiology of learning.

**PSYC*6810 Neuropsychology U [0.50]**
This course focuses on current developments in neuropsychology. Particular emphasis is placed on the aphasias, apraxias, memory disorders, and disorders of movement.

**PSYC*6870 Human Factors U [0.50]**
This course provides an overview of contemporary theory and research in human factors/ergonomics. Topics may include visual performance, information processing, human error, decision-making, mental workload, process control and automation, attention and time sharing, human factors in specific occupational environments, monitoring and supervisory control.

**Applied Psychological**

**PSYC*6720 Issues in Family-Related Social Policy U [0.50]**
This doctoral course examines historical developments and selected contemporary policy domains in Canada. Topics may include policies affecting children, families, the elderly, First Nations people, the mentally and physically disabled, and one parent families. The course also addresses the interplay between social and psychological research and policy formation, as well as the use of social policy as an instrument of social change.

**PSYC*6590 Social and Community Intervention U [0.50]**
A highly applied course that focuses on the epidemiology of mental disorders, the design and implementation of preventive interventions with children, youth, and adults in the community, as well as stress and coping theory and practice.

**PSYC*6640 Foundations of Applied Social Psychology U [0.50]**
This course examines theory and research in social psychology, particularly in those areas most relevant to applied concerns. Topics may include attribution, attitudes, social relationships, language and communication, and self and identity.

**PSYC*6830 Applied Social Psychology U [0.50]**
This course reviews selected theories, methods and problem areas in applied social psychology. Issues involved in the conduct and application of social research, as well as alternative paradigms for such research, are discussed.

**PSYC*6840 Program Evaluation U [0.50]**
This course provides an introduction to a variety of methods of social program evaluation and to the process of consultation with program staff.

*Prerequisite(s):* PSYC*6670 Research Methods (may also be taken concurrently).

**Clinical Psychology: Applied Developmental Emphasis**

**PSYC*6000 Developmental Psychopathology: Etiology and Assessment U [0.50]**
The interaction of neurobiological, physiological, familial and social factors to an understanding of developmental psychopathology is the focus of this course. Emphasis is given to etiology and clinical assessment issues.

**PSYC*6010 Learning Disorders: Research and Clinical Practice U [0.50]**
This course examines various cognitive, social, and educational components of learning and language disorders and accompanying clinical methods of diagnosis and remediation.

**PSYC*6020 Clinical and Diagnostic Interviewing Skills S [0.50]**
This course provides practical training in clinical and diagnostic interviewing. Through role-play, direct observation, and in vivo practice, students will learn how to conduct assessment and diagnostic interviews, and clinical dialogues with children and adults. This course is open only to graduate students in the Clinical Psychology: Applied Developmental Emphasis (CP:ADE) field.

*Prerequisite(s):* Completion of all MA level course work except for the thesis

*Restriction(s):* Open only to graduate students in the Clinical Psychology: Applied Developmental Emphasis (CP:ADE) field

**PSYC*6270 Issues in Family-Related Social Policy U [0.50]**
This doctoral course examines historical developments and selected contemporary policy domains in Canada. Topics may include policies affecting children, families, the elderly, First Nations people, the mentally and physically disabled, and one parent families. The course also addresses the interplay between social and psychological research and policy formation, as well as the use of social policy as an instrument of social change.

**PSYC*6580 Models of Child and Adolescent Psychotherapy U [0.50]**
This course introduces a variety of therapeutic models for addressing problems of atypical development.

**PSYC*6610 Advanced Child and Adolescent Psychotherapy U [0.50]**
This course will consider newly emerging developments in child and adolescent psychotherapy. In addition, issues of power relationships, cultural sensitivity and empirical support will be addressed.

*Prerequisite(s):* PSYC*6580 and PSYC*6472 (may be taken concurrently).

**PSYC*6630 Developmental Psychology U [0.50]**
This course examines issues in the areas of cognitive, social, and emotional development. Specific research topics and theoretical issues concerning the nature of development are discussed.

**PSYC*6690 Cognitive Assessment of Children and Adolescents U [0.50]**
This course considers standards, ethics, uses and interpretation of selected intelligence and other cognitive tests. Students administer tests, score, interpret and write reports under supervision. Restricted to applied developmental students. As a prerequisite for PSYC*6471, a passing grade and a satisfactory rating on the practical component must be achieved.

**PSYC*6700 Personality and Social Assessment of Children and Adolescents U [0.50]**
A mark of satisfactory (SAT) in this course indicates that a student in the Clinical Psychology: Applied Developmental Emphasis (CP:ADE) field has successfully completed a full year (1800-2000 hour) internship in an accredited clinical setting (e.g., CPA or APA) approved by the Director of Clinical Training for CP:ADE.

*Prerequisite(s):* Completion of all course work in the CP:ADE field, the PhD qualifying examination, and the PhD Thesis proposal at the time of application, one year in advance of beginning the clinical internship.

**Industrial/Organizational Psychology**

**PSYC*7010 Personnel I: Foundations of Personnel Decisions U [0.50]**
Basic personnel functions are discussed, including job analysis, job evaluation, human resource planning, and criterion development, as well as the economic and legal environment in which these activities take place.

**PSYC*7020 Personnel II: Recruitment, Selection, and Placement U [0.50]**
An examination of theory, research, and practice in the area of personnel selection.

**PSYC*7030 Organizational Psychology I: Micro and Macro Influences U [0.50]**
This course examines micro- and, to a lesser extent, macro-level influences on organizational behaviour. Topics include absenteeism, turnover, work attitudes, stress, occupational health and safety, and unionization.

**PSYC*7040 Organizational Psychology II: Group and Intergroup Processes U [0.50]**
This course examines theories, research, and application of group and intergroup processes within the organizational context. Topics include basic group dynamics, leadership and supervision, conflict, and industrial relations as well as gender, minority, and cross-cultural issues.

**PSYC*7060 Organization Development Consulting U [0.50]**
An introduction to the theories and consultation techniques for improving organizational effectiveness.

**PSYC*7080 Organizational Interventions U [0.50]**
This course examines various modes of organizational intervention from the standpoint of both theory and practice. Areas typically covered include training and development, organizational development and change, individual coaching, and consulting skills development.

*Prerequisite(s):* Registration in the graduate IO psychology program and permission of the Instructor.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Description</th>
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<tbody>
<tr>
<td>PSYC*7130</td>
<td>Industrial/Organizational Psychology Doctoral Research Seminar I U</td>
<td>0.50</td>
<td>This course introduces participants to a broad range of research in Industrial/Organizational psychology. It emphasizes critical examination and discussion to develop skills in theory building and programmatic research. This course is intended to prepare participants for the Industrial/Organizational Doctoral Research Seminar II and Research Internship(s).</td>
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<tr>
<td>PSYC*7140</td>
<td>Industrial/Organizational Psychology Doctoral Research Seminar II U</td>
<td>0.50</td>
<td>Participants investigate a specific area of Industrial/Organizational psychology. They critically review past and current research, including theory development and empirical findings. Participants work together to integrate past theory and findings, to note inconsistencies in the literature, and to identify promising areas for future investigations. <strong>Prerequisite(s):</strong> PSYC*7130</td>
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<tr>
<td>PSYC*7160</td>
<td>Applications of Industrial/Organizational Psychology U</td>
<td>0.25</td>
<td>This half course provides the opportunity for the integration of material covered throughout the graduate program. Students will design specific interventions that integrate technical, organizational, and ethical issues in response to various organizational problems.</td>
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<tr>
<td>PSYC*7170</td>
<td>Industrial/Organizational Psychology Doctoral Research Internship I U</td>
<td>0.50</td>
<td>Participants work with an Industrial Organizational faculty member to conduct research on a topic of mutual interest (other than their doctoral research). They collect and/or analyze data and write up results with the goal of producing a conference presentation and/or a quality publication manuscript. <strong>Prerequisite(s):</strong> PSYC<em>7130 <strong>Co-requisite(s):</strong> PSYC</em>7140 <strong>Restriction(s):</strong> Instructor's signature required</td>
</tr>
<tr>
<td>PSYC*7180</td>
<td>Industrial/Organizational Psychology Doctoral Research Internship II U</td>
<td>0.50</td>
<td>Participants work with an Industrial Organizational faculty member to conduct research on a topic of mutual interest (other than their doctoral research). They collect and/or analyze data and write up results with the goal of producing a conference presentation and/or a quality publication manuscript. <strong>Prerequisite(s):</strong> PSYC<em>7130, PSYC</em>7140, PSYC*7170 <strong>Restriction(s):</strong> Instructor's signature required</td>
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Public Issues Anthropology

The Departments of Sociology and Anthropology at the University of Guelph and Anthropology at Waterloo offer a joint program leading to an MA in Public Issues Anthropology. This MA program consists of members from both university departments and is administered by a joint co-ordinating committee. Students interested in graduate work in Public Issues Anthropology can send applications for admission to either university. Students are ultimately registered at the university at which their advisor is located. A student comes under the general regulations of the university at which he or she is registered, and the degree is granted by that university.

Administrative Staff

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Satsuki Kawano
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Lisa Kowalchuk
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Belinda Leach
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Madonna R. Maidment
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Kenneth S. Menzies
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William O’Grady
BA, MA Carleton, PhD Toronto - Associate Professor

Patrick Parmaby
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Kerry L. Preibisch
BA, MA Simon Fraser, PhD Reading - Associate Professor

Marta Rohatynskyj
AB Wayne State, BA Carleton, MA, PhD Toronto - Associate Professor

Vivian Shalla
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Jane Sprott
BA Waterloo, MA, PhD Toronto - Associate Professor

R. Stansfield
BSc McMaster, BA, MA Toronto, PhD York - Associate Professor

Renée Sylvain
BA Wilfrid Laurier, MA, PhD Toronto - Associate Professor

Terisa Turner
HBA York (U.K.), MA Oberlin College Ohio, PhD London - Associate Professor

Anthony R. Winson
BA Western, MA, PhD Toronto - Professor

Graduate Faculty from the University of Waterloo

Thomas S. Abler
BA Northwestern, MS Wisconsin-Milwaukee, PhD Toronto

Mary K. Jacks
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTH*6420</td>
<td>Development, Community and Rurality U [0.50]</td>
<td>U</td>
</tr>
<tr>
<td></td>
<td>This course will examine issues in different theories and models to explain rural and community change and persistence within a globalized system. While the emphasis will be on local continuity and change from a sociological and/or anthropological perspective, this will be discussed within a framework of international political economy. Case studies will be selected to illustrate different modes of change and resistance from different contexts. In particular, the role of community-led and participatory forms of development, social organization, social capital, land tenure, gender, agro-food systems, subsistence and commodification, governance, land use and environment management will be amongst topics considered. Students will be encouraged to focus their research on some of these issues in a geographical region of interest to them.</td>
<td></td>
</tr>
<tr>
<td>ANTH*6460</td>
<td>Gender and Development F [0.50]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cross-cultural and historical changes in gender relations and the roles/positions of women brought about by industrialization and the development of the world system. Critical examination of the predominant theories of gender relations, in so far as these inform development research and action in societies with different socio-economic systems. Introduction to the latest theories and research in the area of women and development, as well as with social and political actions undertaken by women themselves. This is one of the two alternative core courses for the Collaborative International Development Studies program.</td>
<td></td>
</tr>
<tr>
<td>ANTH*6480</td>
<td>Work and Change in a Global Context U [0.50]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>This course will consider some of the theoretical frameworks available for examining work, workers and work places in the context of global economic change. Using case studies of particular work worlds, the course may include topics such as changing patterns of work in comparative contexts; labour discipline, organizations and protest; industrial and organizational change; education for work; economic restructuring and reconfigurations of gender, race and class within and beyond the shop floor.</td>
<td></td>
</tr>
<tr>
<td>ANTH*6550</td>
<td>Selected Topics in Theory and Research U [0.50]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>This course will be offered with varying content focusing on theory or research.</td>
<td></td>
</tr>
<tr>
<td>ANTH*6600</td>
<td>Reading Course U [0.50]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A program of directed reading, complemented with the writing of papers or participation in research. Reading courses are arranged by students through their advisors or advisory committees and must be approved by the chair of the department. This course may be repeated provided different content is involved.</td>
<td></td>
</tr>
<tr>
<td>ANTH*6660</td>
<td>Major Paper U [1.00]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The major paper is an extensive research paper for those who do not elect to complete a thesis. It may be taken over two semesters.</td>
<td></td>
</tr>
</tbody>
</table>
Resource and Environmental Economics

Administrative Staff

Graduate Co-ordinator
Spencer Henson (Food, Agricultural and Resource Economics: 321 MacLachlan, Ext. 53134)
shenson@uoguelph.ca

Graduate Co-ordinator
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Alfons J. Weersink
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PhD Program

The PhD in Resource and Environmental Economics is offered collaboratively by the Departments of Economics, and Food, Agricultural and Resource Economics. Students apply to and enroll in one of these departments and the degree is awarded in the subject area of that department. The objective of the PhD program is to provide opportunities for advanced study in this specialized area of economics. The theoretical and practical issues that are addressed in this field demand the attention of highly trained professionals who are competent in a wide range of skills, have an understanding of the relevant economic theory, quantitative methods and institutions, and are familiar with the biological and ecological aspects of environmental and natural resource management.

Admission Requirements

Applicants to the PhD program should have a master's degree in economics or agricultural economics with a minimum average of 80% (A-) in their postgraduate studies. Applicants without a master's degree but with an outstanding record at the baccalaureate level may be admitted initially to the MA program in economics or MSc program in agricultural economics. For students who achieve a superior record and show an aptitude for research, the Board of Graduate Studies, on the recommendation of the department, may authorize transfer to the PhD program without requiring the student to complete a master's degree.

Degree Requirements

The PhD requires the completion of a minimum of 12 courses (see below). Students with an MA or MSc typically will have completed some of the required courses (or their equivalents) already and, when appropriate, these may be accepted in lieu of required courses. The minimum duration for the PhD is nine semesters of full-time study (or the equivalent). Two of the required courses satisfy the quantitative methods requirement, one satisfies an interdisciplinary requirement, and the remaining courses prepare the student for the qualifying examinations. These take place in core economic theory and in two fields of specialization. The first field is natural resource and environmental economics and the second is selected by the student from the field offerings of the two departments. The first phase of the qualifying exams covers microeconomic and macroeconomic theory and is written at the end of the first year, normally before the beginning of classes in the fall semester. The second phase covers the fields of specialization and includes an oral defense of a thesis prospectus. This phase of the exam is taken during the seventh semester of the program. Upon satisfactory completion of the qualifying exams, the student becomes a candidate for the PhD degree. The following summarizes the program requirements:

Economic Theory

All students must satisfy the economic theory requirement by successfully completing the following four courses and by successfully completing the qualifying examination in economic theory.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credit</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON*6000</td>
<td>0.50</td>
<td>Microeconomic Theory I</td>
</tr>
<tr>
<td>ECON*6010</td>
<td>0.50</td>
<td>Microeconomic Theory II</td>
</tr>
<tr>
<td>ECON*6020</td>
<td>0.50</td>
<td>Macroeconomic Theory I</td>
</tr>
</tbody>
</table>

Resource and Environmental Economics

All students must satisfy the field requirement in natural resource and environmental economics by successfully completing the following four courses.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credit</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEC*6610</td>
<td>0.50</td>
<td>Economics: Renewable Resources</td>
</tr>
<tr>
<td>AGEC*6700</td>
<td>0.50</td>
<td>Advanced Resource Economics</td>
</tr>
<tr>
<td>ECON*6800</td>
<td>0.50</td>
<td>Environmental Economics</td>
</tr>
<tr>
<td>ECON*6810</td>
<td>0.50</td>
<td>Economics of Non-Renewable Resources</td>
</tr>
</tbody>
</table>

Economic Research Methods:

All students must satisfy the economics research methods requirement by successfully completing a minimum of the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credit</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEC*6100</td>
<td>0.50</td>
<td>The Methodology of Economics</td>
</tr>
<tr>
<td>ECON*6140</td>
<td>0.50</td>
<td>Econometrics I</td>
</tr>
<tr>
<td>Plus ONE of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGEC*6360</td>
<td>0.50</td>
<td>Mathematical Programming</td>
</tr>
<tr>
<td>ECON*6160</td>
<td>0.50</td>
<td>Econometrics II</td>
</tr>
</tbody>
</table>

Additional course requirements:

All students must successfully complete a further TWO graduate courses as approved by the advisory committee and Graduate Coordinator in the department in which the student is enrolled. At least one of these courses must be from among the offerings of the Departments of Economics and of Food, Agricultural and Resource Economics. Please consult the course listings for these departments in this calendar.

Thesis Proposal:

By the end of a student's fifth semester and only after the microeconomic theory comprehensive examination has been passed, they must prepare and submit a written proposal of their thesis and defend this in an oral examination.

Research Paper:

By the end of a student's sixth semester and only after the microeconomic theory comprehensive examination has been passed, they must prepare a research paper of an acceptable PhD standard under the supervision of at least one faculty member from either the Departments of Economics or of Food, Agricultural and Resource Economics. When a student is deemed to have satisfied all of the above requirements, they will have passed the "Qualifying Examination" requirement as set out by the Faculty of Graduate Studies. At this point, the student becomes a "candidate" for the PhD.

Thesis

Submission and defense of an acceptable thesis on a topic approved by the student's advisory committee completes the requirements for the PhD. The thesis is expected to be a significant and original contribution to knowledge in its field and must demonstrate scholarship and critical judgment on the part of the candidate. Theses must be submitted within 24 months of completing the minimum duration.

Courses

Please consult the Food, Agricultural and Resource Economics and Economics listings for descriptions of the courses available to students in the shared PhD program in resource and environmental economics.
Rural Planning and Development

Rural Planning and Development has a four-part mission of teaching, research, training and outreach.

Administrative Staff

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John E. FitzGibbon
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John FitzSimons
BA Wales, MA McMaster, PhD Western Ontario - Associate Professor

Stewart G. Hills
BA Western Ontario, MA, PhD Toronto - Professor

Donald G. Reid
BA Wilfrid Laurier, MA, PhD Waterloo - Professor

Nonita T. Yap
BSc San Carlos (Philippines), MES Dalhousie, PhD Alberta - Professor

MSc (Planning) Program

Rural Planning and Development provides the opportunity for graduate study, research and professional development in rural planning and development in either Canadian or international development contexts. The program leads to an MSc (Planning) degree. It is a professionally accredited (Canadian Institute of Planners) program that requires substantial commitment to professional performance and ethics.

Graduate students in Rural Planning and Development find employment in rural planning departments, governments, non-governmental organizations, and private consulting firms in Canada and overseas. Graduates are prepared for both local development and planning as well as national-level research and policy planning in international and Canadian contexts.

The program goal is to ensure that students have the knowledge and skill to conduct interdisciplinary research and, in a professional capacity, guide processes of change in rural planning and development.

Where appropriate, faculty from other academic units participate in an advisory capacity to students' research programs.

Admission Requirements

The program is open to qualified graduates from all disciplines including geography, international development, sociology, agriculture, environmental studies, landscape architecture, economics and planning. Applicants are required to demonstrate their specific interest in the program and relevant work experience in rural planning and development. A four-year honours degree with a B average is considered the normal basis for admission.

Degree Requirements

MSc (Planning) in Rural Planning and Development (Canadian)

This field offers both major research paper and thesis options. Both of these options are aimed at providing substantive professional, contextual and specialized knowledge and skill in the domestic rural planning and development context.

All students enrolled in this field are required to complete a set of core courses that provide a foundation for rural planning and development research and practice.

For the Major Paper Option, these consist of:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPD*6300</td>
<td>Rural Planning Synthesis</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6380</td>
<td>Application of Quantitative Techniques in Rural Planning and Development</td>
<td>0.50</td>
</tr>
<tr>
<td>EDRD*6000</td>
<td>Qualitative Analysis in Rural Development</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6240</td>
<td>Planning and Development Theory</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6260</td>
<td>Land Use Planning Law</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6280</td>
<td>Rural Planning Methods</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6250</td>
<td>Public Administration in Rural Communities</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6360</td>
<td>Major Research Paper</td>
<td>1.00</td>
</tr>
</tbody>
</table>

For the Thesis Option, these consist of:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPD*6170</td>
<td>Rural Research Methods</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6380</td>
<td>Application of Quantitative Techniques in Rural Planning and Development</td>
<td>0.50</td>
</tr>
<tr>
<td>EDRD*6000</td>
<td>Qualitative Analysis in Rural Development</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6240</td>
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</tr>
<tr>
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<td>Land Use Planning Law</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6280</td>
<td>Rural Planning Methods</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6250</td>
<td>Public Administration in Rural Communities</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Rural Planning and Development Program has a four-part mission of teaching, research, training and outreach.

In addition, students are required to complete a minimum of five courses (electives) plus the Major Research Paper or the Thesis.

Students may develop an area of specialization with their advisory committees through course work, selection of elective courses, and student research leading to the major research paper or thesis, and in many cases, an internship. The program makes available a set of options to assist in developing the area of emphasis.

In the delivery of the Canadian rural planning and development field, the program draws on courses and faculty from other units on campus as well as on the resources of the school. The field of rural planning and development (Canadian) is formally recognized by the Canadian Institute of Planners, and five faculty in the program are Registered Professional Planners.

MSc (Planning) in Rural Development Planning (International)

This field prepares students for research and practice in international rural planning and development. Students may choose either the course work and major research paper option, or the course work and thesis option. An internship is not a field requirement but is strongly recommended.

All students enrolled in this field are required to complete a set of core courses that provide a foundation for international rural planning and development research and practice.

For the Major Research Paper Option, these consist of:

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Rural Planning Synthesis</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6380</td>
<td>Application of Quantitative Techniques in Rural Planning and Development</td>
<td>0.50</td>
</tr>
<tr>
<td>EDRD*6000</td>
<td>Qualitative Analysis in Rural Development</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6240</td>
<td>Planning and Development Theory</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6260</td>
<td>Land Use Planning Law</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6280</td>
<td>Rural Planning Methods</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6250</td>
<td>Public Administration in Rural Communities</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6360</td>
<td>Major Research Paper</td>
<td>1.00</td>
</tr>
</tbody>
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For the Thesis Option, these consist of:

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<tr>
<th>Course Code</th>
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<tbody>
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<td>Land Use Planning Law</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6280</td>
<td>Rural Planning Methods</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6250</td>
<td>Public Administration in Rural Communities</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6290</td>
<td>Special Topics in Rural Planning and Development</td>
<td>0.50</td>
</tr>
<tr>
<td>RPD*6360</td>
<td>Major Research Paper</td>
<td>1.00</td>
</tr>
</tbody>
</table>

In addition, students are required to complete a minimum of five courses (electives) plus the Major Research Paper or the Thesis.

Students may develop an area of specialization with their advisory committees through course work, selection of elective courses, student research leading to the major research paper or thesis and, in many cases, an internship. The program makes available a set of options to assist in developing the area of emphasis.

In the delivery of the international rural planning and development field, the program draws on courses and faculty from other units on campus as well as on the resources of the school. The field of rural planning and development (International) is formally recognized by the Canadian Institute of Planners, and five faculty in the program are Registered Professional Planners.

Interdepartmental Programs

Rural Studies PhD Program

Rural Planning and Development participates in the PhD program in rural studies in the field of sustainable rural communities. Those faculty members whose research and teaching expertise includes aspects of rural studies may serve as advisors for PhD students. For further information consult the Rural Studies listing in this calendar.
Core Courses

RPD*6030 International Rural Development Planning: Principles and Practices U [0.50]
This course presents the scope and nature of international development planning and alternative roles for development planners; has a rural emphasis; reviews the evolution of development planning from macroeconomic beginnings to more integrated local planning approaches; examines the development planning process and its organizational and spatial dimensions; compares policy, program, project, sectoral and integrated area planning; and compares rural development planning in market, mixed and state-driven societies.

RPD*6050 Professional Practice Course in Development and Planning U [0.50]
This course offers a planned but flexible program for developing skills that are relevant to professional practice in the rural planning and development field. It also fills the skill knowledge gaps for students who cannot take full courses. Students, in consultation with his/her Academic Advisor, assess their knowledge and skills need and acquire them through selected 'modules'.

RPD*6070 Project Development: Principles, Procedures, and Selected Methods U [0.50]
This course introduces students to the principles, procedures and methods in developing a project. It examines the project cycle: identification, preparation, appraisal, implementation/supervision, monitoring and evaluation. It gives an understanding of the major methods involved and teaches selected methods. The focus is on the international, rural context and on small non-farm projects: small industries, small physical infrastructure and social projects.

RPD*6170 Rural Research Methods U [0.50]
The course provides rural planning and development professionals with a number of theoretical frameworks and practical approaches to problem solving in rural Canadian and international contexts. The course content provides an introduction to hypothesis development, data collection, analytical frameworks, research management, and information synthesis and presentation methodologies that are appropriate to the practicing rural planner and developer. It views the roles of the researcher and research as interventionist and intervention in the rural community. Research methods are discussed as an integral and supporting part of the planning and development process.

RPD*6240 Planning and Development Theory U [0.50]
Examines basic concepts, theories and perspectives in rural planning and development. A conceptual examination of 'rural', 'planning' and 'development' precedes an examination of how rural planning and development is viewed from alternative, often conflicting theories of rural change and planned intervention. The implications for practice are discussed.

RPD*6250 Public Administration in Rural Communities U [0.50]
An introduction to the nature and problems of government and administration in the small municipality (less than 25,000). Major topics include: municipal law, capital budget and implementation, public services and infrastructure, personnel management.

RPD*6260 Land Use Planning Law U [0.50]
An introduction to the legal tools used to regulate the use of land and other resources. Zoning, subdivision controls, development control, land banking, expropriation, planning appeals, official maps, etc. An intensive study of the Ontario Planning Act and related legislation.

RPD*6280 Rural Planning Methods U [0.50]
Basics of rural planning practice, including communications, graphics, group dynamics, interviews and community surveys, questionnaire design and non-parametric statistics and role of citizen participation.

RPD*6360 Major Research Paper U [1.00]
Students not pursuing the coursework/thesis route must satisfactorily complete a major research paper. Preparation of the paper will be supervised by a faculty committee. Content of the paper will generally focus on the placement of a problem in rural planning and development practice in a theoretical context, and an analysis of the problem using appropriate methodological and analytical procedures.

Restriction(s): For Major Paper option only

RPD*6380 Application of Quantitative Techniques in Rural Planning and Development U [0.50]
Analysis and application of standard quantitative, statistical and computer-based techniques utilized in rural planning and development. Problems of data collection, analysis and interpretation.

Elective Courses

EDRD*6000 Qualitative Analysis in Rural Development U [0.50]
Nature and use of qualitative data collection and analysis techniques by practitioners in the planning, implementation and evaluation of rural planning and development activities in both domestic and international settings.

EDRD*6050 Farming Systems Analysis and Development W [0.50]
An introduction to the Farming Systems Research/Extension approach to solving problems in tropical and sub-tropical agricultural and livestock production systems including problem diagnosis, stakeholder identification and the process of generation, adaption and validation of solutions.

RPD*6060 Settlement, Housing, and Services: Planning and Management U [0.50]
This course provides an understanding of the issues, policies, and strategies in planning and managing a settlement. It teaches procedures and selected techniques. Topics include financing and managing the settlement, employment and the construction sector, land use, housing and services. The emphasis is on the international and rural context.

RPD*6080 Environment and Development: Biophysical Resources and Sustainable Development in Rural Environments U [0.50]
This course will examine the problems and potential for ecologically sustainable development in the context of rural development planning particularly in the Third World environments. The course critically examines the strategic planning approaches and methods which involve the interaction between social systems and natural ecosystems in the context of planned intervention and change in rural environments.

RPD*6220 Planning and Development Policy Analysis U [0.50]
Planning and development policy has experienced a significant evolution. This course examines the history of policy, and the theory, methods and processes of policy development and governance in planning and management of environment and resources.

RPD*6290 Special Topics in Rural Planning and Development U [0.50]
Selected study topics focus on the nature of rural planning and development issues and/or practices in Canadian and/or International small communities and rural environments. Among the topics which may be addressed are: rural land use planning, ecological restoration, gender analysis in development planning, GIS in agricultural development, micro-credit, physical/site planning and design, project management and development administration.

RPD*6310 Environmental Impact Assessment U [0.50]
This course deals with the role of environmental impact assessments and statements in the planning, development and operation of resource projects. Topics discussed include the philosophical and institutional basis for environmental impact assessments, methods used and the effects of such assessments on resource development projects.

RPD*6320 Water Resource Management U [0.50]
The course provides an assessment of the processes and principles which underlie comprehensive water resource planning and integrated basin management. It also undertakes to evaluate current practice in the context of integrated planning. There is extensive use of Canadian and international practice.

RPD*6370 Economic Development Planning and Management for Rural Communities U [0.50]
Theories and perspectives of local economic development, particularly community-based planning for rural economic development. Economic development within a community development framework, and challenges of sustainable development. Interdisciplinary perspectives and alternative approaches to professional planning practice, strategic planning, management and organizational design/development issues. Alternative economic concepts and perspectives are critically examined. Includes international case studies.

RPD*6390 Rural Social Planning U [0.50]
This course will provide students who have an interest in social development with an avenue for linking that interest to the policy, planning and intervention process.

RPD*6410 Readings in Rural Planning U [0.50]
A program of supervised independent study related to the student's area of concentration. Nature and content of the readings course are agreed upon between the student and the instructor, and are subject to the approval of the student's advisory committee and graduate committee.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPD*6450</td>
<td>Recreation and Tourism Planning and Development U</td>
<td>0.50</td>
</tr>
<tr>
<td>EDRD*6100</td>
<td>Disaster Planning and Management U</td>
<td>0.50</td>
</tr>
<tr>
<td>EDRD*6630</td>
<td>Regional Economics Models U</td>
<td>0.50</td>
</tr>
<tr>
<td>EDRD*6690</td>
<td>Program Evaluation U</td>
<td>0.50</td>
</tr>
</tbody>
</table>

**RPD*6450 Recreation and Tourism Planning and Development U [0.50]**

This course is intended to instruct the student in the principles of planning for recreation and tourism development. Emphasis is placed on the economic and social benefits and costs that accrue from tourism and recreation development. Planning principles are applied to this context.

**EDRD*6100 Disaster Planning and Management U [0.50]**

Provides students with an understanding of the different measures to reduce community vulnerability and increase their ability to withstand disruption and recover from disasters, and of appropriate interventions in response to emergencies and disasters.

**EDRD*6630 Regional Economics Models U [0.50]**

Theories and research in regional economics stressing regional development, socio-economic accounting, analysis of structure and growth, economic base and multiplier models.

**EDRD*6690 Program Evaluation U [0.50]**

An advanced seminar dealing with the theory and practice of program evaluation focusing on public sector programs in agriculture and rural development, international and domestic case studies.
The objective of the PhD program in Rural Studies is to provide opportunities for advanced studies and research on the integration of socio-cultural and bio-physical components for capacity development, design, or planning of landscape systems and rural communities. Graduates are prepared to become leading specialists in addressing sustainable landscapes and rural communities issues. Interdisciplinary research is emphasized, building on the disciplines of capacity development and extension, landscape architecture, and rural planning and development within SEDRD.

**Admission Requirements**

To be considered for admission, an applicant must have a master's degree (or the equivalent) from a recognized university in a relevant discipline. Master's graduates in a range of humanities, social-science and applied-science disciplines are eligible for consideration for admission. As examples, master's graduates in geography, sociology, planning, landscape architecture, environmental science, capacity development and extension, and international development may be particularly suitable. Applicants who have not completed courses relevant to rural studies or gained experience in rural communities may be required to do so prior to admission or as part of initial phases of the PhD program.

The program's admission policy is governed by the availability of graduate advisors and other resources and by the need to admit applicants from a variety of disciplines and backgrounds. The interaction of students with diverse backgrounds will greatly enhance the multidisciplinary approaches in the program. The program also seeks to achieve the significant participation of women and aboriginal people from North America and international students. The co-ordinator of the program receives applications directly from prospective students or through prospective advisors and ensures that application files are complete for review by the admission committee. The committee then consults with prospective advisors and recommends applicants for admission to Graduate Program Services. Applicants should consult the program for the deadline for admission.

**Degree Requirements**

**Advisory Committee**

Each doctoral student has an advisory committee composed of faculty members from a range of disciplines pertinent to the field, specialization and research topic. Each committee consists of at least three members. Committees are broadly based with at least two major disciplines represented by its members. The advisor and the advisory committee provide guidance to allow for the student's intellectual growth in the program.

The advisory committee assesses and approves the thesis-research proposal which is to be prepared by the student by the end of the second year, concurrent with preparation for the qualifying examination.

**Course Requirements**

The minimum course and credit requirements for the PhD in rural studies consist of a common 2.0-credit core of two integrative 1.0-credit courses (Sustainable Rural Systems, and Integrative Research Methods), a 0.25-credit research seminar, and one elective graduate 0.5-credit course or the RST*6500 Special Topics course. Additional courses may be required by the student's advisory committee. Make-up courses may be required prior to admission to the PhD program or early in the program. All courses will normally be completed prior to the qualifying examination. All or most of the courses should be taken in the first year of study.

To foster the interdisciplinary nature of the program, some courses are team taught. Attention is also paid to the sequencing of courses to promote interdisciplinarity.

**Qualifying Examination**

The qualifying examination for the PhD program in rural studies assesses the acceptability of the intellectual capability and research potential of students. The examination committee is constituted to represent a range of disciplines pertinent to the field.

The qualifying examination is used to determine if the student has an advanced level of knowledge and competence in the area(s) of specialization related to their research. The areas of specialization typically focus on one of the program fields, however, it is acceptable to have an area of specialization outside of these fields as long as it is agreed upon by the graduate student, Program Co-ordinator, and the Advisory Committee. The qualifying examination has both written and oral components. The written component is constructed to represent a range of disciplines pertinent to the field.

The oral examination is devoted to discussion of the written materials. The examination evaluates the student's ability to integrate disciplinary knowledge within the field and to undertake interdisciplinary research. The qualifying examination must be completed by the end of semester five.

**Courses**

**Common Core Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>RST*6000</td>
<td>Sustainable Rural Systems F-W [1.00]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sustainable development theory in the rural communities and environment context.</td>
<td></td>
</tr>
<tr>
<td>RST*6100</td>
<td>Integrative Research Methods F-W [1.00]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Research design and evaluation with a focus on measures of sustainability and on interdisciplinary applications.</td>
<td></td>
</tr>
</tbody>
</table>
### Sector Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>RST*6300</td>
<td>Research Seminar U [0.25]</td>
<td></td>
</tr>
<tr>
<td>RST*6500</td>
<td>Special Topics U [0.50]</td>
<td></td>
</tr>
<tr>
<td>RPD*6170</td>
<td>Rural Research Methods U [0.50]</td>
<td></td>
</tr>
</tbody>
</table>

The course provides rural planning and development professionals with a number of theoretical frameworks and practical approaches to problem solving in rural Canadian and international contexts. The course content provides an introduction to hypothesis development, data collection, analytical frameworks, research management, and information synthesis and presentation methodologies that are appropriate to the practicing rural planner and developer. It views the roles of the researcher and research as interventionist and intervention in the rural community. Research methods are discussed as an integral and supporting part of the planning and development process.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>RPD*6170</td>
<td>Rural Research Methods U [0.50]</td>
<td></td>
</tr>
<tr>
<td>CDE*6260</td>
<td>Research Design U [0.50]</td>
<td></td>
</tr>
</tbody>
</table>

Provides students with abilities and knowledge to undertake, formulate and implement research in their chosen area of development. Students are expected to acquire the ability to identify research question and the appropriate designs to answer such questions.

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>LARC*6380</td>
<td>Research Seminar W [0.25]</td>
<td></td>
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</tbody>
</table>

A seminar course focussed on the process and communication of research, influenced by the current research of the participants. Participants organize a conference to present their research results.

<table>
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<tr>
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<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LARC*6380</td>
<td>Research Seminar W [0.25]</td>
<td></td>
</tr>
</tbody>
</table>
Sociology

The Department of Sociology and Anthropology offers programs of study leading to the degrees of MA and PhD in Sociology. See the Department website at http://www.sociology.uoguelph.ca/ for additional information.

Administrative Staff

Chair
Frans Schryer (625 MacKinnon, Ext. 56527) 
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Myrna Dawson (641 MacKinnon, Ext. 56028) 
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Graduate Faculty

J.I. (Hans) Bakker
BA South Alabama, MA Colorado State, PhD Toronto - Professor

Myrna Dawson
BA York, MA, PhD Toronto - Associate Professor

Frederick T. Evers
BS Cornell, MS, PhD Iowa State - Professor

Cecil A. Foster
BA, MA, PhD York - Associate Professor

Linda M. Gerber
BCSN, MA, PhD Toronto - Associate Professor

Edward J. Hedican
BA Lakehead, MA McMaster, PhD McGill - Associate Professor

Sally Humphries
BA, MA, PhD York - Associate Professor

Linda Hunter
BA, MA Guelph, PhD York - Assistant Professor

Satsuki Kawano
BA Keio, MA Minnesota, PhD Pittsburgh - Associate Professor

Lisa Kowalchuk
BA McMaster, MA McGill, PhD York - Associate Professor

Belinda Leach
BA Carleton, MA, PhD Toronto - Associate Professor

Madonna R. Maidment
BA, MA Memorial, PhD Carleton - Assistant Professor

Kenneth S. Menzies
BA Queen's, MSc London, PhD Essex - Professor

William O'Grady
BA, MA Carleton, PhD Toronto - Associate Professor

Patrick Parnaby
BA, MA Queen’s, PhD McMaster - Assistant Professor

Kerry L. Preibisch
BA, MA Simon Fraser, PhD Reading - Associate Professor

Marta Rohatynskyj
AB Wayne State, BA Carleton, MA, PhD Toronto - Associate Professor

Frans J. Schryer
BA Toronto, MA, PhD McGill - Professor and Chair

Vivian Shalla
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Jane Sprott
BA Waterloo, MA, PhD Toronto - Associate Professor

R. Stansfield
BS McMaster, BA, MA Toronto, PhD York - Associate Professor

Renée Sylvain
BA Wilfrid Laurier, MA, PhD Toronto - Associate Professor

Terisa Turner
HBA York (U.K.), MA Oberlin College Ohio, PhD London - Associate Professor

Anthony R. Winson
BA Western, MA, PhD Toronto - Professor

MA Program

The MA program permits students to become actively involved in research, teaching and professional practice. The objective of the program is to offer opportunities for advanced study and research in sociology.

The Master of Arts program in Sociology covers the following:

- Rural, community and development studies
- Work and change in global context
- Criminology and criminal justice
- Gender, diversity and social equality

Rural Community and Development Studies

This area includes rural sociology and rural development (Canada and international), women and gender relations in development, anthropology of development, sociology of agriculture and of the rural community, community development, political economy of rural agricultural systems and the like, agro-food systems, environment, subsistence and commodification.

Work and Change in Global Context

This area incorporates sociology of work, the workplace, political economy, labour markets, transition from school to work, skills and lifelong learning, technological change, women and work, work and economic restructuring, the labour movement, labour process and social policy.

Criminology and Criminal Justice

This area covers sociology of policing, corrections and penology, violent crime, sociology of law, criminological theory, critical criminology, street youth, young offenders, gender offending, and criminal justice theory.

Gender, Diversity and Social Equality

This area includes gender and women's studies, Aboriginal studies, indigenous peoples, native studies, class, stratification, citizenship, power, race, minorities, ethnicity, social movements, hermeneutics, and religion.

Application Procedure

Graduate students are admitted each fall semester (approximately 15 - 17 students). February 1 is the deadline for application to the MA in Sociology program or the MA in Sociology with Collaborative International Development program. Graduate students are admitted into the program in the fall semester only. On-application and application information can be found at http://www.uoguelph.ca/registrat/graduatestudies/index.cfm?apply

Admission Requirements

Applicants must possess an Honours BA (4 years) degree or its equivalent with at least a B+ average in the final two undergraduate years. Students who do not meet departmental requirements, e.g., students whose undergraduate degree does not include basic courses in sociology and/or anthropology, may be admitted provisionally and required to complete appropriate make-up courses from offerings in the undergraduate program.

Degree Requirements

Students must either complete a minimum of 2.0 credits and write a thesis or complete a minimum of 4.0 credits (including 1.0 credit in the Major Paper course) and write a major paper. All students are required to master basic theory and methodological skills. This is normally fulfilled through the successful completion of the courses andSOC*6140 and SOC*6070 in the fall semester and SOC*6130 in the winter semester.

Students typically begin their studies in the fall semester. You will be assigned an interim advisor who is a likely candidate to be your advisor, given your stated area of interest. When you arrive, the graduate coordinator will inform you as to which faculty members, on the basis of their areas of specialization, are likely candidates for membership on your advisory committee. Until you have formed your advisory committee, your interim advisor will fill out your evaluation reports. It is strongly recommended, that you choose your permanent advisor and your committee by the end of February in your second semester.

All students are required to pass SOC*6700, Pro-Seminar. This is a two semester course (Fall and Winter) and is graded as SAT/UNSAT. This course is intended to introduce students to the department, the university, and the professions of sociology and anthropology.

PhD Program

The doctoral program comprises two fields within the discipline of Sociology that build on current faculty strengths. These fields are:

- Global Agro-Food Systems, Communities and Rural Change
- Work, Gender and Change in a Global Context

Global Agro-Food Systems, Communities and Rural Change

This field reflects recent sociological interests in food studies and global agro-food systems, resources and the environment, community sustainability, rural-urban linkages, the transnationalization of labour regimes and social movements in the rural context. Students specializing in this field will be encouraged to take a comparative and historical approach, focussing on cross-national and inter-regional studies where possible, and to examine...
how class, gender, race and ethnicity play out in each particular substantive topic comprising the rural field.

**Work, Gender and Change in a Global Context**

This field reflects recent sociological interests in changing patterns of work and employment in comparative contexts, labour regimes, industrial and organizational change, organizations and protest, education for work, and the regulation of work. These trends are located in the broader processes of globalization, economic restructuring and fundamental shifts in public policy. Students specializing in this field will be encouraged to focus on the dialectical relationship between the configurations of gender, class, race and ethnicity, and the transformation of work.

**Degree Requirements**

All students in the PhD program are required to successfully complete four courses during the first two semesters of study. Students must also successfully complete two qualifying examinations and a research proposal, and produce and orally defend a dissertation on a topic that has been approved by the advisory committee.

**Admission Requirements**

Only applicants with a recognized MA degree in Sociology and with high academic standing (80% or higher) in their graduate-level studies will be admitted into the program. Students are expected to have successfully completed Master’s-level courses in sociological theory as well as Master’s-level qualitative and quantitative methodology courses in Sociology. It is also expected that students will have taken courses across the breadth of Sociology.

**Admission Procedure**

Graduate students are admitted into the program in the fall semester only. The application deadline is February 1. On-application and application information can be found at http://www.uoguelph.ca/registrar/graduatestudies/index.cfm?apply

**Interdepartmental Program**

**International Development Studies Collaborative MA Program**

The Department of Sociology and Anthropology participates in the MA program in collaborative international development studies (CIDS). Students in this option register in both the department and CIDS. Those faculty members whose research and teaching expertise includes aspects of international development studies may serve as advisors for MA students. Please consult the International Development Studies listing http://www.uoguelph.ca/cids/ for a detailed description of the MA collaborative program and the special additional requirements for each of the participating departments.

**Courses**

**Core courses**

**SOC**6700 Pro-seminar F-W [0.00]

The pro-seminar concerns matters involved in graduate studies and later work as a professional sociologist or anthropologist, including how to form a graduate advisory committee, assistantship responsibilities, presentation skills, exploration of careers in sociology and anthropology, writing grant proposals, reports and articles, and teaching. In the first semester students will begin to prepare research proposals for theses and major papers.

**SOC**6140 Qualitative Research Methods F [0.50]

An examination of the methods of qualitative research, including participant observation and unstructured interviews, as well as the ethical considerations of fieldwork. Other topics, such as comparative and historical methods, may be included.

**SOC**6070 Sociological Theory F [0.50]

Classical and contemporary theoretical perspectives and their inter-relationships. A central concern will be to develop the student's ability to assess theory critically and to understand how theory and research relate to each other.

**SOC**6130 Quantitative Research Methods W [0.50]

The application of multiple regression to data generated by nonexperimental research, e.g., survey data and data from other sources (census, archival). In large part a course in theory construction, a thorough grounding in the mechanics and statistical assumptions of multiple regression is followed by its application to the construction of structural equation (or causal) models representing substantive theories in sociology and related disciplines.

**Rural, Community and Development Studies**

**SOC**6420 Development, Community and Rurality U [0.50]

This course will examine issues in different theories and models to explain rural and community change and persistence within a globalized system. While the emphasis will be on local continuity and change from a sociological and/or anthropological perspective, this will be discussed within a framework of international political economy. Case studies will be selected to illustrate different modes of change and resistance from different contexts. In particular, the role of community-led and participatory forms of development, social organization, social capital, land tenure, gender, agro-food systems, subsistence and commodification, governance, land use and environment management will be amongst topics considered. Students will be encouraged to focus their research on some of these issues in a geographical region of interest to them.

**Work and Change in a Global Context**

**SOC**6480 Work and Change in a Global Context U [0.50]

This course will consider some of the theoretical frameworks available for examining work, workers and work places in the context of global economic change. Using case studies of particular work worlds, the course may include topics such as changing patterns of work in comparative contexts; labour discipline, organizations and protest; industrial and organizational change; education for work; economic restructuring and reconfigurations of gender, race and class within and beyond the shop floor.

**Social Movements**

**SOC**6350 Social Movements in Latin America W [0.50]

Students will critically review the major theoretical perspectives on social movements and consider their relevance in understanding the timing, tactics, and impact of movements in Latin America. Movements to be examined may include labour, peasant, armed insurgent, indigenous, feminist, gay rights, and anti-globalization struggles.

**Criminology and Criminal Justice**

**SOC**6350 Society, Crime and Control U [0.50]

This seminar course surveys classical theoretical perspectives and more recent theoretical developments in the sociology of crime. It will examine the assumptions and logical structure of each perspective and justifications of particular criminal justice/public policy responses. The course will also critically assess recent empirical research relevant to each perspective.

**Gender, Diversity and Social Equality**

**SOC**6270 Diversity and Social Equality U [0.50]

This course will examine a range of approaches used in the study of intergroup relations, with special emphasis on struggles over influence and power. Students will acquire a deeper understanding of the complex intersection, as well as the overlap among forms of identity and group mobilization based on ethnic, linguistic, regional, class, gender, racial and other forms of social division. The course may also cover native issues and policies related to multiculturalism, equity and local or regional autonomy.

**Other**

**SOC**6460 Gender and Development F [0.50]

Cross-cultural and historical changes in gender relations and the roles/positions of women brought about by industrialization and the development of the world system. Critical examination of the predominant theories of gender relations, in so far as these inform development research and action in societies with different socio-economic systems. Introduction to the latest theories and research in the area of women and development, as well as with social and political actions undertaken by women themselves. This is one of the two alternative core courses for the Collaborative International Development Studies program.

**SOC**6550 Selected Topics in Theory and Research U [0.50]

This course will be offered with varying content focusing on theory or research.

**SOC**6600 Reading Course F [0.50]

A program of directed reading, complemented with the writing of papers or participation in research. Reading courses are arranged by students through their advisors or advisory committees and must be approved by the chair of the department. This course may be repeated provided different content is involved.

**SOC**6660 Major Paper F [1.00]

The major paper is an extensive research paper for those who do not elect to complete a thesis. It may be taken over two semesters.
The MFA program at the University of Guelph requires the attainment of a professional level of studio practice, and a sophisticated awareness of contemporary discourse in visual arts as well as a detailed knowledge of the selected field of specialization. Each degree candidate will complete a thesis. The MFA thesis consists of an exhibition, a brief supporting paper, and an oral examination.

The following are some of the specific degree requirements for the MFA degree in studio art (the complete MFA degree regulations are to be found in the Degree Regulations section of this calendar):

### Minimum Duration

The minimum duration is at least four semesters of full-time study.

### Prescribed Studies

A total of 10.0 credits is required for the completion of this program. In addition to individually oriented studio courses, students are required to complete four MFA seminars; two graduate courses in art theory and criticism courses; and two teaching practicum courses.

A maximum of two courses outside the School of Fine Art and Music may be substituted for courses in art history, theory and criticism. The courses selected must be acceptable to the school and the Dean of Graduate Studies for graduate credit. All 12 “substantive” courses comprise the candidate's prescribed studies, in which the student must obtain an overall average grade of at least 'B-' standing.

### Additional Courses

In addition to the prescribed studies, the student may undertake to achieve satisfactory standings in ancillary courses supportive of the special discipline. These courses may be at either the undergraduate or the graduate level.

### Exhibition/Paper

Each degree candidate must present an exhibition, performance, or showing of their studio work, as well as a critical paper of approximately 4,000 - 5,000 words that articulates the aesthetic, historical, theoretical and technical issues pertinent to their artwork. The submitted studio work must demonstrate a professional level of competence and a sophisticated awareness of contemporary discourse in visual art, and its ideological complexities.

### The Master’s Examination

At the time of the exhibition, the MFA candidate will be expected to successfully complete a final oral examination devoted chiefly to the MFA exhibition with reference to the supporting critical paper. This is a school examination identified as the master's examination.

### School Regulations

In addition to meeting the university's MFA regulations regarding thesis format, the candidate must submit appropriate visual documentation of the MFA exhibition as well as the supporting critical paper to the director of the School of Fine Art and Music for inclusion in the school's archives.
### Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FINA*6510</td>
<td>Introduction to Graduate Studio F [1.50]</td>
<td></td>
<td>A qualifying open-studio course to determine the student's interests and level of performance. The student will come in contact with a variety of faculty and may choose to work in a number of areas during this period.</td>
<td></td>
</tr>
<tr>
<td>FINA*6515</td>
<td>MFA Studio I W [1.50]</td>
<td></td>
<td>Sustained work at an independent level under the supervision of the chair of the student's advisory committee.</td>
<td>FINA*6510</td>
</tr>
<tr>
<td>FINA*6530</td>
<td>MFA Teaching Practicum I F [0.50]</td>
<td></td>
<td>This course will give the MFA student supervised teaching experience in a studio discipline. In addition, a seminar component will consider theoretical and practical issues relevant to the teaching of studio art. Prerequisite: admission to the MFA program.</td>
<td></td>
</tr>
<tr>
<td>FINA*6531</td>
<td>MFA Teaching Practicum II F [0.50]</td>
<td></td>
<td>Continuation of teaching practicum under the guidance of a faculty member. The practicum seminar will consider theoretical and practical issues relevant to the teaching of studio art such as educational goals, course and curriculum planning, academic evaluation, health and safety policies, and appropriate materials and equipment. Prerequisite(s): FINA*6530</td>
<td></td>
</tr>
<tr>
<td>FINA*6540</td>
<td>MFA Seminar I F [0.50]</td>
<td></td>
<td>Examination of critical issues in the visual arts relevant to studio practice.</td>
<td></td>
</tr>
<tr>
<td>FINA*6545</td>
<td>MFA Seminar II W [0.50]</td>
<td></td>
<td>Continuation of issues examined in FINA*6540.</td>
<td>FINA*6540</td>
</tr>
<tr>
<td>FINA*6551</td>
<td>Seminar in Art Theory and Criticism I W [0.50]</td>
<td></td>
<td>Selected topics in art theory and criticism with particular relevance to studio practice.</td>
<td>FINA*6545</td>
</tr>
<tr>
<td>FINA*6610</td>
<td>MFA Studio II F [1.50]</td>
<td></td>
<td>Continuation of FINA*6515.</td>
<td>FINA*6515</td>
</tr>
<tr>
<td>FINA*6615</td>
<td>MFA Studio III W [1.50]</td>
<td></td>
<td>Continuation of FINA*6610.</td>
<td>FINA*6610</td>
</tr>
<tr>
<td>FINA*6640</td>
<td>MFA Seminar III F [0.50]</td>
<td></td>
<td>Continuation of FINA*6545.</td>
<td>FINA*6640</td>
</tr>
<tr>
<td>FINA*6641</td>
<td>MFA Seminar IV W [0.50]</td>
<td></td>
<td>Continuation of FINA*6640.</td>
<td></td>
</tr>
<tr>
<td>FINA*6652</td>
<td>Individual Study in Art Theory and Criticism W [0.50]</td>
<td></td>
<td>Students will pursue special study under the guidance of a faculty member with appropriate expertise.</td>
<td>FINA*6545</td>
</tr>
<tr>
<td>FINA*6650</td>
<td>Selected Topics in Fine Art U [0.50]</td>
<td></td>
<td>Seminar in a fine art topic in a subject to be specified by the instructor.</td>
<td>FINA*6550</td>
</tr>
<tr>
<td>FINA*6652</td>
<td>Seminar in Canadian Art U [0.50]</td>
<td></td>
<td>Selected topics in Canadian Art.</td>
<td>FINA*6552</td>
</tr>
<tr>
<td>FINA*6654</td>
<td>Seminar in Nineteenth Century Art U [0.50]</td>
<td></td>
<td>Selected topics of the period.</td>
<td>FINA*6554</td>
</tr>
<tr>
<td>FINA*6655</td>
<td>Seminar in Twentieth Century Art U [0.50]</td>
<td></td>
<td>Selected topics of the period.</td>
<td>FINA*6655</td>
</tr>
<tr>
<td>FINA*6650</td>
<td>Individual Study in Art History U [0.50]</td>
<td></td>
<td>Students will pursue special study under the guidance of a faculty member with appropriate expertise.</td>
<td>FINA*6650</td>
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</tbody>
</table>

### Additional and Elective Courses

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<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
<th>Description</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FINA*6550</td>
<td>Selected Topics in Fine Art U [0.50]</td>
<td></td>
<td>Seminar in a fine art topic in a subject to be specified by the instructor.</td>
<td>Approval of the co-ordinator of the MFA program.</td>
</tr>
<tr>
<td>FINA*6652</td>
<td>Seminar in Canadian Art U [0.50]</td>
<td></td>
<td>Selected topics in Canadian Art.</td>
<td>Approval of the co-ordinator of the MFA program.</td>
</tr>
<tr>
<td>FINA*6654</td>
<td>Seminar in Nineteenth Century Art U [0.50]</td>
<td></td>
<td>Selected topics of the period.</td>
<td>Approval of the co-ordinator of the MFA program.</td>
</tr>
<tr>
<td>FINA*6655</td>
<td>Seminar in Twentieth Century Art U [0.50]</td>
<td></td>
<td>Selected topics of the period.</td>
<td>Approval of the co-ordinator of the MFA program.</td>
</tr>
<tr>
<td>FINA*6650</td>
<td>Individual Study in Art History U [0.50]</td>
<td></td>
<td>Students will pursue special study under the guidance of a faculty member with appropriate expertise.</td>
<td>Approval of the co-ordinator of the MFA program.</td>
</tr>
</tbody>
</table>
**Toxicology**

The interdepartmental collaborative program is the focal point for graduate teaching and research in toxicology. Students wishing to undertake graduate studies at the MSc or PhD level with emphasis on toxicology will be admitted by a participating department and will register in both the participating department and in the collaborative program. The participating academic units include the Departments of Animal and Poultry Science, Biomedical Sciences, Chemistry, Environmental Biology, Human Health and Nutritional Sciences, Integrative Biology, Land Resource Science, Mathematics and Statistics, Molecular and Cellular Biology, Pathobiology, and Plant Agriculture (Horticulture division).

**Administrative Staff**

**Director of Toxicology Program**
Herman J. Boermans (2602 OVC, Ext. 54984)

**Secretary**
Beth Baker (2603 OVC, Ext. 52644)

**Graduate Faculty**

**Herman J. Boermans**
Associate Professor, Biomedical Sciences

**Manfred Brauer**
Associate Professor, Molecular and Cellular Biology

**Nigel J. Bunce**
Professor, Chemistry

**Lesley J. Evans**
Professor, Land Resource Science

**Beverley Hale**
Associate Professor, Land Resource Science

**Christopher J. Hall**
Professor, Environmental Biology

**M. Anthony Hayes**
Professor, Pathobiology

**John J. Hubert**
Professor, Mathematics and Statistics

**P. David Josephy**
Professor, Molecular and Cellular Biology

**Bettina E. Kalisch**
Associate Professor, Biomedical Sciences

**Niel A. Karrow**
Assistant Professor, Animal and Poultry Science

**Peter G. Kevan**
Professor, Environmental Biology

**Gordon M. Kirby**
Assistant Professor, Biomedical Sciences

**James B. Kirkland**
Assistant Professor, Human Health and Nutritional Sciences

**Hung Lee**
Professor, Environmental Biology

**Francesco Leri**
Assistant Professor, Psychology

**Richard A. Manderville**
Associate Professor, Chemistry

**Joanne M. O'Meara**
Assistant Professor, Physics

**Leonard Ritter**
Professor, Environmental Biology

**Cynthia Scott-Dupree**
Associate Professor, Environmental Biology

**Frances J. Sharan**
Professor, Molecular and Cellular Biology

**Paul K. Sibley**
Assistant Professor, Environmental Biology

**Trevor K. Smith**
Professor, Animal and Poultry Science

**Keith R. Solomon**
Professor, Environmental Biology

**E. James Squires**
Professor, Animal and Poultry Science

**Jack T. Trevors**
Professor, Environmental Biology

**Glen J. Van Der Kraak**
Professor, Integrative Biology and Associate Dean, Research, CBS

**MSc Program**

**Admission Requirements**

MSc students in the collaborative program in toxicology must meet the MSc admission requirements of the participating department in which they are enrolled.

**Degree Requirements**

MSc students in the collaborative program in toxicology must complete a minimum of 1.5 graduate credits, which must include the toxicology courses TOX*6000 and TOX*6200 and courses required by the participating department in which they are enrolled. TOX*6000 may be waived for students whose undergraduate degree included significant training in toxicology.

**PhD Program**

**Admission Requirements**

PhD students in the collaborative program in toxicology must meet the PhD admission requirements of the participating department in which they are enrolled.

**Degree Requirements**

PhD students in the collaborative program in toxicology must meet all the academic requirements specified by the participating department in which they are enrolled. They must also complete the courses TOX*6000 and TOX*6200 if they, or equivalent courses, were not taken as part of an MSc program.

**Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOX*6000 Toxicology S [0.50]</strong></td>
<td>An intensive course in the principles of modern aspects of toxicology, taught in a lecture/case study format.</td>
</tr>
<tr>
<td><strong>TOX*6200 Advanced Topics in Toxicology W [0.50]</strong></td>
<td>Advanced topics in toxicology will include oral presentations by students, faculty members, and guest lecturers. The emphasis will be on advanced concepts and techniques in toxicology research with particular relevance to mechanistic, molecular and interpretive toxicology.</td>
</tr>
<tr>
<td><strong>TOX*6530 Ecotoxicological Risk Characterization W [0.50]</strong></td>
<td>A biologically based advanced course that will give students working knowledge of current procedures and techniques for ecotoxicological risk characterization. The course material will cover the topics: problem definition, dose response characterization, exposure characterization, and risk assessment and risk-management decision making. (Credit may be obtained for only one of TOX<em>6530, ENVB</em>6530 and TOX*4550.) Department of Environmental Biology</td>
</tr>
<tr>
<td><strong>ENVB*6530 Ecotoxicological Risk Characterization W [0.50]</strong></td>
<td>A biologically based advanced course that will give students working knowledge of current procedures and techniques for ecotoxicological risk characterization. The course material will cover the topics: problem definition, dose response characterization, exposure characterization, and risk assessment and risk-management decision making. (Credit may be obtained for only one of TOX<em>6530, ENVB</em>6530 and TOX*4550.) Department of Environmental Biology</td>
</tr>
<tr>
<td><strong>TOX*6590 Biochemical Toxicology F [0.50]</strong></td>
<td>The molecular mechanisms of action of carcinogens and other toxic compounds. Enzymes of biotransformation, including a detailed study of cytochrome P-450. Interactions of reactive species with DNA and other macromolecules. (Credit may be obtained for only one of TOX*4590 and 940650.) Department of Chemistry and Biochemistry</td>
</tr>
<tr>
<td><strong>CHEM*7310 Selected Topics in Biochemistry I U [0.50]</strong></td>
<td>Discussion of specialized topics related to the research interests of members of the centre: for example, recent offerings have included peptide and protein chemistry, biochemical toxicology, medical aspects of biochemistry, glycolipids and glycoproteins, redox enzymes, biological applications of magnetic resonance, etc. Department of Chemistry</td>
</tr>
<tr>
<td><strong>CHEM*7320 Selected Topics in Biochemistry II U [0.50]</strong></td>
<td>Discussion of specialized topics related to the research interests of members of the centre: for example, recent offerings have included peptide and protein chemistry, biochemical toxicology, medical aspects of biochemistry, glycolipids and glycoproteins, redox enzymes, biological applications of magnetic resonance, etc. Department of Chemistry</td>
</tr>
<tr>
<td><strong>CHEM*7330 Selected Topics in Biochemistry III U [0.50]</strong></td>
<td>Discussion of specialized topics related to the research interests of members of the centre: for example, recent offerings have included peptide and protein chemistry, biochemical toxicology, medical aspects of biochemistry, glycolipids and glycoproteins, redox enzymes, biological applications of magnetic resonance, etc. Department of Chemistry</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
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<tr>
<td>-------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>CHEM*7600</td>
<td>Selected Topics in Organic Chemistry I U [0.50]</td>
</tr>
<tr>
<td>CHEM*7610</td>
<td>Selected Topics in Organic Chemistry II U [0.50]</td>
</tr>
<tr>
<td>CHEM*7620</td>
<td>Selected Topics in Organic Chemistry III U [0.50]</td>
</tr>
<tr>
<td>CHEM*7630</td>
<td>Selected Topics in Organic Chemistry IV U [0.50]</td>
</tr>
<tr>
<td>ENVB*6180</td>
<td>Physiology and Biochemistry of Herbicides W [0.50]</td>
</tr>
<tr>
<td>BIOM*6440</td>
<td>Biomedical Toxicology U [0.50]</td>
</tr>
<tr>
<td>BIOM*6480</td>
<td>Pharmacodynamics and Pharmacokinetics U [0.50]</td>
</tr>
<tr>
<td>BIOM*6721</td>
<td>Special Topics in Pharmacology-Toxicology U [0.25]</td>
</tr>
<tr>
<td>BIOM*6722</td>
<td>Special Topics in Biomedical Pharmacology-Toxicology U [0.50]</td>
</tr>
</tbody>
</table>
Veterinary Science

The Interdepartmental Group in Veterinary Science consists of members of the graduate faculty in the Ontario Veterinary College who are involved in the doctor of veterinary science (DVSc) program. Specific functions of the group are discharged by the Interdepartmental DVSc Program Committee, which is involved with the admission, progress, and certification for graduation of students enrolled in the DVSc program.

Administrative Staff

Chair
Robert Jacobs (2151 OVC, Ext. 54667)
rjacobs@ovc.uoguelph.ca

Graduate Secretary
Barbara Gaudette (2653 OVC, Ext. 54406)
bgaudett@ovc.uoguelph.ca

Program Committee

Scott A. McEwen
Professor, Population Medicine

Michael R. O'Grady
Associate Professor, Clinical Studies

John F. Prescott
Professor, Pathobiology

DVSc Program

The DVSc is a unique post-professional degree. The DVSc program provides advanced discipline training and research at the doctoral level. It involves course and investigational work on an applied problem, together with advanced discipline training. Students enrolled in the program select one of the sixteen specializations (listed below) and register in the appropriate department. The departments and specializations are:

- Biomedical Sciences
- Clinical pharmacology
- Clinical Studies
- Comparative medicine
  (small animal medicine, small animal surgery, large animal medicine, large animal surgery, emergency medicine and critical care, anesthesiology, ophthalmology, cardiology and neurology)
- Pathobiology
  Clinical pathology, anatomic pathology, laboratory-animal science, and comparative pathology
- Population Medicine
  Clinical epidemiology, ruminant health management, swine health management and theriogenology

Admission Requirements

The normal basis for admission to DVSc studies is a DVM or equivalent degree that would allow the applicant to be eligible for licence to practice veterinary medicine in Ontario. The applicant must have achieved high academic standing according to the standards of the University of Guelph.

Students who meet the aforementioned requirements and possess either an acceptable graduate diploma, MSc degree, or PhD degree with 'B+' average standing may be admitted and granted credit for two semesters in the DVSc program.

A student enrolled in the graduate diploma program who achieves a superior record and shows a particular aptitude for applied studies may be authorized by the Board of Graduate Studies, on recommendation of the Interdepartmental DVSc Program Committee, to transfer to the DVSc program without completing the graduate diploma program. This authorization must be granted no later than the end of the second semester of study. The transfer will be effective the following semester.

Degree Requirements

A minimum of 2.5 course credits is required. A qualifying examination must be taken prior to the end of the sixth semester to assess the student's knowledge of the selected area of specialization and the basic sciences supporting this area. Candidates are required to develop investigational skills in their distinctive area of specialization by carrying out an original study, generally related to animal health. The research must make a significant contribution to the area of specialization, be written up as a thesis, and defended.

At least nine semesters of full-time study must be devoted to the DVSc program. Additional information on the DVSc program may be found in the calendar description of each participating department.
Zoology

The Zoology Graduate Program offers MSc and PhD degrees. Three major areas of emphasis and the faculty associated with those areas are:

- **Ecology and Behaviour** -- Ackerman, Brooks, Cottenie, Fryxell, McCann, McLaughlin, Norris, Nudds, Robinson, Thomas
- **Evolutionary Biology** -- Boulding, Crease, Danzmann, Ferguson, Fu, Hebert, Lynn
- **Physiology** -- Ballantyne, Bernier, Fudge, Gillis, McDonald, Van Der Kraak, Wright

Interdepartmental programs are available for students wishing to specialize in toxicology, biophysics and aquaculture.

**Administrative Staff**

**Integrative Biology Chair**
Moir M. Ferguson (359 Axelrod, Ext. 53598/52726)
nmfergus@uoguelph.ca

**Integrative Biology Graduate Co-ordinator**
Denis H. Lynn (271 Axelrod, Ext. 52746/52975)
ddr@uoguelph.ca

**Graduate Secretary**
Mary Anne Davis (255 Axelrod, Ext. 56094)
mmdavis@uoguelph.ca

**MSc Program**

The Zoology Graduate Program offers MSc degrees in each of the three major areas of emphasis: ecology and behaviour, evolutionary biology and physiology. The three areas of interest focus on (but are not restricted to), experimental approaches in field and laboratory settings and a strong linkage between theoretical and applied investigations. The department encourages students to pursue interdisciplinary research and, where appropriate, utilize faculty expertise from across campus on their advisory committees.

**Admission Process**

There are two parts to the application process (see steps below). Before submitting an application, you are strongly encouraged to view the "Before you Apply" section on the CBS Graduate Opportunities webpage for further details. This is a two-step self-administered application process. First you must complete an online "submission summary" and second, assemble all required documentation (listed below) and forward the complete package to the ADR Office, Laurie Winn, CBS Graduate Admissions Secretary, Room 256, Axelrod Building (moving to Science Complex effective August 1, 2007), University of Guelph, Guelph, Ontario Canada N1G 2W1.

For further information, contact the CBS Graduate Admissions Secretary at lwinn@uoguelph.ca.

**Admission Requirements**

To be considered, applicants must meet the requirements of a four-year honours science degree with a minimum 'B' (73%) average during the final two years (4 semesters) of undergraduate study. Applicants must obtain the support of a faculty member willing to serve as their thesis advisor.

Under exceptional circumstances, an applicant with a 'B-' (70-72%) average during the last 2 years (4 semesters) of study may be considered for admission. Such applicants must have outstanding letters of recommendation that provide strong evidence of potential research capability and a strong endorsement from a potential thesis advisor.

Admission may be granted in September, January or May. Completed applications should arrive in the department at least one full semester (four months) before the expected date of admission. Applications from international students, especially those applying for financial support, should arrive at least eight months prior to the expected date of admission.

**Degree Requirements**

Students must complete and defend an acceptable thesis. In addition, they must successfully complete courses totalling not fewer than 1.5 credits. These credits must include the two mandatory courses IBIO*6630 Scientific Communication I (0.75 credit), and IBIO*6640 Scientific Communication II (0.25 credit).

An acceptable MSc thesis comprises a scientifically defensible account of the student's research on a particular, well-defined research problem or hypothesis. (Such research should begin with the practical expectation that it could be completed and the thesis defended in no more than six semesters.) Paramount to the notion of acceptability of the thesis is its quality with respect to the underlying rationale (problem identification), the approach used to address the problem, and the evaluation of the results. Final acceptance of the MSc thesis need not imply that the work is sufficiently meritorious to warrant publication in scholarly media, though the majority of MSc research in the department is published.

The department endorses the idea that graduate students in the Zoology program should benefit from exposure to recent developments both within and between the major areas of emphasis. To that end, students may enrol in any of the regularly offered courses entitled "Advances in...", which are team-taught by several faculty members. A selection of subjects is given in each of the course descriptions below. Details of course content, format and evaluation will be available in the office of the chair of the department one semester prior to the semester in which the course is offered.

In addition, the department offers two "Topics in..." courses to provide students with the opportunity to study with individual faculty on specific topics in the faculty member's area of expertise. These courses may be taken by groups as either reading/seminar courses, or on an individual research-project basis. Students should approach individual faculty members to request supervision on individual research project courses; faculty members may be petitioned by students to offer, or may advertise, "Topics in..." courses at least one semester prior to the semester in which the course is to be offered.

**PhD Program**

The Zoology Graduate Program offers PhD degrees for studies in each of the three major areas of emphasis: ecology and behaviour, evolutionary biology and physiology. The 3 areas of interest focus on (but are not restricted to), experimental approaches in field and laboratory settings and a strong linkage between theoretical and applied investigations. The department encourages students to pursue interdisciplinary research and, where appropriate, utilize faculty expertise from across campus on their advisory committees.

**Admission Process**

There are two parts to the application process (see steps below). Before submitting an application, you are strongly encouraged to view the "Before you Apply" section on the CBS Graduate Opportunities webpage for further details. This is a two-step self-administered application process. First you must complete an online "submission summary" and second, assemble all required documentation (listed below) and forward the complete package to the ADR Office, Laurie Winn, CBS Graduate Admissions Secretary, Room 256, Axelrod Building (moving to Science Complex effective August 1, 2007), University of Guelph, Guelph, Ontario Canada N1G 2W1.

For further information, contact the CBS Graduate Admissions Secretary at lwinn@uoguelph.ca.
Admission Requirements

The admission and degree requirements of the PhD program are essentially those of the university. Most applicants will have a recognized master’s degree in a related field obtained with minimum academic standing of 'A-' (80%) in their postgraduate studies, and the endorsement of a potential thesis advisor. Under exceptional circumstances admission directly to a PhD program with an appropriate honours degree alone, or transfer from MSc to PhD program without completing the MSc thesis requirements, is also possible. Applications should be received at least one full semester (four months) prior to the expected date of admission. Applications from international students, especially those applying for financial support, should arrive at least eight months prior to the expected date of admission.

Degree Requirements

The Zoology program expects that the major part of the student's time will be devoted to research in fulfillment of the thesis requirement. For that reason, the department does not require that PhD students take any courses. Even so, students entering directly into the PhD program are strongly encouraged to take IBIO*6630 Scientific Communication I (0.75 credit) in their first Fall semester. Furthermore, advisory committees may, from time to time, require that a student take some prescribed or additional courses. Regardless, PhD students are expected to contribute and participate actively in the full academic life of the department, including regular attendance at departmental and inter-departmental seminars, and to provide leadership and counselling to undergraduate and MSc students.

PhD students will become candidates for the PhD degree upon successful completion of an oral or written qualifying examination, which must be conducted not later than the fifth semester of the PhD program. However students are strongly encouraged to take the exam by the end of their third semester. The exam evaluates students’ knowledge in the general area of the intended research. Candidates will spend not fewer than five semesters (seven without an MSc) in the program, and are expected to complete their studies within 11 semesters.

Submission and defence of an acceptable thesis complete the requirements for a PhD. An acceptable thesis comprises a report of the candidate’s research on a particular and well-defined research problem or hypothesis. It should represent a significant contribution to knowledge in that field. Emphasis is placed on the quality of the work as judged by the expression of mature scholarship, critical judgment, and satisfactory literary style in the thesis. Thesis approval implies that it is judged sufficiently meritorious to warrant publication in reputable, refereed journals in its field.

Interdepartmental Programs

MSC (Aquaculture) Interdepartmental Program

The Department of Integrative Biology participates in the MSC program in aquaculture. Those faculty members whose research and teaching expertise includes aspects of aquaculture may serve as advisors for MSc (Aquaculture) students. Please consult the Aquaculture listing for a detailed description of the MSc (Aquaculture) interdepartmental program.

Biophysics MSc/PhD Program

The Department of Integrative Biology participates in the MSc/PhD program in biophysics. Those faculty members whose research and teaching expertise includes aspects of biophysics may serve as advisors for MSc and PhD students in biophysics. Please consult the Biophysics listing for a detailed description of the graduate programs offered by the Biophysics Interdepartmental Group (BIG).

Toxicology MSc/PhD Collaborative Program

The Department of Integrative Biology participates in the MSc/PhD program in toxicology. Those faculty members whose research and teaching expertise includes aspects of toxicology may serve as advisors for MSc and PhD students. Please consult the Toxicology listing for a detailed description of the MSc/PhD collaborative program.

Courses

Evolutionary Biology

IBIO*6020 Special Topics in Evolution U [0.50]

Students will explore aspects of evolution not otherwise covered in existing graduate courses. A program of study will be developed with a faculty advisor according to the student’s requirements. Research papers, laboratory work and/or written and oral presentations may be required.

Physiology

IBIO*6010 Advances in Physiology U [0.50]

A modular course format in which several faculty members lecture and/or lead discussion groups in tutorials on advances in their areas, or related areas, of physiology. Topics may include metabolic adaptation to extreme environments, behavioural and molecular endocrinology, and exercise and muscle physiology. The course includes lectures and seminars in which the students participate. Offered annually.

IBIO*6090 Special Topics in Physiology U [0.50]

Students will explore aspects of physiology not otherwise covered in existing graduate courses. A program of study will be developed with a faculty advisor according to the student’s requirements. Research papers, laboratory work and/or written and oral presentations may be required.

Ecology and Behaviour

IBIO*6000 Advances in Ecology and Behaviour U [0.50]

This is a modular course in which several faculty members lecture and/or lead discussion groups in tutorials about advances in their broad areas, or related areas, of ecology and behaviour. Topics may include animal communication, optimal foraging, life-history evolution, mating systems, population dynamics, niche theory and food-web dynamics. The course includes lectures and seminars in which the students participate. Offered annually.

IBIO*6040 Special Topics in Ecology U [0.50]

Students will explore aspects of ecology not otherwise covered in existing graduate courses. A program of study will be developed with a faculty advisor according to the student’s requirements. Research papers, laboratory work and/or written and oral presentations may be required.

Cellular and Molecular Biology

IBIO*6100 Molecular Evolution U [0.50]

This course is designed to provide students with an appreciation for the uses of molecular data in the study of evolutionary processes. An overview of the principles of molecular data analysis using a phylogenetic approach will be given. In addition, the importance of incorporating evolutionary history into biodiversity research and other applied topics will be emphasized. Laboratory sessions will be devoted to practical training in analytical tools using specialized computer software, and for student presentation of independent research projects. The course will involve practical training in molecular data analysis using a phylogenetic approach and discussion of current topics from the primary literature.

General

IBIO*6070 Topics in Advanced Integrative Biology I U [0.50]

This course provides graduate students, either individually or in groups, with the opportunity to pursue topics in specialized fields of botany and zoology under the guidance of graduate faculty. Course topics will normally be advertised by faculty one semester prior to their offering. Courses may be offered in any of lecture, reading/seminar, or individual project formats. A minimum enrolment may be required for some course offerings.

IBIO*6080 Topics in Advanced Integrative Biology II U [0.50]

This course provides graduate students, either individually or in groups, with the opportunity to pursue topics in specialized fields of botany and zoology under the guidance of graduate faculty. Course topics will normally be advertised by faculty one semester prior to their offering. Courses may be offered in any of lecture, reading/seminar, or individual project formats. A minimum enrolment may be required for some course offerings.

ZOO*6550 Aquaculture U [0.50]

Examination of the history, practice and future of aquaculture with special reference to the application of biological principles and knowledge to the production of aquatic organisms for food and other uses.

IBIO*6630 Scientific Communication I U [0.75]

The development and refinement of the skills of scientific communication, emphasizing writing skills, in the context of developing a thesis proposal. This course is mandatory for MSc students in the Department of Integrative Biology.

IBIO*6640 Scientific Communication II U [0.25]

The development and refinement of the skills of scientific communication, emphasizing oral skills, and culminating in the defence of the thesis proposal. This course is mandatory for MSc students in the Department of Integrative Biology.
Other Departments

School of Languages and Literatures

Director:

Daniel Chouinard, 265 MacKinnon, ext. 54891/53883

The School offers the following undergraduate programs:

DÉPARTEMENT D'ÉTUDES FRANÇAISES

Head: Dr. Frédérique Arroyas, 278 MacKinnon, ext. 52885/53884

CLASSICS

Head: Dr. Padraig O'Cleirigh, 244 MacKinnon, ext. 53156/53883

EUROPEAN STUDIES

Coordinator: Dr. Dorothy Odartey-Wellington, 276 MacKinnon, ext. 53179/53883

GERMAN STUDIES

Head: Dr. Paola Mayer, 255 MacKinnon, ext. 58562/53883

ITALIAN STUDIES

Head: Dr. Mary DeCoste, 284 MacKinnon, ext. 53187/53883

SPANISH STUDIES

Head: Dr. Stephen Henighan, 274 MacKinnon, ext. 54489/53884

The School of Languages and Literatures presently offers a program in French for graduate students. Graduate students who are required by their departments to fulfill a language requirement other than French should consult the Undergraduate Calendar. Classes in German, Greek, Italian, Latin and Spanish are all available. Any graduate student who considers their language ability sufficient to meet departmental requirements may submit to a test, in the first week of the fall or the winter semester. Requests should reach the Head of the program involved at least two weeks before the test. In the case of a pass, the School will report to the dean of Graduate Studies that the student has successfully passed a reading test in the language, and the student's record is annotated to that effect. Grades are not shown.

Examinations are offered in French, German, Greek, Italian, Latin or Spanish, and others may be considered. Several members of the faculty in the School are members of the graduate faculty of other departments and participate in their graduate programs as follows:

Frederique Arroyas
BA, MA, PhD Western Ontario - Associate Professor

Daniel Chouinard
BaSp, MA, PhD (Montréal) for SLAPSIE (MA in English/SETS) - Assistant Professor

Dawn M. Cornelio
BA, MA, PhD Connecticut - Associate Professor

Stephen Henighan
BA (Swarthmore), MA (C'DIA), PhD (Oxford) (MA in English/SETS) - Associate Professor

Margot Irvine
BA, MA, PhD Toronto - Assistant Professor

Padraig O'Cleirigh
BA, MA National Univ. of Ireland, PhD (Cornell) (MA/PhD in History) - Associate Professor

Dana Paramskas
BSL, MSL (Georgetown), PhD (Laval) (MA in English and Drama/SETS) - Professor

Joubert Satyre
BA State University Haiti, MEd, PhD Montreal - Associate Professor

Alain Thomas
BA York, MA, PhD Toronto - Associate Professor

Music

Director of the School of Fine Art and Music

John D. Kissick (Zavitz 203, Ext. 56930)

The Music program does not presently offer programs for graduate students.