

2006-2007 Graduate Calendar

The information published in this Graduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2006-2007 academic years, including the Summer Semester 2006, the Fall Semester 2006, the Winter Semester 2007 and the Summer 2007.

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

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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.

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VIII. Graduate Programs

This is where you'll find academic information on our graduate programs, including program-specific admission and degree regulations, course offerings and a listing of the faculty.

Degree Programs listed by College

College of Arts Drama English History - Tri-University Program Literary Studies/Theatre Studies in English Studio Art Philosophy	College of Biological Science Botany Human Biology and Nutritional Sciences Microbiology Molecular Biology and Genetics Zoology
College of Management and Economics Business Administration Food and Agribusiness Management Hospitality and Tourism Management Consumer Studies Economics Leadership	College of Physical and Engineering Science Chemistry Computing and Information Science Engineering Mathematics and Statistics Physics
College of Social and Applied Human Science Family Relations and Applied Nutrition Geography Political Science Psychology Sociology	Ontario Agricultural College Animal and Poultry Science Capacity Development and Extension Environmental Biology Food, Agricultural and Resource Economics Food Science Land Resource Science Landscape Architecture Plant Agriculture Rural Planning and Development
Ontario Veterinary College Biomedical Sciences Clinical Studies Pathobiology Population Medicine Veterinary Science	Interdepartmental Programs Aquaculture Biophysics Business Administration Food Safety and Quality Assurance International Development Studies Resource and Environmental Economics Rural Studies Toxicology

Degree Programs listed by Division

Humanities Drama English History - Tri-University Program Philosophy Literary Studies/Theatre Studies in English Studio Art	Social Sciences Business Administration Capacity Development and Extension Consumer Studies Economics Family Relations and Applied Nutrition Food, Agricultural and Resource Economics Geography International Development Studies Landscape Architecture Political Science Psychology Sociology Rural Planning and Development
Human and Animal Sciences Animal and Poultry Science Biomedical Sciences Biophysics Clinical Studies Environmental Biology Family Relations and Applied Nutrition Food Science Food Safety and Quality Assurance Human Biology and Nutritional Sciences Microbiology Molecular Biology and Genetics Pathobiology Population Medicine Psychology Zoology	Plant Sciences Botany Environmental Biology Land Resource Science Microbiology Molecular Biology and Genetics Plant Agriculture

Physical and Engineering Sciences

Biophysics
Chemistry
Computing and Information Science
Engineering
Geography
Land Resource Science
Mathematics and Statistics
Physics

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, Schenkel, 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

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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

BASc, MSc Laval, 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 Moccia 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*6020 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*6030 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.
<i>Prerequisite(s):</i> Advanced Animal Nutrition and Metabolism I 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.

Aquaculture

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.

Administrative Staff

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Graduate Faculty

James L. Atkinson

Associate Professor, Animal and Poultry Science

James S. Ballantyne

Professor, Integrative Biology

Dominique Bureau

Associate Professor, Animal and Poultry Science

David Castle

Assistant Professor, Philosophy

Moiria M. Ferguson

Professor and Chair, Integrative Biology

John F. Leatherland

Professor, Biomedical Sciences

John Lumsden

Associate Professor, Pathobiology

Ian McMillan

Professor, Animal and Poultry Science

Richard D. Moccia

Professor, Animal and Poultry Science

Wayne C. Pfeiffer

Associate Professor, Food, Agricultural and Resource Economics

Rosalynn M.W. Stevenson

Associate Professor, Molecular and Cellular Biology

Margaret Thorburn

Associate Professor, Population Medicine

Glen J. Van Der Kraak

Professor, Integrative Biology and Associate Dean, Research, CBS

Patricia A. Wright

Professor, Integrative Biology

Rickey Y. Yada

Professor, Food Science

MSc Program

Aquaculture is the production of biomass of any aquatic plant or animal, including algae, molluscan, crustacean, and fish species, through artificial cultivation techniques. The MSc (Aquaculture) program is a non-thesis degree consisting of courses and a special project related primarily to the production of cool water and cold water fin-fish species. The objective of the degree is to provide an intensive, multidisciplinary program of study, without areas of sub-specialization. Graduates will obtain an integrated, technical knowledge of the concepts of animal production, agribusiness and state-of-the-art technology as they relate to aquaculture. The program includes a wide range of courses, a special project requirement and a practicum intended to provide essential experience in applied fish-production systems.

Admission Requirements

Students may be admitted to the MSc (Aquaculture) program from a variety of undergraduate backgrounds, including honours degree programs in animal or agricultural science, environmental biology, fisheries biology, marine biology, microbiology, nutritional sciences, wildlife biology, and zoology. The adequacy of a student's background and experience will be assessed by an admissions committee before a student is permitted to enter the program. All applicants must meet the university minimum criteria for admission to graduate studies. 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, student seminar and essay course designed to examine the role of science and technology in the aquaculture industry. Latest 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*2200	0.5	Principles of Aquaculture
ANSC*6450	0.5	Topics in Animal Biotechnology

Capacity Development and Extension

REXT*6190	0.5	Fundamentals of Interpersonal and Intercultural Communication
REXT*6311	0.5	Extension Theory and Methods

Economics

ECON*6750	0.5	Managerial Economics
ECON*6770	0.5	Financial Management

Food, Agricultural and Resource Economics

AGEC*6120	0.5	Marketing Management
AGEC*6130	0.5	Special Topics in Financial Management
AGEC*6430	0.5	Case Studies in Farm Management

Food Safety and Quality Assurance

FSQA*6600	0.5	Principles of Food Safety and Quality Assurance
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Geography

GEOG*6281	0.5	Environmental Resource Evaluation
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Hospitality and Tourism Management

HTM*6110	0.5	Foundations of Leadership
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Integrative Biology

ZOO*6550	0.5	Aquaculture
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Marketing and Consumer Studies

COST*6010	0.5	Product Development and Management Systems
COST*6150	0.5	Quality Assurance Management

Rural Planning and Development

RPD*6310	0.5	Environmental Impact Assessment
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Undergraduate Courses Eligible for Graduate Credit

(Students must not have received credit for these courses as part of their undergraduate programs):

Food, Agricultural and Resource Economics

AGEC*4220	0.5	Advanced Farm Management
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Animal Science

ANSC*3120	0.5	Introduction to Animal Nutrition
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ANSC*3150	0.5	Principles of Farm Animal Care and Welfare
ANSC*4050	0.5	Recombinant DNA in Animal Science
NUTR*3340	0.5	Nutrition of Fish and Crustacea

Biology

BIOL*3450	0.5	Introduction to Aquatic Environments
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Environmental Sciences

ENVB*3360	0.5	Waste Management and Utilization
ENVB*4020	0.5	Water Quality and Environmental Management

Food Science

FOOD*4700	0.5	Food Product Development
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Marketing and Consumer Studies

COST*3010	0.5	Quality Management
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Pathobiology

PATH*3610	0.5	Principles of Disease
PATH*4100	0.5	Diseases of Aquatic Animals

Integrative Biology

ZOO*4110	0.5	Principles of Fish and Wildlife Management
ZOO*4020	0.5	Ichthyology
ZOO*4330	0.5	Environmental Biology of Fishes
ZOO*4350	0.5	Biology of Polluted Waters
ZOO*4390	0.5	Environmental Physiology

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

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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 February 8, 2007

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 third semester 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

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 U [0.50]

A multidisciplinary seminar course to promote understanding of physiological processes occurring during mammalian pregnancy, from implantation to the perinatal period. Regulation of homeostasis and growth as well as both maternal and fetal factors that contribute to suboptimal gestational outcomes are covered.

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.

BIOM*6610 Vascular Biology U [0.50]

An interdisciplinary course in which the interrelationships between vascular proteins, cellular elements and the maintenance of vascular integrity are examined. Structural-functional relationships in vascular biology are explored through seminar presentations, group discussions and small group participation in problem based examples of vascular dysfunction.

BIOM*6701 Special Topics in Development, Cell and Tissue Morphology U [0.25]

Permits further in depth study of developmental and morphological sciences.

BIOM*6702 Special Topics in Development, Cell and Tissue Morphology U [0.50]

See BIOM*6701 above.

BIOM*6711 Special Topics in Physiology & Biochemistry U [0.25]

This course involves an appropriate combination of an experimental procedure (or project), seminars, selected reading or a literature review outside the thesis subject, developed according to the student's requirements.

BIOM*6712 Special Topics in Physiology & Biochemistry U [0.50]

See BIOM*6711 above.

BIOM*6721 Special Topics in Pharmacology-Toxicology U [0.25]

This course will comprise a combination of an experimental procedure (or project), seminars, selected reading or a literature review outside the thesis subject, developed based on the student's requirements. Topics could include clinical pharmacology/toxicology, pharmaco-epidemiology/economics, gerontological or perinatal pharmacology and toxicokinetics. Department of Biomedical Sciences

BIOM*6722 Special Topics in Biomedical Pharmacology-Toxicology U [0.50]

See BIOM*6721 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.

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Manfred Brauer

Associate Professor, Molecular and Cellular Biology

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Dev Mangroo

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Graduate Faculty from University of Waterloo

Elizabeth Meiring

Professor, Chemistry

Graduate Faculty from Wilfrid Laurier University

Ross E. Cressman

Professor, Mathematics

Masoud Jelokhani-Niaraki

Assistant Professor, Chemistry

Additional Members of the Program

John Katsaras

National Research Council of Canada, Chalk River ON

Martine Monette

Bruker Canada, Milton ON

MSc Program

Admission Requirements

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 defence 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 from the MSc program in Biophysics, or who complete the MSc program in Biophysics 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 emphasize 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 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*6950 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.

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*7540 Selected Topics in Experimental Biophysics U [0.50]

Offered on demand

PHYS*7570 Special Topics in Biophysics U [0.50]

Offered on demand

Courses in Related Subjects:

Biomedical Sciences

BIOM*6110	0.5	Advanced Microscopy for Biomedical Sciences
BIOM*6160	0.5	Cellular Biology
BIOM*6190	0.5	Tissue Culture Techniques in Biomedical Sciences

Chemistry

CHEM*7360	0.5	Regulation in Biological Systems
CHEM*7370	0.5	Enzymes
CHEM*7380	0.5	Cell Membranes and Cell Surfaces
CHEM*7310-7330	0.5	Selected Topics in Biochemistry

Computing and Information Science

CIS*6040	0.5	Advanced Image Analysis
CIS*6050	0.5	Advanced Neural Networks: Dynamical Recurrent Networks
CIS*6060	0.5	Bioinformatics
CIS*6080	0.5	Genetic Algorithms
CIS*6420	0.5	Artificial Neural Networks

Engineering

ENGG*6070	0.5	Medical Imaging
ENGG*6130	0.5	Physical Properties of Biomaterials
ENGG*6150	0.5	Bioinstrumentation
ENGG*6560	0.5	Advanced Digital Signal Processing

Human Biology and Nutritional Sciences

HBNS*6020	0.5	Biodynamics
HBNS*6030	0.5	Applied Ergonomics
HBNS*6440	0.5	Nutrition, Gene Expression and Cell Signalling

Mathematics and Statistics

MATH*6051	0.5	Mathematical Modelling
MATH*6071	0.5	Biostatistics
STAT*6761	0.5	Survival Analysis
STAT*6850	0.5	Advanced Biometry
STAT*6950	0.5	Statistical Methods for the Life Sciences
STAT*6960	0.5	Design of Experiments and Data Analysis for the Life SciencesM

Microbiology

MICR*6040	0.5	Advanced Microbial Physiology
MICR*6070	0.5	Bacterial Structures and Virulence
MICR*6423	0.5	Advances in Immunology and Immunochemical Techniques
MICR*6500	0.5	Microbial Genetics

Molecular and Cellular Biology

MBG*6060	0.5	Topics in Cell Biology and Genetics
MBG*6100	0.5	High Resolution Microscopy for Molecular Biologists
MCB*6110	0.5	Protein Structural Biology and Bioinformatics
MCB*6210	0.5	Structure and Function of Biological Membranes

Physics

PHYS*7010	0.5	Quantum Mechanics I
PHYS*7020	0.5	Quantum Mechanics II
PHYS*7040	0.5	Statistical Physics I
PHYS*7050	0.5	Statistical Physics II

Botany

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

- **Ecology, Evolution and Systematics** -- Ackerman, Caruso, Husband, Klironomos, Larson, 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.

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Steven G. Newmaster

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Usher Posluszny

BSc, PhD McGill - 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

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 honours 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.

Degree Requirements

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

Courses (minimum of 1.5 credits) which are acceptable to the department and the Dean of Graduate Studies as graduate credits, are required. Courses included in the Graduate Calendar have graduate credit. IBIO*6630 Scientific Communication I and IBIO*6640 Scientific Communication II are mandatory for MSc students in the Department of Integrative Biology. Undergraduate courses may be taken on the advisory committee's recommendation as additional courses.

Students must prepare a written research proposal on their research topic which is acceptable to their advisory committee. The oral presentation of the proposal is public. The research proposal may be taken as a course. MSc students in the Department of Integrative Biology must take IBIO*6630 and IBIO*6640 as mentioned above. MSc students in the Department of Molecular and Cellular Biology may take MBG*6080 Research Topics Course.

An acceptable thesis has to be prepared for the final MSc oral examination, at which time the thesis is defended. The usual duration of the MSc program is six semesters.

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.

Admission Requirements

Applicants for the PhD program should have a recognized master's degree with a 75% ('B') average in their postgraduate studies. Direct admission of honours baccalaureate graduates to the PhD program is normally not granted and will only be considered for students with a superior average academic standing (at least 80% or 'A-' during the last four semesters or two years of study).

Degree Requirements

Students in the PhD degree program are required to prepare and defend an acceptable research proposal, pass a qualifying examination, and prepare and defend an acceptable thesis. There are no specific minimum course requirements, except for students accepted directly after an honours baccalaureate degree (see under Degree Requirements for the MSc program).

Students must prepare a written research proposal on their research topic which is acceptable to their advisory committee. The oral presentation of this proposal is public.

The qualifying examination is used to determine whether or not the student has the academic foundation and native ability to complete the PhD degree. A student will be required to withdraw from the PhD program if the qualifying examination is not passed (one repeat is permitted).

An acceptable thesis has to be prepared for the final PhD oral examination, at which time this thesis is defended. The examination committee includes an appropriate external examiner. The usual duration of the program is nine semesters.

Courses

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.

BOT*6438 Plant Metabolism U [0.50]

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 included are 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.

Plant Anatomy and Morphology

BOT*6405 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.

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.

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

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BS, MBA, PhD Cornell - Professor

Geoffrey W. Smith

MBA Guelph - Associate Professor

John Walsh

BA Thames Polytechnic, MBA, PhD Western Ontario - 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:

- Financial and Managerial Accounting AGBU*6180
- Financial Management AGBU*6200
- Foundations of Human Resource Management HTM*6140
- Foundations of Management Leadership HTM*6110
- Management Communications HTM*6050
- Operations Management HTM*6800
- Research Methods for Managers HTM*6150

Specialization Courses

Food and Agribusiness Management

The Food and Agribusiness Management specialization is designed to prepare graduates for advanced careers in the food, agribusiness and production agriculture sectors.

Working with faculty of the Department of Food, Agricultural and Resource Economics, participants complete advanced courses related to the food and agribusiness sector:

- Food and Agribusiness Economics & Policy AGBU*6100
- Managing Price Risk AGBU*6510
- Marketing Management AGBU*6120
- Food & Agribusiness Strategic Management AGBU*6400
- Marketing Research and Analysis AGBU*6520

Hospitality and Tourism Management

The Hospitality and Tourism Management specialization is designed to prepare graduates for advanced careers in the accommodation, food service and tourism industries.

Working with faculty from the School of Hospitality and Tourism Management, participants complete advanced courses related to the hospitality and tourism sector:

- Hospitality and Tourism Economics & Policy HTM*6170
- Revenue Management HTM*6510
- Hospitality and Tourism Marketing HTM*6300
- Managing Service Quality HTM*6550
- Safety and Risk in Hospitality and Tourism HTM*6530
- Hospitality and Tourism Strategic Management HTM*6700

In addition, the program allows participants to choose to complete the requirements for the MBA degree by additional elective courses or by the completion of a major research project.

Major Research Project

The major research project is comprised of developing a research proposal, researching an applied management problem and requires data collection, analysis and the ability to link understanding of the problem with an appropriate body of literature.

Degree Requirements

MBA Online

The University of Guelph Executive Master of Business Administration (Online) program operates on a full cost recovery basis delivering a highly successful distance learning program that is a combination of electronic coursework and two one-week residential periods.

Guelph's MBA program offers specializations in Hospitality and Tourism Management and Food and Agribusiness Management, and requires completion of thirteen courses and a major research project or fifteen courses.

Online courses are offered as 8-week modules that require approximately 20 hours of study per week. With Internet service you can study anywhere, anytime with the flexibility that enables you to balance family, career and study priorities.

The two one-week residential components are held at the University of Guelph, Ontario, Canada in the summer of each year.

Program Time Commitment and Duration

Participants normally complete the Online MBA within three years. Regulations state that participants must complete the program within six years. Courses are completed in sequence and are typically two months in length. Students are expected to devote 20 to 25 study hours per week to participate in the program.

MBA On campus

The MBA on campus program is designed for people who wish to complete the MBA in one intensive year of study.

The MBA on campus program also requires completion of thirteen courses and a major research project or the program may be completed entirely by coursework by completing fifteen courses.

The courses are completed on campus at the University of Guelph. Participants complete required coursework in three consecutive semesters beginning annually in September. A fourth semester is sometimes necessary to complete a major research project or thesis.

Computer Systems Requirements

On-Line MBA: Equipment Requirements

MBA Online participants are required to have Microsoft Office software and adequate peripherals to support the learning system, which must include CD-ROM capability and a sound card. A basic level of computer literacy is strongly recommended for the MBA program.

Online MBA participants are solely responsible to arrange for purchase/maintenance of recommended computer systems and software, and should have a contingency plan in the event of system failure. Participants may be required to upgrade minimum hardware/software based on rapidly changing industry standards and continuous development of state-of-the-art learning tools.

For information pertaining to the computer requirements contact our program administrative staff or visit our MBA web site: <http://www.mba.uoguelph.ca/>

On Campus MBA: Equipment Requirements

It is recommended that all On Campus MBA participants have access to a lap top 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 Financial and Managerial Accounting

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 group 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 trading strategies and on the policy and corporate governance framework necessary to support effective management.

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.

Restriction(s): Non MBA students only by permission of instructor.

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.

Restriction(s): Non MBA students only by permission of instructor.

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.

Restriction(s): Non MBA students only by permission of instructor.

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.

Restriction(s): Non MBA students only by permission of instructor.

HTM*6220 Special Topics in Management Issues F,W,S [0.50]

An advanced course for those specializing in management, marketing or organizational behaviour. Deals with current and future topics, trends and problems in the industry, strategic planning, and the integration of management, marketing, and organizational behaviour.

HTM*6300 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.

Restriction(s): Non MBA students only by permission of instructor.

HTM*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.

Prerequisite(s): HTM*6300

Restriction(s): Non MBA students only by permission of instructor.

HTM*6530 Safety, Security and Risk Assessment in HTM 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.

Restriction(s): Non MBA students only by permission of instructor.

HTM*6550 Managing Service Quality S [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.

Restriction(s): Non MBA students only by permission of instructor.

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.

Restriction(s): Non MBA students only by permission of instructor.

HTM*6800 Operations 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.

Restriction(s): Non MBA students only by permission of instructor.

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.

Courses in Other Programs

Various programs offer other courses that may be used to fulfill graduation requirements. These programs include agricultural economics, computing and information science, economics, philosophy, psychology, mathematics and statistics, sociology, rural planning and development. Students should discuss changes in the typical program with the graduate coordinator or their advisor prior to final course selection.

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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Craig J. Pearson

BSc Western Australia, MSc Guelph, PhD Macquarie - Dean, Ontario Agricultural College

MSC Program

Rural Extension Studies 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 School of Rural Extension Studies 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 the equivalent, must be completed. Thesis and major paper options are available. For the thesis option, 3.0 credits plus a research thesis are required; for the major paper option, 4.0 credits plus the Major Research Paper are required. All students must complete the core courses (described in the course list for this program).

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

All students will be required to complete a thesis or major research paper.

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 is a major participant in the PhD in rural studies in the field of sustainable rural communities. Included in the graduate faculty for the program are G. C. Filson, J. Janakiram, A. Lauzon, J. Mahone, H. Hambly Odame, and R. Ramirez. This PhD program provides opportunities for students to be advised by faculty in this program. PhD students will enroll in the interdepartmental Rural Studies program.

Courses

Disciplinary Core

plus Analytical Methods, RPD*6380 or EDRD*6000

REXT*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.

REXT*6260 Research Methods 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.

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.

Prerequisite(s): RPD*6170 or REXT*6260 or LARC*6610

Rural Extension Processes

REXT*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.

REXT*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.

REXT*6320 Capacity Building for Sustainable Development U [0.50]

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.

REXT*6330 Facilitation and Conflict Management U [0.50]

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. Visits to community-facilitated meetings will be part of the course.

Communication Technology

REXT*6420 Development Communication U [0.50]

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.

Other (May be applicable in either or both of the above fields)

REXT*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).

REXT*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.

REXT*6410 Readings in Capacity Building and Extension U [0.50]

A program of supervised independent study related to the student's area of concentration.

REXT*6690 Decision Making and Conflict U [0.50]

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.

REXT*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.

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.

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MSc, PhD, DSc Warsaw - Professor

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BSc, PhD York University - Assistant Professor

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BSc, PhD Toronto - Associate Professor

John F. Honek

BSc, PhD McGill - Professor

Vassili Karanassios

BSc Thessaloniki, PhD Alberta - Professor

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K. Tong Leung

BSc, PhD British Columbia - Professor

Wing-Ki Liu

BSc, MSc, PhD Illinois - Professor

Qing-Bin Lu

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BSc, PhD Dalhousie - Associate Professor

Bruce Reed

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Russell Rodrigo

BSc Ceylon, PhD Nottingham - Adjunct Professor

James J. Sloan

BSc, PhD Queen's - Professor

Xiao-Wu (Shirley) Tang

BS Huazhong University of Science and Technology, PhD Massachusetts Institute of Technology - Assistant Professor

Scott Taylor

BSc McGill, MSc, PhD Toronto - Associate Professor

MSc 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).

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 (GWC)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 Bunce 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 (GWC)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

CHEM*7100 Selected Topics in Inorganic Chemistry I U [0.50]

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.

CHEM*7110 Selected Topics in Inorganic Chemistry II U [0.50]

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.

CHEM*7120 X-ray Crystallography U [0.50]

Introduction: crystals, basic concepts; space groups: the reciprocal lattice; x-ray diffraction; the phase problem; structure factors; electron density; small molecule structure solution, structure refinement, structure results, journals and databases, paper writing.

CHEM*7130 Chemistry of Inorganic Solid State Materials U [0.50]

Introduction to solid state chemistry, common crystal structures, principles of solid state synthesis, theory and experimental methods for characterizing solids, including thermal analysis techniques, powder x-ray and neutron diffraction methods; special topics to include one or more of the optical, electronic, magnetic, or conductive properties of inorganic materials. Prerequisites: one semester-long undergraduate course (at least third-year level) in inorganic chemistry, preferably with content in structural and/or solid state.

CHEM*7150 Structure and Bonding in Inorganic Chemistry U [0.50]

Free electron, Hückel and extended Hückel methods for molecules and clusters. Perturbation theory. Applications of group theory in inorganic chemistry; Jahn-Teller effects in molecules and solids. Energy bands in one, two and three dimensions. Prerequisites: three semester-long undergraduate courses in inorganic chemistry and one semester-long undergraduate course in quantum mechanics or group theory.

CHEM*7170 Advanced Transition Metal Chemistry U [0.50]

Magnetochemistry of transition metal compounds. Electronic spectra of complex ions including applications of molecular orbital and ligand field theories. Stabilization of unusual oxidation states and co-ordination numbers. Bonding, structure and reactivity of certain important classes of metal complexes, e.g., metal hydrides, metal-metal bonded species, biologically significant model systems such as macrocycles.

CHEM*7180 Advanced Organometallic Chemistry U [0.50]

Reactions, structure and bonding of organometallic compounds of transition and non-transition metals.

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; instrumental characteristics; 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 (LLC, LSC, GPC, IEC), supercritical fluid (SFC) chromatographies; GC-MS, CG-FTIR; 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 chronamperometry, chronocoulometry, polarography, voltammetry, chronopotentiometry, coulometric titrations, flow techniques, electrochemical sensors and chemically modified electrodes.

CHEM*7290 Surface Analysis U [0.50]**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]

Mechanisms of regulation of metabolism - enzyme clusters; phosphorylation and protein kinases/phosphatases, repression and induction, protein turnover. Regulation of transcription, translation and mRNA processing. Cell cycle and control of cell division.

CHEM*7370 Enzymes U [0.50]

Mechanisms of rate enhancement. Enzyme kinetics - steady state; inhibitors; bisubstrate enzymes; fast reaction kinetics. Enzyme reaction mechanisms. Structural and genetic modification of enzymes. Catalytic antibodies. Binding processes. Multiple sites and co-operativity. Allosteric enzymes and metabolic control. Catalysis by RNA.

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 Schrodinger 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; electrolyte 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; electrolyte 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; electrolyte theory; non-electrolyte solution theory, thermodynamics of biological systems; thermodynamics.

CHEM*7530 Selected Topics in Physical 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: principles of magnetic resonance in biological systems; collisions, spectroscopy and intermolecular forces, surface chemistry; catalysis; electrolyte theory; non-electrolyte solution theory, thermodynamics of biological systems; thermodynamics.

CHEM*7550 Kinetics - Dynamics U [0.50]

Empirical analysis. Kinetic theory of gases. Potential energy surfaces. Unimolecular rates. Relaxation and steady state methods. Diffusion rates. Rates between polar molecules. Energy transfer.

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.

CHEM*7690 Physical Organic Chemistry U [0.50]

Linear free energy relationships; substituent effects and reactive intermediates.

Polymer**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 kinet

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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DVM, DVSc Guelph, Dipl. ACVIM - Assistant Professor

Nick Whelan

BSc, BVSc, MVSc Massey - Assistant Professor

J. Paul Woods

DVM Guelph, MS Wisconsin, Dipl. ACVIM - Associate Professor

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 spring (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 spring (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 spring (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 DVSc 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 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 spring (S) semesters respectively. The student is required to prepare a paper for publication in a recognized 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 spring (S) semesters respectively. The student is required to prepare a paper for publication in a recognized 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 spring (S) semesters respectively. The student is required to prepare a paper for publication in a recognized 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.

CLIN*6710 Pathophysiology in Small Animal Surgery II 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.

Anesthesiology**CLIN*6420 Anesthesiology I S [0.50]**

A course in advanced veterinary anesthesia and allied topics such as fluid, acid-base, and electrolyte balance, shock therapy, and cardio pulmonary resuscitation.

CLIN*6440 Anesthesiology II F,W,S [0.50]

A discussion, reading and investigative course on research methods in comparative anesthesiology. Course CLIN*6420 is normally a prerequisite.

Radiology**CLIN*6330 Advanced Principles of Diagnostic Imaging U [0.50]**

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.

CLIN*6350 Advanced Radiology I W [0.50]

Radiographic changes seen in diseases of the thorax and abdomen are demonstrated by using radiographs. Contrast and special studies are included where applicable.

CLIN*6370 Advanced Radiology II F [0.50]

A continuation of CLIN*6350, covering radiographic abnormalities of the neurological and skeletal systems.

General**CLIN*6900 Clinical "Grand Rounds" Seminar F-W [0.25]**

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.

CLIN*6920 Veterinary Clinical Practice I F [0.50]

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 spring semesters respectively.

CLIN*6930 Veterinary Clinical Practice II W [0.50]

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 spring semesters respectively.

CLIN*6940 Veterinary Clinical Practice III S [0.50]

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 spring semesters respectively.

CLIN*6950 Special Topics in Clinical Studies F,W,S [0.50]

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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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 amount of spaces are filled 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 can 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/?q=graduate#forms>

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 fulfil 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 seminar must be presented before the final semester of the candidate, and no earlier than the third semester after entering the program. 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. Entrants 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 can 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 summarizing the progress in the previous program including the qualifying examination.

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/?q=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 before the semester when the Qualifying Examination is completed, and no earlier than the third semester after entering the program. The second seminar must be presented after the semester when the Qualifying Examination is completed, during the final year but before the final semester of the candidate. 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

CIS*6000 Distributed Systems U [0.50]

The evolution of high-performance distributed computer systems. Models for distributed processing. Taxonomy and performance evaluation of multiprocessor systems. Interconnection networks. Memory and I/O system for multiprocessor architectures. Performance of distributed systems. Architectural issues of distributed database systems.

CIS*6020 Knowledge Representation and Expert Systems U [0.50]

The major features of expert systems today: a discussion of logic and rule-based systems; forward and backward chaining; frames, scripts, semantic nets and the object-oriented approach; the evaluation of expert systems and knowledge acquisition. A sizeable project is required and applications in other areas are encouraged.

CIS*6030 Advanced Database Systems U [0.50]

Relational database systems, advanced features of database management, concurrency protocols, data integrity, transaction management, distributed databases, remote access, data warehousing, data mining, and deductive databases.

CIS*6040 Advanced Image Analysis U [0.50]

An insight into advanced topics in image processing and analysis. A study of methods for analyzing and interpreting information from two and three-dimensional images obtained from a variety of medical and biological imaging modalities.

CIS*6050 Advanced Neural Networks: Dynamical Recurrent Networks U [0.50]

Artificial neural networks, dynamical recurrent networks, dynamic input/output sequences, communications signal identification, syntactic pattern recognition.

CIS*6060 Bioinformatics U [0.50]

Data mining and bioinformatics, molecular biology databases, taxonomic groupings, sequences, feature extraction, Bayesian inference, cluster analysis, information theory, machine learning, feature selection.

CIS*6070 Discrete Optimization U [0.50]

This course will discuss problems where optimization is required and describes the most common techniques for discrete optimization such as the use of linear programming, constraint satisfaction methods, and genetic algorithms.

CIS*6080 Genetic Algorithms U [0.50]

This course introduces the student to basic genetic algorithms, which are based on the process of natural evolution. It is explored in terms of its mathematical foundation and applications to optimization in various domains.

CIS*6090 Hardware/Software Co-design of Embedded Systems U [0.50]

Specification and design of embedded systems, system-on-a-chip paradigm, specification languages, hardware/software co-design, performance estimation, co-simulation and validation, processes architectures and software synthesis, retargetable code generation and optimization.

CIS*6100 Parallel Processing Architectures U [0.50]

Parallelism in uniprocessor systems, parallel architectures, memory structures, pipelined architectures, performance issues, multiprocessor architectures.

CIS*6120 Uncertainty Reasoning in Knowledge Representation U [0.50]

Representation of uncertainty, Dempster-Schafer theory, fuzzy logic, Bayesian belief networks, decision networks, dynamic networks, probabilistic models, utility theory.

CIS*6130 Object-Oriented Modeling, Design and Programming U [0.50]

Objects, modeling, program design, object-oriented methodology, UML, CORBA, database

CIS*6140 Software Engineering U [0.50]

An introduction to the field of software engineering. Course covers issues such as requirements analysis, specifications, software architectures, quality assurance, and software metrics.

CIS*6150 Complexity of Parallel Computation U [0.50]

Computing models, sequential model, complexity models, evolution of parallelism, parallel complexity, P-completeness, survey of P and NC, open problems.

CIS*6160 Multiagent Systems U [0.50]

Intelligent systems consisting of multiple autonomous and interacting subsystems with emphasis on distributed reasoning and decision making. Deductive reasoning agents, practical reasoning agents, probabilistic reasoning agents, reactive and hybrid agents, negotiation and agreement, cooperation and coordination, multiagent search, distributed MDP, game theory, and modal logics.

CIS*6200 Design Automation in Digital Systems U [0.50]
Techniques and software tools for design of digital systems. Material covered includes high-level synthesis, design for testability, and FPGAs in design and prototyping.
CIS*6320 Image Processing Algorithms and Applications U [0.50]
Brightness transformation, image smoothing, image enhancement, thresholding, segmentation, morphology, texture analysis, shape analysis, applications in medicine and biology.
CIS*6420 Artificial Neural Networks U [0.50]
Neural networks, artificial intelligence, connectionist model, back propagation, resonance theory, sequence processing, software engineering concepts.
CIS*6450 Software Systems Development and Integration U [0.25]
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.
CIS*6490 Analysis and Design of Computer Algorithms U [0.25]
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.
CIS*6650 Topics in Computer Science I U [0.50]
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.
CIS*6660 Topics in Computer Science II U [0.50]
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. <i>Restriction(s):</i> Requires instructor's signature.
CIS*6890 Technical Communication and Research Methodology U [0.50]
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.

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 and public sector organizations. The department's graduate program leads to the master of science degree in consumer studies.

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MSc Program

The MSc program draws on a variety of disciplines for theory, concepts, and research methods. Students are required to successfully complete four departmental core courses, one in consumption behaviour theory and three graduate courses in measurement and analysis. Two elective courses are selected by the student in conjunction with the graduate coordinator and/or his/her advisory committee and are 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 consumer studies direct their course work and thesis research toward applications related to marketing within private and public 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 toward the pursuit of a PhD in the marketing or consumer behaviour.

Students with a marketing orientation to their research complete theses in one of the following areas: consumer behaviour, advertising, pricing, services, or the management of marketing, frequently with respect to a specific industry (e.g., food, textiles & clothing, housing & real estate development, various services).

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 consumer studies seminar (COST6950) for each semester of full-time graduate study. The program consists of:

Fall Semester:

COST*6000	Consumption Behaviour Theory
COST*6050	Research in Consumer Studies
1 elective: If have not taken COST*3100 (Economic Behaviour of Households) or equivalent, take	
COST*6370	Consumer Economics OR an alternative elective*
COST*6950**	Department Seminar

Winter Semester:

COST*6080	Qualitative Methods
COST*6060	Multivariate Methods
(Or 2 suitable methods courses)	
1 elective*	
COST*6950**	Department Seminar

Note

*Chosen by the graduate student with the approval of the graduate coordinator and his/her advisory committee

Note

**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 (see Department of Marketing and Consumer Studies web site for graduate faculty phone numbers and e-mail addresses).

All applicants should have completed a minimum of one course in statistics as well as intermediate microeconomics as part of their undergraduate program. Applicants are also encouraged to have completed courses in areas such as marketing, consumer behaviour, economics, 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, enrolment in the consumer studies seminar (COST*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.

COST*6000 Consumption Behaviour Theory F [0.50]

A review of the nature and scope of consumption behaviour and the approaches to studying the role of human consumption using the major theoretical perspectives.

COST*6010 Product Development and Management Systems U [0.50]

The development of organizational technology and innovation strategy; product/market-strategy formulation; issues associated with product development, product management and consumer affairs.

COST*6020 Marketing Strategy & Decision Support Systems U [0.50]
The application of knowledge about consumer behaviour, markets, research, problem-solving approaches, and concepts and principles of marketing to the analysis of marketing situations and problems, and the formulation of marketing strategy and policy. Includes the use of marketing-decision support systems, simulations and models for strategy formulation and decision making for product development, test marketing, and marketing-mix decisions.
COST*6050 Research in Consumer Studies F [0.50]
A comprehensive review of measurement theory, including issues such as construct definition, scale development, validity and reliability. Applicants of measurement principles will be demonstrated, particularly as they relate to experimental and survey research design.
COST*6060 Multivariate Research Methods W [0.50]
A review of selected multivariate analysis techniques as applied to marketing and consumer research. Topics include regression, anova, principal components, factor and discriminant analysis, nonmetric scaling and trade-off analysis. The course uses a hands-on approach with small sample databases available for required computer-program analysis.
COST*6080 Qualitative Methods for Consumer Research W [0.50]
A review of the nature, importance and validity issues associated with qualitative research. Topics include theory and tactics in design, interpersonal dynamics, analysis of interaction and transcripts.
COST*6090 Special Topics in Consumer Research and Analysis U [0.50]
COST*6120 Marketing Management U [0.50]
A study of marketing decision-making with emphasis on the formulation of strategic marketing plans.
COST*6150 Quality Assurance Management U [0.50]
Examination and review of principles and concept of quality assurance and their application to consumer products and services. Topics include applied aspects of total-quality management principles.
COST*6260 Special Topics in Food Marketing U [0.50]
COST*6300 Special Topics in Consumer Studies U [0.50]
COST*6310 Retail Systems and Strategy U [0.25]
The analysis and evaluation of evolving retailing systems. Topics include retail structure and strategy, environmental change and retail adaptation, location analysis and operation management.
COST*6320 Promotion Management U [0.25]
A review of the concepts, principles and theory of promotion and promotion management. Topics include the structure of the promotion and advertising industry, consumer decision-making, information processing, response to promotion, copy development, media selection, and evaluation.
COST*6350 Consumer, Business and Government Relations F,W [0.25]
The development of an original and critical perspective to major issue development and macro-level-policy formation processes concerned with business and government interfaces, business and consumer interfaces, and Canadian and international product/service standards, which provide structure for issue management and policy development.
COST*6370 Consumer Economics U [0.50]
An applied economics course focusing on aggregate consumption at the domestic/international level; financial and time allocation at the individual/household level; theoretical, mathematical and econometric analysis of consumption; applications to contemporary consumption issues and problems.
COST*6700 Special Topics in International Marketing U [0.50]
COST*6710 Special Topics in Marketing U [0.50]
COST*6720 Special Topics in Housing and Real Estate U [0.50]
COST*6950 Consumer Studies Seminar F,W [0.00]

Drama

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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*6060 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*6080 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*6090 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*6120 Aspects of 20th-Century Theatre U [0.50]

A seminar on selected aspects of theatre in the 20th century.

DRMA*6150 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*6180 Aspects of 19th-Century Theatre U [0.50]

A seminar on selected aspects of theatre in the 19th century.

Dramatic Literature and Criticism

DRMA*6020 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*6040 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*6050 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*6100 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*6130 Aspects of 19th-Century Drama U [0.50]

Studies of selected scripts from the 19th century, providing opportunities for detailed analyses of particular writings, periods, or genres in their social and cultural contexts

DRMA*6140 Aspects of 20th-Century Drama U [0.50]

Studies of selected scripts from the 20th century, providing opportunities for detailed analyses of particular writings, periods, or genres in their social and cultural contexts.

DRMA*6190 Special Studies in Drama U [0.50]

Detailed study of a particular aspect of dramatic literature, providing opportunities for the student to pursue in depth an area of specialized research.

Other Courses

DRMA*6280 Independent Reading Course U [1.00]

Independent Reading Course

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

DRMA*6802 Reading Course II 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. A Co-op stream is available to a limited number of students in the MA program. Students may also register in this Department to take the Collaborative International Development Studies (CIDS).

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MA Program

The MA program contains core courses in theory and quantitative methods. Fields are offered in most areas of economics.

Admission Requirements

The university requires that students have the equivalent of an honours degree at the baccalaureate level.

Admission to the MA program requires that students have a solid background in economic theory and econometrics from a recognized undergraduate program. Normally, the Department requires a 'B+' (upper-second class) average as a minimum.

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.

MA Co-op Stream

This option is part of a number of initiatives designed to increase the readiness of our graduates for the workplace. The co-op program is available only to Canadians and permanent residents. Degree requirements are the same as for the existing MA with the addition of one or two (consecutive) work semesters (four or eight months) and the writing of a work report. The length of the program is four or five semesters. The location of the work placement is arranged jointly by the Department of Economics and the University's Co-op Office. Admission is based partly on academic performance and partly on the student's resume.

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.)

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	Econometrics I
ECON*6160	Econometrics II

Theory

ECON*6000	Microeconomic Theory I
ECON*6010	Microeconomic Theory II
ECON*6020	Macroeconomic Theory I
ECON*6040	Macroeconomic Theory II

Year II: Research Paper

During the summer of the second year and only after the theory comprehensive exams are passed, students must prepare a research paper under the supervision of a faculty member. Once the paper is deemed to be acceptable, the advisor notifies the Graduate Coordinator who in turn notifies the Dean of Graduate Studies that the student has 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.

Year III and IV: Thesis

Submission and defence 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 judgement on the part of the candidate. Theses must be submitted within 48 months of completing the minimum duration.

Interdepartmental Programs

Collaborative International Development Studies MA Program (CIDS)

The Department of Economics participates in the Collaborative International Development Studies (CIDS) program. Applicants for this program enter through one of the participating departments; course selections are based, in part, on the applicant's primary discipline. Those faculty members in the Department of Economics whose research and teaching expertise includes aspects of international development studies may serve as advisors for these MA students. 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.

Business Studies MBA Program

The Department of Economics participates in the MBA program in the fields of agribusiness management which is offered by the Department of Food, Agricultural and Resource Economics.

Courses

Economic Theory

ECON*6000 Microeconomic Theory I U [0.50]

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 U [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 U [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 U [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 econometrics 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.

Other

ECON*6300 International Trade Theory U [0.50]

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.

ECON*6400 Public Finance U [0.50]

This course surveys the normative theory of the public sector. Topics may include public expenditure theory, tax theory, cost benefit analysis and fiscal federalism.

ECON*6650 Economics of Social Welfare U [0.50]

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.

ECON*6700 Industrial and Market Organization U [0.50]

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.

ECON*6750 Managerial Economics U [0.50]

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.

ECON*6770 Financial Management U [0.50]

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.

ECON*6930 Reading Course U [0.50]

In some circumstances, students may arrange to take a reading course under the direction of a faculty member.

ECON*6940 Research Project U [1.00]

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.

Engineering

The graduate degree programs in engineering include research and course work options, as well as full- and part-time studies. A thesis-based MSc degree program is available in four research fields: biological engineering, environmental engineering, engineering systems and computing, and water resources engineering. An MEng degree is offered in three areas: water resources engineering, environmental engineering and biological engineering.

The research-based MSc and PhD programs provide the opportunity to obtain advanced training in the engineering sciences and in research methodology through a variety of applied and basic research topics and courses. They provide for specialization in the fields of biological engineering, environmental engineering, engineering systems and computing, and water resources engineering. Biological engineering research concentrates biological processing environments and human factors; it covers physical processing of food, restructuring of foods and wastes, physical properties of biological materials, and biomechanics. Environmental engineering research examines methods to understand and enhance processes central to environmental protection. It includes the assessment of the fates of substances in the environment, development of new process technology and remediation of contaminated material and sites. Water resources engineering research concentrates on watershed engineering, hydrology, erosion, drainage & irrigation flood control, water-resource systems management, soil and water conservation, storm water and water-quality management. Engineering Systems & Computing research examines techniques, methods and procedures for systems where the computer plays an integral role. In today's society, a computer is intimately integrated into industrial processes and everyday appliances and equipment. Research encompasses aspects of software, hardware, intelligence as well as a focus on particular application areas. Software areas include real-time systems, embedded computing, distributed processing as well as communication systems. Hardware areas include VLSI, special purpose computing and embedded systems. Intelligent systems exploration into control, autonomous robotics, machine vision, image processing, soft computing and human-machine interfaces. Typically a research project will be within the scope of an application area, for example automation, biomedical, food sciences or environmental.

The objective of the MEng degree in biological engineering, water resources engineering and environmental engineering is to provide students (mostly practising engineers) the opportunity to extend their understanding of engineering principles involved in these disciplines beyond the coverage possible in an undergraduate program and to enlarge their grasp of the application of these principles to the solution of complex, practical problems. Areas of emphasis currently covered in water resources engineering are hydrologic modelling and model applications of water supply assessment, pollutant transport and management, watershed management, agricultural water management including irrigation, drainage, erosion and sediment transport and design of naturalized channels. The areas of emphasis currently covered in environmental engineering are water treatment, site remediation, management of agriculture and municipal solid and liquid wastes and risk assessment. Areas of emphasis currently covered in biological engineering are food engineering, and bioprocess engineering.

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February 8, 2007

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MSc Program

Admission Requirements

MSc by Thesis

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

- Bachelor's degree in engineering or equivalent. At least a second class honours standing in the work of the last four full-time semesters or the last two complete undergraduate years.
- Science degree 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. Applicant must have demonstrated an acceptable analytical ability by having taken a sufficient number of courses in mathematics, chemistry and physics. Applicant must be prepared to make-up undergraduate engineering courses without receiving graduate credit in topics related to the research project.

MEng Program

Applicant must be a graduate from an honours 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.

Applicant must have demonstrated an acceptable analytical ability by having taken a sufficient number of courses in mathematics, and the physical sciences.

For the environmental engineering degree the applicant must have a minimum of three of the following courses or equivalent:

- Introduction to Environmental Engineering
- Engineering Unit Operations

- Water Quality
- Air Quality
- Solid Waste Management
- Water and Wastewater Treatment
- Ecology.

For water resources engineering the applicant must have four of the following courses or equivalent:

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

For biological engineering the applicant must have a minimum requirement of three of the following courses or equivalent.

- 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.

Applicant qualifications may be assessed via an entrance interview/oral examination conducted by the graduate co-ordinator 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. The student will be admitted on probation until the requirements have been completed. These courses will not count toward the student's graduate credit requirements.

Degree Requirements

MSc 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, including the Engineering Seminar course and at least two other engineering 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 studies program 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 the student will make arrangements with one of the graduate faculty to act as 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 MSc 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 MSc degree. At least 1.5 of the credits must be at the graduate level, including the Engineering Seminar course and at least two graduate engineering courses. Under special circumstances the school may reduce the requirement for 1.5 credits in graduate courses; 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.

Students who have completed their MSc degree in the School of Engineering are not required to enrol in the graduate Engineering Seminar course, and their credit requirements are reduced. 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]
Basic physical principles of transport phenomena. Heat and mass transfer methods for physical systems. Time and volume averaging. Dimensional analysis.
ENGG*6020 Advanced Fluid Mechanics U [0.50]
Laminar and turbulent flow. Turbulence and turbulence modelling. Boundary-layer flow. Compressible flow. Potential flow.
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]
Boundary-value problems. Methods of approximation. Time dependent problems. Isoparametric elements. Numerical integration. Computer implementation. Mesh generation and layouts. Two-dimensional finite elements.
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*6090 Special Topics in Engineering W [0.50]
A course of directed study involving selected readings and analyses in developing knowledge areas which are applicable to several of the engineering disciplines in the School of Engineering.

Biological Engineering

ENGG*6110 Food and Bio-Process Engineering W [0.50]
Kinetics of biological reactions, reactor dynamics and design. Food rheology and texture; water activity and the role of water in food processing; unit operations design-thermal processing; and drying, freezing and separation processes.
ENGG*6120 Fermentation Engineering F [0.50]
Modelling and design of fermenter systems. Topics include microbial growth kinetics, reactor design, heat and mass transfer. Instrumentation and unit operations for feed preparation and product recovery. Prerequisite: undergraduate course in each of microbiology, heat and mass transfer, and biochemistry or bioprocess engineering.
ENGG*6130 Physical Properties of Biomaterials F [0.50]
Rheology and rheological properties. Contact stresses between bodies in compression. Mechanical damage. Aerodynamic and hydro-dynamic characteristics. Friction.
ENGG*6150 Bio-Instrumentation W [0.50]
Instrumentation systems. Transducers. Amplifier circuits. Recording methods. Spectroscopy & colorimetry. Radiation, humidity, pH and noise measurements. Chromatography.

ENGG*6160 Advanced Food Engineering F [0.50]
Application of heat and mass transfer, fluid flow, food properties, and food-processing constraints in the design and selection of food process equipment. Development of process specifications for the control of the flow of heat and moisture and the associated microbial, nutritional and organoleptic change in foods. Food system dynamics and process development.
ENGG*6170 Special Topics in Food Engineering U [0.50]
A course of directed study involving selected readings and analyses in developing knowledge areas of food engineering.
ENGG*6180 Final Project in Biological Engineering U [1.00]
A project course in which a problem of advanced design or analysis in the area of biological engineering is established, an investigation is performed and a final design or solution is presented.
ENGG*6190 Special Topics in Biological Engineering W [0.50]
A course of directed study involving selected readings and analyses in developing knowledge areas of biological engineering.
ENGG*6290 Special Topics in Agricultural Engineering U [0.50]
A course of directed study involving selected readings and analyses in developing knowledge areas of agricultural engineering.
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.

Environmental Engineering

ENGG*6610 Urban Stormwater Management W [0.50]
Continuous stormwater management models and model structure. Catchment discretization and process disaggregation. Pollutant build-up, wash off and transport. Flow and pollutant routing in complex, looped, partially surcharged pipe/channel networks including pond storage, storage tanks, diversion structures, transverse and side weirs, pump stations, orifices, radial and leaf gates and transient receiving water conditions (including tides). Pollutant removal in sewer networks, storage facilities and treatment plants.
ENGG*6620 Water Pollution Control Planning F [0.50]
Methods of developing area-wide pollution control plans and sustainable use plans in Ontario and elsewhere. Quantitative and non-quantitative information is examined in the context of planning, using continuous models such as HSP-F. Field trips.
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*6790 Special Topics in Environmental Engineering U [0.50]
A course of directed study involving selected readings and analyses in developing knowledge areas of environmental engineering.
ENGG*6950 Final Project in Environmental Engineering U [1.00]
A project course in which a problem of advanced design or analysis in the area of environmental engineering is established, an investigation is performed and a final design or solution is presented.

Engineering Systems and Computing

ENGG*6070 Medical Imaging W [0.50]
Digital image processing techniques including filtering and restoration; physics of image formation for such modalities as radiography, MRI, ultrasound. <i>Prerequisite(s):</i> ENGG*3390 or equivalent
ENGG*6100 Machine Vision F [0.50]
Computer vision studies how computers can analyze and perceive the world using input from imaging devices. Topics covered include image pre-processing, segmentation, shape analysis, object recognition, image understanding, 3D vision, motion and stereo analysis, as well as case studies.
ENGG*6140 Optimization Techniques for Engineering W [0.50]
This course serves as a graduate introduction into combinatorics and optimization. Optimization is the main pillar of Engineering and the performance of most systems can be improved through intelligent use of optimization algorithms. Topics to be covered: Complexity theory, Linear/Integer Programming techniques, Constrained/Unconstrained optimization and Nonlinear programming, Heuristic Search Techniques such as Tabu Search, Genetic Algorithms, Simulated Annealing and GRASP.
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*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. <i>Prerequisite(s):</i> 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. Instructors 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, rts 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.
<i>Prerequisite(s):</i> 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. .

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.
ENGG*6800 Deterministic Hydrological Modelling W [0.50]
Deterministic hydrological models. Function of watershed models for hydraulic design, environmental assessment, operation of water control structures, flood warning. Calculation algorithms.
ENGG*6810 Stochastic Hydrological Modelling U [0.50]
Distribution function selection for historic hydrologic data representation. Monte Carlo simulation techniques. ARMA modelling of hydrologic processes. Regional analysis. Risk analysis.
ENGG*6820 Measurement of Water Quantity and Quality U [0.50]
This course covers techniques used to measure rates of movement and amounts of water occurring as precipitation, soil water, ground water and streamflow. Available measurements of water quality are surveyed. Calculation procedures involved in the use of indirect indicators of water quantity and quality individually and in combination are described.
ENGG*6830 Design of Pressurized Flow Systems U [0.50]
Boundary resistance. Steady State and transient flow in gravity and pumped systems. Pressure control systems.
ENGG*6840 Open Channel Hydraulics W [0.50]
Basic concepts, energy principle; momentum principle; flow resistance; non-uniform flow; channel controls and transitions; unsteady flow; flood routing.
ENGG*6850 Design of Water Management Systems U [0.50]
Analytical decision making. Optimization methods. Planning under uncertainty. Deterministic river basin modelling. Irrigation planning and operation. Water quality management modelling.
ENGG*6880 Soil Erosion and Fluvial Sedimentation U [0.50]
Students will be able to (i) describe processes related to soil erosion by water, (ii) describe processes related to fluvial sedimentation, (iii) evaluate and prescribe structural and non-structural control methods, and (iv) run at least one soil erosion/fluvial sedimentation computer model if the course is satisfactorily completed.
ENGG*6900 Final Project in Water Resources Engineering U [1.00]
A project course in which an advanced design problem in the area of watershed engineering is established, a feasibility investigation performed and a final design presented.
ENGG*6910 Special Topics in Water Resources Engineering U [0.50]
A course of directed study involving selected readings and analyses in developing knowledge areas of water resources engineering.

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Alan Shepard

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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 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

ENGL*6201 Topics in Canadian Literature U [0.50]

A course to be offered at least once every academic year. This course in Canadian Literature may focus on cross-genre study or on single genres such as poetry, biography, the short story, literary memoir and/or autobiography, and poetic prose. The focus may be on such topics as the literary and general cultural production of a time-period, an age group (such as children's literature), or a specific region (such as Atlantic Canada, the Prairies, or the West Coast), or may bring together texts from two or more categories to allow for a comparative study. Other possible topics include: post-modernism and the creation of an ex-centric Canadian canon; multiculturalism and the transcultural aesthetics of Canadian writing; the construction and reinvention of a national identity and literature; and literary history, influence, reception and critique.

ENGL*6209 Topics in Commonwealth/Postcolonial Literature U [0.50]

A course to be offered at least once every academic year. A comparative study of postcolonial literatures in English. Topics may include a focus on a single area, such as India, the Caribbean, Africa, Australia, or New Zealand or may focus on the comparative study of some of these literatures, considering the construction of Third World, diasporic, or settler-invader colonies, or writing and reading practices in colonial, neo-colonial, and postcolonial environments.

ENGL*6412 Topics in Medieval/Renaissance Literature U [0.50]

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, a specific genre, or relationships between the literary and the cultural.

ENGL*6421 Topics in Eighteenth Century and Romantic Literature U [0.50]

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, a specific genre, or relationships between the literary and the cultural.

ENGL*6431 Topics in Nineteenth Century Literature U [0.50]

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, a specific genre, or a central critical question.

ENGL*6441 Topics in Modern British Literature U [0.50]

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.

ENGL*6451 Topics in American Literature U [0.50]

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.

ENGL*6611 Topics in Women's Writing U [0.50]

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.

ENGL*6621 Topics in Children's Literature U [0.50]

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.

ENGL*6641 Topics in Scottish Literature U [0.50]

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.

ENGL*6691 Interdisciplinary Studies U [0.50]

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.

ENGL*6801 Reading Course I U [0.50]

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.

ENGL*6802 Reading Course II U [0.50]

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.

ENGL*6803 Research Project U [1.00]

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.

ENGL*6811 Special Topics in English U [0.50]

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.

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.

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Hung Lee

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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.

- Entomology emphasizes applied aspects of insect pest management plus systematics, ecology, physiology, and toxicology.
- Environmental microbiology and biotechnology emphasizes the physiology, ecology, biochemistry and genetics of microorganisms with potential for environmental or

biotechnological applications. It also includes studies on microbial pathogen detection and monitoring in the environment.

- 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 honours 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 a 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 Introductory Seminar, ENVB*6710, and the Advanced Seminar, ENVB*6720, unless exempted from taking the Introductory Seminar by the advisory 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 a 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 the Advanced Seminar, ENVB*6720, and may be required by their advisory committee to take the Introductory Seminar, ENVB*6710.

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 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 for a detailed description of this program.

Courses

ENVB*6040 Molecular Basis of Plant-Microbe Interactions F [0.50]

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.

ENVB*6060 Topics in Phytopathology W [0.50]

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.

ENVB*6080 Plant Disease Epidemiology and Management W [0.50]

Epidemiology and management of plant diseases caused by fungi, viruses, and bacteria. (Offered in alternate years.)

ENVB*6180 Physiology and Biochemistry of Herbicides W [0.50]

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

ENVB*6190 Environmental Microbial Technology W [0.50]

Current topics in selected areas of environmental microbial technology. An 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.)

Restriction(s): Undergraduate degree in microbiology or related discipline.

ENVB*6340 Colloquium in Insect Systematics W [0.25]

Weekly discussions and seminars dealing with current topics in systematic entomology.

ENVB*6370 Physiology of Insects F [0.50]

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.

ENVB*6451 Topics in Environmental Biology F,W,S [0.25]

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.

ENVB*6452 Topics in Environmental Biology F,W,S [0.50]

See ENVB*6451 above.

ENVB*6520 Pollination Biology F [0.50]

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.)

ENVB*6530 Ecotoxicological Risk Characterization W [0.50]

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 TOX6530, ENVB6530 and TOX4550.) Department of Environmental Biology

ENVB*6540 Integrated Pest Management - Insects W [0.50]

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.

ENVB*6550 Bioactivity and Metabolism of Pesticides W [0.50]

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).

ENVB*6560 Forest Ecosystem Dynamics F [0.50]

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.

ENVB*6620 Management and Biology of the Honey Bee F [0.50]

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.

ENVB*6710 Introductory Seminar F [0.25]

This course provides information and training in various scientific presentation styles - written, computer generated, oral, and poster formats. Students will prepare a scientific essay based on research they have conducted and subsequently transform the essay into an oral and a poster format.

ENVB*6720 Advanced Seminar W [0.25]

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.

Family Relations and Applied Nutrition

The Department of Family Relations and Applied Nutrition offers MSc and PhD level graduate study in two fields: i) applied human nutrition and ii) family relations and human development. An accredited MSc program in couple and family therapy and a Master of Applied Nutrition professional program are 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 draws on several disciplines in the study of family dynamics and individual development within the context of the family across the life-cycle. The program promotes a broad and sophisticated understanding of human development and family functioning and supports students' specialization in an area of emphasis. Current areas of emphasis in research are:

- Child and adolescent development - parent-child relationships, peer relationships, early childhood services, program development and evaluation,
- adult development and family relations - intergenerational relations, alternate family structures, human sexuality, gerontology

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 individuals, couples, and families. 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 and gender (both men's and women's experience).

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 half-course in applied statistics; 2) one half-course in research methods; 3) two half-courses in biochemistry; 4) two half-courses in human physiology (at or beyond the second-year level); 5) two half-courses in human development/sociology/psychology/communications; 6) one 300-level and three 400-level half-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 half-course in applied statistics; 2) one half-course in one of social-science research methods; 3) one half-course in human development, child development, gerontology, parent-child relations; 4) one half-course in family sociology, social psychology, in one of family relations, family theory, communications; 5) three 400-level (senior, fourth year) half-courses. The deadline for application is February 1 of each year.

Couple and Family Therapy

General admission requirements for the MSc with an emphasis in 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; a statement of intent and a statement of research interest must be included with the application. 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. Prior to beginning the program admitted students must submit a current police check (CPIC - Canadian Police Information Centre) from their local police. Applications from outside of Canada are welcome and external interviewing appropriately explored. The deadline for application is January 10 of each year.

Degree Requirements

Applied Human Nutrition

For all students in the MSc program in applied human nutrition a minimum of seven graduate courses will be chosen in consultation with the student's adviser and advisory committee including:

FRAN*6030	Quantitative Research Methods
FRAN*6040	Introduction to Qualitative Methods
FRAN*6420	Introductory Applied Statistics
FRAN*6430	Advanced Applied Statistics I
OR	
FRAN*6050	Qualitative Analysis
FRAN*6510	Nutrition in the Community
FRAN*6610	Advances in Clinical Nutrition/Assessment I
FRAN*6550	Research Seminar

In addition, students must complete a research thesis. The courses and research may emphasize, for example, community nutrition, therapeutic nutrition, and nutritional epidemiology. The courses may be taken within the department and in other academic units of the university including Agricultural Economics and Business, Biomedical Sciences, Human Health and Nutritional Sciences, Political Science, Population Medicine, Rural Extension Studies, Sociology and Anthropology, and Rural Planning and Development.

Family Relations and Human Development

For all students in the MSc program in family relations and human development there are six required graduate courses:

FRAN*6030	Quantitative Research Methods
FRAN*6040	Introduction to Qualitative Methods
FRAN*6420	Introductory Applied Statistics
FRAN*6430	Advanced Applied Statistics I
OR	
FRAN*6050	Qualitative Analysis
FRAN*6340	Interdisciplinary Perspectives in FRHD
FRAN*6330	Research Seminar

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. Each of the emphases includes areas of research that reflect current faculty interests and is intended to help students define an area of research and study.

Couple and Family Therapy

Beyond the required courses noted in the above section on the MSc in family relations and human development, students in the Couple and Family Therapy program are required to take several additional courses. The intensive curriculum 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 and thus conduct a research study or they may choose the major research paper (non-thesis) option.

Clinical training consists of four continuous practica (FRAN*6090) within the Couple and Family Therapy Centre, plus an externship in a community agency. Prior to graduation the CFT student must accumulate 500 hours of direct therapy work with clients; with at least 250 hours (of the 500 hours) working with couples and/or families. Each practicum student receives a minimum of one hour of individual supervision for every five hours of client sessions; supervision modalities include live supervision, live observation, and case consultation. All program faculty are Clinical Members and Approved Supervisors or Supervisor Candidates of the American Association for Marriage and Family Therapy (AAMFT).

In addition to the required courses for the MSc in family relations and human development and the five practica, students in the Couple and Family Therapy program are required to take:

FRAN*6080	Special Topics in Couple and Family Therapy
FRAN*6100	Clinical Issues in Couple and Family Therapy I, II, III, IV
FRAN*6120	Theories and Methods of Family Therapy I
FRAN*6130	Theories and Methods of Family Therapy II
FRAN*6140	Professional Issues
FRAN*6160	Facilitation in Family Functioning
FRAN*6180	Research in Couple and Family Assessment and Intervention

One elective in individual and family development across the lifespan.

Upon completion of the requirements for the emphasis in couple and family therapy, the student will receive an MSc. The transcript will specify Family Relations and Applied Nutrition: Couple and Family Therapy.

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 an 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 half-course in applied statistics and 2) one half-course in research methods. 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:

FRAN*6510	Nutrition in the Community;
FRAN*6610	Advances in Clinical/Nutritional Assessment;
one of selected graduate courses from the Faculty of Management, based on course content, prerequisites and availability;	
and	
FRAN*6710	Practicum in Applied Human Nutrition I
FRAN*6720	Practicum in Applied Human Nutrition II
FRAN*6730	Practicum in Applied Human Nutrition III
FRAN*6750	Final Project in Applied Human Nutrition

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. Areas of research emphasis are: 1) Child and adolescent development (socialization processes, parent-child relationships, peer relationships, early childhood services, program development and evaluation), and 2) Adult development and family relations (family socialization, intergenerational relations, alternate family structures, human sexuality, gerontology). 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.

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

Applied Human Nutrition

PhD students in applied human nutrition are required to take a minimum of eleven courses that build a foundation for their research and/or practice:

FRAN*6030	Quantitative Research Methods
FRAN*6040	Introduction to Qualitative Methods
FRAN*6050	Qualitative Analysis
FRAN*6420	Introductory Applied Statistics
FRAN*6430	Advanced Applied Statistics I
FRAN*6440	Advanced Applied Statistics II
FRAN*6510	Nutrition in the Community
FRAN*6610	Advances in Clinical Nutrition/Assessment I
FRAN*6620	Nutritional Epidemiology
FRAN*6630	Advances in Clinical Nutrition/Assessment II
FRAN*6550	Research Seminar

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 nine courses (if not completed previously):

FRAN*6030	Quantitative Research Methods
FRAN*6040	Introduction to Qualitative Methods
FRAN*6050	Qualitative Analysis
FRAN*6420	Introductory Applied Statistics
FRAN*6430	Advanced Applied Statistics I
FRAN*6440	Advanced Applied Statistics II
FRAN*6340	Interdisciplinary Perspectives in FRHD
FRAN*6280	Theorizing in FRHD
FRAN*6330	Research Seminar

The student's choice of emphasis is primarily determined by research specialization and by 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 also indicates 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

FRAN*6510 Nutrition in the Community U [0.50]
Concepts and knowledge of nutrition as applied in community and public health nutrition. Examination of current programs in applied nutrition.
FRAN*6550 Research Seminar U [0.25]
Research literature in applied nutrition.
FRAN*6560 Special Topics in Applied Human Nutrition U [0.50]
FRAN*6600 Theoretical Perspectives 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]
An advanced overview of nutritional 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 investigation 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. <i>Prerequisite(s):</i> FRAN*6610
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. <i>Restriction(s):</i> 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 <i>Prerequisite(s):</i> FRAN*6710 <i>Restriction(s):</i> 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. <i>Prerequisite(s):</i> FRAN*6720 <i>Restriction(s):</i> 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) 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. <i>Restriction(s):</i> For MAN students only.

Family Relations and Human Development

FRAN*6000 Research Methods F [0.50]
This course includes critical appraisal of the research literature. Research ethic, 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. <i>Prerequisite(s):</i> 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. <i>Prerequisite(s):</i> FRAN*6000 <i>Restriction(s):</i> Instructor permission for non-FRAN students
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*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. <i>Restriction(s):</i> Signature required.
FRAN*6200 Research Topics in Family Relations and Human Development U [0.50]
Contemporary research in family relations and human development. <i>Restriction(s):</i> 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]

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*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-contextualist 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*6010

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 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 Facilitation in Family Functioning U [0.50]

A systemic exploration of family processes to understand diversity in family structures and functioning. This course has an applied focus on developing basic facilitation, communication and observational skills for exploring family structure and functioning. Students participate in learning groups supporting the development of these skills.

FRAN*6180 Research in Couple and Family Assessment and Intervention W [0.50]

The focus of this course is on research, assessment and intervention with couples and families across the lifespan.

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

Chair

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Graduate Faculty

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BS, MS North Dakota State, PhD Minnesota - Professor and Chair

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BSc, MSc Guelph, PhD Purdue - Associate Professor

F. Harry Cummings

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BSc (Agr), MSc Guelph, PhD Minnesota - Professor

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Spencer Henson

BSc, PhD Reading - Professor

Karl D. Meilke

BS Washington State, PhD Minnesota - Professor

Craig J. Pearson

BSc Agr Western Australia, MSc Guelph, PhD Macquarie - Dean, Ontario Agricultural College

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 (Joint appointment with College of Management and Economics)

Francis Tapon

Licence, Des Science Economiques Paris, MBA Columbia, MA, PhD Duke - Professor

Alfons J. Weersink

BSc Guelph, MSc Montana State, PhD Cornell - Professor

MSc Program

The MSc program emphasizes the economics of agricultural markets, food business economics and 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 agriculture, food and related fields. 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:

- Microeconomic Theory (ECON*3710 or ECON*6000)
- Macroeconomic Theory (ECON*4810 or ECON*6020)
- One graduate course in quantitative methods selected from:
 - Mathematical Programming (AGEC*6360)
 - Econometrics (ECON*6050) or (ECON*6140)
 - Multivariate Statistics (COST*6060)
- Two graduate courses in agricultural economics
- One additional graduate course
- One-credit seminar course (AGEC*6800).

Areas of study in the Program

The fields in which the Master's program at Guelph specializes are natural resource and environmental economics, food business economics and the economics of agricultural markets. For students wishing to specialize in one of these fields, the following course combinations are recommended:

Natural Resource and Environmental Economics:

- Microeconomic Theory (ECON*3710 or ECON*6000)
- Macroeconomic Theory (ECON*4810 or ECON*6020)
- One graduate course in quantitative methods selected from:
 - Mathematical Programming (AGEC*6360)
 - Econometrics (ECON*6050 or ECON*6140)
 - Multivariate Statistics (COST*6060)
- Renewable Resource Economics (AGEC*6610)
- Environmental Economics (ECON*6800)
- One-credit seminar course (AGEC*6800)

Food Business Economics:

- Microeconomic Theory (ECON*3710 or ECON*6000)
- Macroeconomic Theory (ECON*4810 or ECON*6020)
- One graduate course in quantitative methods selected from:
 - Mathematical Programming (AGEC*6360)
 - Econometrics (ECON*6050 or ECON*6140)
 - Multivariate Statistics (COST*6060)
- Three of the following:
 - Marketing Management (AGEC*6110)
 - Food and Agribusiness Strategic Management (AGEC*6140)
 - Future and Options (AGEC*6250)
 - Operations Management (AGEC*6410)
- One-credit seminar course (AGEC*6800)

Economics of Agricultural Markets:

- Microeconomic Theory (ECON*3710 or ECON*6000)
- Macroeconomic Theory (ECON*4810 or ECON*6020)
- One graduate course in quantitative methods selected from:
 - Mathematical Programming (AGEC*6360)
 - Econometrics (ECON*6050 or ECON*6140)
 - Multivariate Statistics (COST*6060)
- Two of the following:
 - Futures and Options (AGEC*6250)
- One additional graduate course
- One-credit seminar course (AGEC*6800)

Note that students electing to take certain courses that are offered to MBA students in the department may be required by the Departmental Graduate Program Committee to complete successfully more than six taught courses.

PhD Program

The PhD program in agricultural economics focuses on three major areas of emphasis:

- Natural resource and environmental economics
- Food business economics
- Economics of agricultural markets

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 economic 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 baccalaureate; 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 11 taught courses that prepare them for the various elements of comprehensive examination. However, students that are able to demonstrate satisfactory level of competence in any of these requirements may have these course requirements adjusted in accordingly, subsequent to evaluation and the decision of the Departmental Graduate Program Committee.

All students must complete the following microeconomic theory and economic research methods courses:

Microeconomic Theory:

ECON*6000 Microeconomic Theory I
ECON*6010 Microeconomic Theory II

Economic Research Methods:

AGEC*6360 Mathematical Programming
AGEC*6100 The Methodology of Economics

Plus ONE from the following:

ECON*6050 Introduction to Econometric Methods
ECON*6140 Econometrics I
COST*6060 Multivariate Research Methods

In addition, students must complete the following courses related to their chosen area of specialization:

AGEC*6400 Advanced Topics in Agricultural Economics

Plus FIVE from:

ECON*6700 Industrial and Market Organization
AGEC*6250 Futures and Options
ECON*6300 International Trade Theory
ECON*6800 Environmental Economics
ECON*6020 Macroeconomics I
ECON*6350 Economic Development
AGEC*6600 Agriculture in Economic Development

Students may also be permitted to take other courses as substitutes for the above, subject to approval by the Departmental Graduate Program Committee.

Students are required to complete their course work by the end of the fourth semester.

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 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 diagnostic 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*3740, ECON*2770

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): AGEN*6910

Co-requisite(s): ECON*3710

AGEC*6930 Food Firms, 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 Firms, Consumers and Markets II F [0.50]

This course builds on Food Firms, 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): AGEN*6930, ECON*3710

AGEC*6980 Agricultural Trade Relations W [0.50]

An examination of the institutional, theoretical and empirical aspects of international agrifood trade.

Prerequisite(s): ECON*3710, AGEN*6910

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 theoretical literature is 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 contemp. theoretical work and empirical papers discussed. Emphasis on extending 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, AGECE*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): AGECE*6180

Restriction(s): Non MBA students only by permission of instructor

AGEC*6230 Food and Agribusiness Economics and Policy W [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.

AGEC*6250 Futures and Options W [0.50]

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.

AGEC*6260 Managing Business Risk U [0.50]

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.

AGEC*6410 Operations Management I S [0.50]

Overview of the management problems involved in planning, operating and controlling the systems used in operations, with emphasis on farm and agribusiness applications.

AGEC*6750 Problems in Agricultural Business F [0.50]

Seminar course with industry speakers, in preparation to AGECE*6760, and leading to a formal business project proposal.

Other Courses**AGEC*6400 Advanced Topics in Agricultural Economics S [0.50]**

The application of economic theory and various contemporary tools of economic analysis in solving production problems in the agricultural sector of the economy.

AGEC*6760 Major Project in Food and Agribusiness Management U [0.50]

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.

AGEC*6100 The Methodology of Economics W [0.50]

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.

AGEC*6720 Readings in Agricultural Economics F,S,W [0.50]

A reading course on selected topics of special interest. May be offered to individual students or to groups of students in any semester.

AGEC*6800 Seminar in Agricultural Economics S [0.00]

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.

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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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 honours 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:

- Food Safety and Quality Assurance Seminar (FSQA*6000).
- Food Safety and Quality Assurance Research Project (FSQA*6500). This project is equal to 1.0 credit and counts as one course of the eight required courses.
- Principles of Food Safety and Quality Assurance (FSQA*6600)
- 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 U [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.

Other Graduate Courses Suitable for Credit in this Program

Biomedical Sciences

BIOM*6440 0.5 Biomedical Toxicology

Marketing and Consumer Studies

COST*6150 0.5 Quality Assurance Management

Engineering

ENGG*6110 0.5 Food and Bio-process Engineering

ENGG*6160 0.5 Advanced Food Engineering

Food Science

FOOD*6190 0.5 Advances in Food Science

FOOD*6220 0.5 Advanced Food Analysis Methodology

FOOD*6280 0.5 Rapid Methods in Food Microbiology

FOOD*6600 0.5 Advances in Food Microbiology

Human Biology and Nutritional Sciences

HBNS*6400 0.5 Functional Foods and Nutraceuticals

Microbiology

MICR*6070 0.5 Bacterial Structures and Virulence

Pathobiology

PABI*6000 0.5 Bacterial Pathogenesis

Population Medicine

POPM*6200 0.5 Epidemiology I

POPM*6210 0.5 Epidemiology II

POPM*6300 0.5 Epidemiology of Zoonoses

POPM*6350 0.5 Safety of Foods of Animal Origin

Undergraduate Courses Suitable for Credit in this Program

Food Science

FOOD*3010 0.5 Food Chemistry

FOOD*4120 0.5 Food Analysis
FOOD*4090 0.5 Functional Foods and Nutraceuticals

Human Biology and Nutritional Sciences

NUTR*4510 0.5 Toxicological Aspects of Nutrition

Population Medicine

POPM*4040 0.5 Epidemiology of Food-Borne Diseases

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 1999, 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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Rickey Y. Yada

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MSc Program

Thesis Master's Program Objectives

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) or 213 (computer-based). To assist in identifying a suitable thesis advisor, applicants should submit a short statement of research interests. Admission into the department is contingent on the student obtaining a scholarship or Graduate Research Assistantship. Students may be admitted into the fall, winter or summer semesters.

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 ensures 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) or 213 (computer-based).

To assist in identifying a suitable thesis advisor, applicants should submit a short statement of research interests. Admission into the department is contingent on the student obtaining a scholarship or GRA. It is also possible for a student to transfer from the MSc program without completing a master's thesis if the student has an excellent academic record and shows a strong aptitude for research which can be expanded to the doctoral level. Students may be admitted into the fall, winter or summer semesters.

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 Chemistry

FOOD*6160 Chemistry of Food Lipids U [0.50]

Composition and function of lipids in food systems. Analytical procedures used in isolating, identifying and quantifying lipid components. Lipid classes and their properties. Polyunsaturated lipids and their reactions. Physical properties of lipids and instrumental methods of analysis. Industrial processing including hydrogenation, fractionation, interesterification and enzymic processes. Biotechnology of lipids.

FOOD*6170 Chemistry of Food Proteins U [0.50]

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.

FOOD*6210 Chemistry of Food Carbohydrates U [0.50]

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.

FOOD*6220 Advanced Food Analysis Methodology U [0.50]

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).

FOOD*6260 Food Colloids U [0.50]

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.

FOOD*6270 Applied Enzymology and Biotechnology U [0.50]

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.

Food Microbiology**FOOD*6280 Rapid Methods in Food Microbiology U [0.50]**

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.

FOOD*6410 Advanced Oenology U [0.50]

A comprehensive and advanced treatise, by lectures and practice, of all aspects involved in the production of white and red table wines. Special attention is given to the basic principles involved in the vinification process as they relate to cellar technology.

FOOD*6600 Advanced Food Microbiology U [0.50]

This course will review current issues in food microbiology. Topics to be covered will include the microbial ecology of food, factors affecting the growth and survival of microorganisms in foods, and strategies for the production of safe food.

FOOD*6620 Industrial Microbiology U [0.50]

Applications of Molecular Genetics and Biotechnology to industrial microbial processes including the production of organic acids, amino acids, antibiotics, ethanol, and solvents. There is extensive coverage of the fermentation industries: baking, brewing, vinting and spirit production.

General**FOOD*6110 Food Materials Science U [0.50]**

Mechanical properties of foods. Application of the principles of rheology to food materials. Relationship between texture and microstructure. Instrumental measurement of food texture. Principles of measurement systems for different types of foods. Interpretation of force-deformation diagrams. Texture modification. Texture profile analysis.

FOOD*6120 Fruit and Vegetable Technology F [0.50]

A course that deals with the current status of technologies based on fruits and vegetables. The subject coverage will include post harvest storage, the parameters that determine quality, biochemical and molecular strategies for improving storage life and quality, processing technologies and issues related to genetic engineering, food safety, functional food ingredients and their health-regulatory function.

FOOD*6190 Advances in Food Science U [0.50]

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.

FOOD*6300 Seminar U [0.50]

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.

FOOD*6350 Applied Functional Foods and Nutraceuticals W [1.00]

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.

Prerequisite(s): HBNS*6400

Geography

The Department of Geography offers programs of study leading to the degrees of MA, MSc and PhD. Students may register in this department to undertake the MA and MSc programs in Collaborative International Development Studies and shared MA and MSc programs with the University School of Rural Planning and Development

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MA and MSc Programs

The Department of Geography offers both MA and MSc degrees, with specializations in resource assessment, biophysical processes, rural studies and international development. The MA program offers a specialization in rural studies, with an emphasis on rural land use, population dynamics and settlement. The MSc program stresses an experimental approach to geomorphic, biotic and landscape processes. The resource assessment specialization, focusing on opportunities, constraints and impacts in the human use of biophysical systems, and the international development specialization are available through either the MA or the MSc degree.

Admission Requirements

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 must submit a statement of their research interests with their application. They are encouraged to contact potential advisors prior to submission of an application. Students are admitted in September and applications should be completed by January 30 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 fields of rural resource evaluation and environmental analysis. These fields are part of a broader domain which encompasses theoretical and empirical investigations of the dynamic interrelationships between land, water and biological processes and the social and economic contexts in which these processes occur. These socio-environmental relationships can be addressed at various geographic scales, from the local to the global. The unifying theme is the focus on integration and evaluation.

The fields of rural resource evaluation and environmental analysis include three overlapping areas of specialization:

- **Biophysical Processes** encompasses the analysis of geomorphic and biotic phenomena and processes.
- **Rural Studies** embraces the spatial organization of human activity in the rural milieu.
- **Resource Assessment** centres on the evaluation of constraints, opportunities and impacts in the human use of biophysical systems.

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. They are encouraged to contact potential advisors in the department prior to submission of an application. Students are admitted in September and applications should be completed by January 30 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. The broader scholarly field must embrace the resource assessment area of specialization and at least one other specialization. Submission and defence of an acceptable thesis on an approved topic complete the requirements of the PhD.

Interdepartmental Programs

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). Both thesis and non-thesis options are available. Students selecting the thesis option are expected to complete an acceptable thesis, the five 'core' courses in CIDS, the Research Methods course offered by the Department of Geography, and one other geography course (0.5 credits) approved by the student's advisory committee. Students selecting the non-thesis option are expected to complete the five 'core' courses in CIDS, the Research Methods course and Research Project course in the Department of Geography, and two other geography courses (1.0 credits) approved by the student's advisory committee. Please consult the International Development Studies listing for a detailed description of the MA/MSc collaborative program.

Rural Studies PhD Program

The Department of Geography 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.

Courses

Biophysical Processes

GEOG*6330 Biotic Processes and Biophysical Systems U [0.50]

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.

GEOG*6500 Sedimentary Processes in Geomorphology W [0.50]

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.

GEOG*6610 Global Hydrology F [0.50]

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 secretary in completed form by February 1.

Administrative Staff - Tri-University Program

Director

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Tri-University Secretary - Guelph

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Graduate Co-ordinator 2005-2006

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Graduate Faculty

Note

(*indicates approved PhD Advisors)

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Alan McDougall

BA, MSt, DPhil Oxford - Associate Professor

Graeme Morton

BA, PhD Edinburgh - Chair, Scottish Studies

Jacqueline Murray *

BA British Columbia, MA, PhD Toronto - Professor

Susan Nance

BA, MA Simon Fraser, PhD California (Berkeley) - Assistant Professor

Jesse S. Palsetia *

BA, MA, PhD Toronto - Associate Professor

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BA Saskatchewan, MA, PhD Tulane - Associate Professor

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BA Carleton, MA, PhD Toronto - Associate Professor and Director, Tri-University Program

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Graduate Faculty from Wilfrid Laurier University

Blain Chiasson

PhD Toronto

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BA Glendon, MA York, PhD Guelph

Adam Crerar

PhD Toronto

Darryl Dee

PhD Emory

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BA Waterloo, MA, PhD Toronto

Jerry Grishow

PhD Queen's

Erich Haberer

PhD Toronto

John Laband

PhD Natal

Douglas A. Lorimer

BA, PhD British Columbia

Joyce Lorimer

BA, PhD Liverpool

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BA, MA McGill, PhD Toronto

Darren Mulloy

PhD East Anglia, UK

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Eva Plach

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Roger Sarty

PhD Toronto

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George Urbaniak

BA, MA, PhD Toronto

Suzanne Zeller

BA, MA Windsor, PhD Toronto

Graduate Faculty from the University of Waterloo

Carl Bon Tempo

PhD Virginia

Gary Bruce

PhD McGill

John English

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Patrick J. Harrigan

AB Detroit, MA, PhD Michigan

Geoff W. Hayes

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Andrew Hunt

BA, PhD Utah

Heather A. MacDougall

BA, MA, PhD Toronto

Karin J. MacHardy

BA, MA Western Ontario, PhD California (Berkeley)

Ken M. McLaughlin

BA Waterloo, MA Dalhousie, PhD Toronto

Wendy L. Mitchinson

BA, MA, PhD York

Bessma Momani

PhD Western

Lynne Taylor

BA Western Ontario, MA London, PhD Michigan

James W. Walker

BA Toronto, MA Waterloo, PhD Dalhousie

MA Program

The MA (by thesis) program provides for emphasis on medieval and modern British history; Scottish studies; Canadian history; the United States from the colonial period to the 20th century; medieval and early modern European history; selected aspects of late 19th- and 20th-century European history; gender, family, and women's history in Europe, Britain, and North America; the social and military impact of war, race and slavery; global history; rural history; and the history of science, technology and medicine.

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 other means, such as the Graduate Record Examination. Non-Canadian applicants whose first language is not French or English are required to submit evidence of proficiency in the English language or pass the Test of English as a Foreign Language (TOEFL). A net score of 600 is required. Registration at one university for three degrees (BA, MA, PhD) is discouraged.

Degree Requirements

Students must demonstrate a knowledge of written French (or other appropriate second language, approved by the co-ordinating committee) before the qualifying examination. Students must register in the Doctoral Seminar. For details see the program handbook.

Courses - MA

Note

For the courses offered in a particular year, see the listing published by the Office of Registrarial Services.

Canadian History

HIST*6230 Canadian History I U [0.50]

A course that examines the current historiography of selected aspects of Canadian history. Topics will vary with the expertise of individual instructors.

HIST*6231 Canadian History I Research U [0.50]

Continuation of HIST*6230 in which students prepare an indepth research paper based on primary sources.

HIST*6280 Canadian History II U [0.50]

A course that examines the current historiography of selected aspects of Canadian history. Topics will vary with the expertise of individual instructors.

HIST*6281 Canadian History II Research U [0.50]

Continuation of HIST*6280 in which students prepare an indepth research paper based on primary sources.

HIST*6290 Topics in North American History U [0.50]

Depending on the expertise of the instructor, this course may concentrate on either the United States or Canada, or it may select an historical theme or themes common to the larger continent.

HIST*6291 North American Research U [0.50]

Continuation of HIST*6290 in which students prepare an indepth research paper based on primary sources.

Scottish History

HIST*6150 Scottish Archival Research U [0.50]

This course will comprise of classroom teaching, practical instruction and work-placement within the Scottish Collection of the University of Guelph's Archives. It will introduce students to basic skills in the digitization of sources and teach competence in conservation, record creation and archival research.

Restriction(s): Student numbers are limited by the number of placements available in the University Archives.

HIST*6190 Topics in Scottish History I U [0.50]

This course will introduce students to selected aspects of medieval and early modern Scottish history and historiography, including the use of source materials, and practical training involving manuscripts in the University Archives.

HIST*6191 Scottish History I Research U [0.50]

Continuation of HIST*6190 in which students prepare an indepth research paper based on primary sources.

HIST*6200 Topics in Scottish History II U [0.50]

This course will introduce students to selected aspects of modern Scottish history and historiography, including the use of source materials, and provide practical training involving manuscripts in the University Archives.

HIST*6201 Scottish History II Research U [0.50]

Continuation of HIST*6200 in which students prepare an indepth research paper based on primary sources.

British History

HIST*6140 Topics in British History Since 1688 U [0.50]

Although topics vary with the expertise of individual instructors, this course encompasses the British Isles.

HIST*6141 British History Research U [0.50]

Continuation of HIST*6140 in which students prepare an indepth research paper based on primary sources.

General

HIST*6000 HIST*6000 Historiography I F [0.50]

This course will introduce students to some of the essential components of the historical process as exemplified by the literature produced prior to 1914. It will also assess history as a cognitive discipline in contemporary society. While the scope of the course will extend from ancient times to the eve of World War I, emphasis will be placed on 19th-century historiography.

HIST*6020 Historiography II W [0.50]

An examination of major examples of recent historical methodology, including works in cultural and social history. The student is also expected to develop and present a thesis proposal.

HIST*6040 Special Reading Course U [0.50]

Students selecting this course should speak to individual instructors to arrive at appropriate topics.

HIST*6300 Topics in Modern Europe I U [0.50]

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.

HIST*6301 Modern Europe I Research U [0.50]

Continuation of HIST*6300 in which students prepare an indepth research paper based on primary sources.

HIST*6310 Topics in Modern Europe II U [0.50]

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.

HIST*6311 Modern Europe II Research 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*6500 Topics in Global History U [0.50]

This is a topical course, that explores the history of processes that take place on a worldwide scale. These may include social, cultural, economic, or environmental processes.

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.

HIST*7010 Qualifying Examination U [1.00]

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.

HIST*7020 Colloquium U [1.00]

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.

HIST*7030 Language Requirement U [0.00]

A written demonstration of the student's knowledge of written French (or other appropriate second language).

HIST*7040 Major Field U [1.00]**HIST*7050 First Minor Field U [0.50]****HIST*7060 Second Minor Field U [0.50]**

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.

HIST*7100 Canadian History Major Seminar U [1.00]**HIST*7120 British History Major Seminar U [1.00]****HIST*7120 Scottish History Major Seminar U [1.00]****HIST*7120 British History Major Seminar U [1.00]****HIST*7120 Scottish History Major Seminar U [1.00]****HIST*7130 Community Studies Major Seminar U [1.00]****HIST*7140 Early Modern European History Major Seminar U [1.00]****HIST*7150 Modern European History Major Seminar U [1.00]****HIST*7160 Gender, Women and Family Major Seminar U [1.00]****HIST*7170 Race, Slavery, and Imperialism Major Seminar U [1.00]****HIST*7180 United States History Major Seminar U [1.00]****HIST*7600 Canadian History Minor Seminar U [0.50]****HIST*7610 British History Minor Seminar U [0.50]****HIST*7620 Scottish History Minor Seminar U [0.50]****HIST*7630 Community Studies Minor Seminar U [0.50]****HIST*7640 Early Modern European History Minor Seminar U [0.50]****HIST*7650 Modern European History Minor Seminar U [0.50]****HIST*7660 Gender, Women and Family Minor Seminar U [0.50]****HIST*7670 Race, Slavery, and Imperialism Minor Seminar U [0.50]****HIST*7680 United States History Minor Seminar U [0.50]****HIST*7690 International History Minor Seminar U [0.50]****HIST*7700 Science, Medicine and Technology Minor Seminar U [0.50]****HIST*7710 Other Minor Seminar U [0.50]****HIST*7990 HIST*7990 U [2.00]**

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 Biology and Nutritional Sciences

The Human Biology 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 aquaculture or toxicology.

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.

Administrative Staff

Chair

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Graduate Co-ordinator

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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

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Leah R. Bent

BSc, MSc Guelph, PhD British Columbia - Assistant Professor

William J. Bettger

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 - Assistant 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.

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	0.5	Nutrition, Exercise and Metabolism
HBNS*6040	0.5	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	0.5	Seminar in Human Biology and Nutritional Sciences
HBNS*6320	0.5	Advances in Human Biology and Nutritional Sciences Research

at least one of:

HBNS*6910	0.5	Basic Research Techniques and Processes
HBNS*6920	0.5	Applied Research Techniques and Processes
HBNS*6930	0.5	Research Project

at least one of:

HBNS*6700	0.5	Nutrition, Exercise and Metabolism
HBNS*6040	0.5	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.

Degree Requirements

The major part of a student's time will be devoted to research in fulfilment of the dissertation requirement. Course work would be established through discussion with the student's Advisory Committee.

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

Toxicology MSc/PhD Collaborative Program

The Department of Human Health and Nutritional Sciences participates in the MSc/PhD program in Toxicology. Professor Kirkland is a member of the Toxicology 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 Toxicology 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

HBNS*6010 Seminar in Human Biology and Nutritional Sciences S [0.50]

Students will develop their scientific communication skills by translating a specific body of knowledge on a chosen topic into a seminar. The class will also explore scientific process-oriented concepts and issues such as effective scientific communication and dissemination of results.

Restriction(s): Limited to HBNS MSc course work and project students only

HBNS*6030 Applied Ergonomics U [0.50]

Reviews selected topics in ergonomics from a multidisciplinary perspective with special reference to understanding the scientific basis of associated data gathering techniques and to practicing the necessary skills. This course is also a graduate course offering in the Department of Psychology

HBNS*6040 Research Fronts in Nutritional and Nutraceutical Sciences F [0.50]

Building on an information base in nutrition, biochemistry and physiology, the course comprises selected research topics pertaining to the importance of nutrition as a determinant of health throughout the life span. Distinction will be drawn between the metabolic basis of nutrient essentiality and the health protectant effects of nutraceuticals.

HBNS*6130 Advanced Skeletal Muscle Metabolism in Humans W [0.50]

This course examines how the energy provision pathways in human skeletal muscle and associated organs meet the energy demands of the muscle cell during a variety of metabolically demanding situations.

HBNS*6320 Advances in Human Biology and Nutritional Sciences Research S,F,W [0.50]

This course provides the student with an opportunity to study a topic of choice and involves literature research on a chosen topic. The course may stand alone (MSc thesis and PhD students) or provide the background information for an experimental approach to the topic (MSc course work and project students).

HBNS*6400 Functional Foods and Nutraceuticals F [0.50]

This course considers the relation of nutraceuticals, functional foods, designer foods, medical foods and food additives to foods and drugs. The course emphasizes the development and commercialization of nutraceuticals.

HBNS*6410 Applied Functional Foods and Nutraceuticals W [1.00]

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. The course applies and integrates the concepts defined in Functional Foods and Nutraceuticals (HBNS*6400).

HBNS*6440 Nutrition, Gene Expression and Cell Signalling (offered odd-numbered years) W [0.50]

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.

HBNS*6700 Nutrition, Exercise and Metabolism F [0.50]

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.

HBNS*6710 Advanced Topics in Nutrition and Exercise W [0.50]

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.

HBNS*6910 Basic Research Techniques and Processes S,F,W [0.50]

Working with a faculty advisor, students will gain experience in basic aspects of scientific research. This will be accomplished through experience of one or more components of the scientific method in a laboratory setting. Objective outcomes will be evaluated and will include documentation of the experience in a written report. (Instructor's signature required.)

HBNS*6920 Applied Research Techniques and Processes S,F,W [0.50]

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.)

HBNS*6930 Research Project S,F,W [0.50]

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. (Instructor's signature required.)

Prerequisite(s): HBNS*6910 or HBNS*6920

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.

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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. Students meet both departmental and CIDS requirements. More detailed information is available in the CIDS Graduate Studies Handbook or on the CIDS Graduate website: www.uoguelph.ca/cids.

Admission Requirements

Students must meet the admission requirements of the department of their choice and demonstrate familiarity with conceptual frameworks employed in the social sciences.

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 graduate calendar for other departments. One CIDS core course may be waived if a student has taken a comparable course at the senior undergraduate level.

Courses

CIDS Core*

- One of Gender and Development SOC*6460/ANTH*6460 or Development Communication REXT*6420 or Development, Community and Rurality SOC*6420/ANTH*6420 or Diversity and Social Equality SOC*6270/ANTH*6270
- One of Urbanization and Development GEOG*6400 or Political Identities, Territory and Territoriality GEOG*6450
- One of Economic Development in Historical Perspective ECON*6370 or Agriculture in Economic Development AGECE*6600 or Economic Development ECON*6350 (with permission of Instructor)
- One of Development Administration POLS*6750 or The Politics of Development and Underdevelopment POLS*6730
- International Development Studies Seminar IDEV*6100

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 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 listed below.

Departmental Requirements

Programs not listed below are designed by special arrangements.

Anthropology (MA)

- Anthropological Theory ANTH*6080
- Qualitative Research Methods ANTH*6140
- Pro-Seminar ANTH*6700
- Either a Thesis and one additional course or ANTH*6660 Major Paper and three additional courses

Economics (MA)

- Microeconomic Theory I ECON*6000
- Macroeconomic Theory I ECON*6020
- Introduction to Econometric Methods ECON*6050 and Econometric Methods ECON*6180 or Econometrics I ECON*6140
- Research Project ECON*6940

Engineering: MEng (Environmental Engineering or Water Resources Engineering)

CIDS Core Courses Required:

- One of Gender and Development SOC*6460/ANTH*6460 or Development Communication REXT*6420 or Development, Community and Rurality SOC*6420/ANTH*6420 or Diversity and Social Equality SOC*6270/ANTH*6270
- One of Economic Development in Historical Perspective ECON*6370 or Agriculture in Economic Development AGECE*6600 or Economic Development ECON*6350 (with permission of Instructor)
- One of Development Administration POLS*6750 or The Politics of Development and Underdevelopment POLS*6730
- International Development Studies Seminar IDEV*6100

Departmental Requirements:

- Six courses from the list of required graduate courses in Engineering (to be selected in consultation with advisor)
- Engineering Seminar ENGG*6080 (0.00 credit)
- Final Project ENGG*6950 or ENGG*6900 (1.00 credit)

Engineering: MSc (Environmental Engineering or Water Resources Engineering)**CIDS Core Courses Required:**

- One of Gender and Development SOC*6460/ANTH*6460 or Development Communication REXT*6420 or Development, Community and Rurality SOC*6420/ANTH*6420 or Diversity and Social Equality SOC*6270/ANTH*6270
- One of Economic Development in Historical Perspective ECON*6370 or Agriculture in Economic Development AGECE*6600 or Economic Development ECON*6350 (with permission of Instructor)
- One of Development Administration POLS*6750 or The Politics of Development and Underdevelopment POLS*6730
- International Development Studies Seminar IDEV*6100

Departmental Requirements:

- Two courses from the list of required graduate courses in Engineering (to be selected in consultation with advisor)
- Engineering Seminar ENGG*6080 (0.00 credit)
- Thesis

English (MA)

- Approaches to Research and Theory ENGL*6010
- One other English course and a thesis, or
- two other English courses and the Research Project ENGL*6803

Food, Agricultural and Resource Economics (MSc)

- Advanced Microeconomics ECON*3710 or Microeconomics Theory I ECON*6000
- Advanced Macroeconomic Theory ECON*4810
- One of the following:
 - Multivariate Research Methods COST*6060 or Mathematical Programming AGECE*6360 or Introduction to Econometric Methods ECON*6050
 - Agriculture in Economic Development AGECE*6600 (if not taken as part of CIDS core)
 - 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)

- Research Methods GEOG*6090
- One other Geography course
- Either a thesis or GEOG*6180 Research Project plus one other Geography course

History (MA)

- Historiography I HIST*6000
- Historiography II HIST*6020
- Two additional History courses (only one if the CIDS core includes Economic Development in Historical Perspective ECON*6370)
- Either a thesis or Major Paper HIST*6400

Note

N.B. Historical Conceptions of the City HIST*6390 may substitute for the geography component of the CIDS core

Philosophy (MA)

- MA Seminar PHIL*6950
- Additional philosophy courses in consultation with the department

- Either a thesis or research paper (in conjunction with Guided Research Project PHIL*6990)

Political Science (MA)

- Proseminar POLS*6900
- Political Research: Theories and Approaches POLS*6940
- Either a thesis plus one additional course or POLS*6970 Major Paper plus two additional courses (normally from the Political Science Department)

Capacity Development and Extension (MSc)

- Foundations of Capacity Building and Extension REXT*6070
- Research Methods REXT*6260
- Application of Quantitative Techniques in RPD RPD*6380 or Qualitative Analysis in Rural Development EDRD*6000
- Two additional courses from the following group
- Adult Learning and Development REXT*6060
- Interpersonal/Intercultural Communication REXT*6190
- Special Topics in Capacity Building and Extension REXT*6290
- Extension Theory and Methods REXT*6311
- Capacity Building for Sustainable Development REXT*6320
- Facilitation and Conflict Management REXT*6330
- Readings in Capacity Building and Extension REXT*6410
- Development Communication REXT*6420
- Decision Making and Conflict REXT*6690
- One additional course in other areas of research (open elective)
- A thesis or
- Major Paper REXT*6900 plus two more courses from the restricted electives group (see course list above)

Rural Planning and Development (MSc [Plan])**CIDS Core Courses Required:**

- One of Gender and Development SOC/ANTH*6460 or Development Communication REXT*6420 or Development, Community and Rurality SOC/ANTH*6420
- One of Agriculture in Economic Development AGECE*6600 or Economic Development in Historical Perspective ECON*6370
- International Development Studies Seminar IDEV*6100

Departmental Requirements

- International Rural Development Planning RPD*6030
- Philosophy and Methods in Rural Planning and Development RPD*6170
- Rural Planning and Development Theory RPD*6240
- Rural Development Planning Synthesis RPD*6300
- Application of Quantitative Techniques in Rural Planning and Development RPD*6380
- A thesis or Major Paper RPD*6360 plus two additional electives

Sociology (MA)

- Sociological Theory SOC*6070
- One of the following: Quantitative Research SOC*6130 or Qualitative Methods ANTH*6140
- Proseminar SOC*6700
- Either a thesis plus one additional course or Major Paper SOC*6660 plus three additional courses

IDEV*6000 Regional Context U [0.50]

This reading course provides an opportunity for in-depth investigation about a particular region in preparation for a thesis, major paper or research project. The Course normally is directed by the student's advisor.

IDEV*6100 International Development Studies Seminar U [0.50]

A bi-weekly seminar discussion of issues which arise in the study of international development. Led by faculty and visitors from a variety of disciplines.

IDEV*6500 Fieldwork in International Development Studies U [0.50]

This course recognizes an intensive commitment to research in an archival repository, 'in the field' or at an appropriate development institution in Canada or abroad. The course normally is directed by the student's advisor in consultation with the advisory committee

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.

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Dipl Geol, Dr. rer nat Gottingen (Germany) - Associate Professor

R. Paul Voroney

BSc Calgary, MSc, PhD Saskatchewan - Professor

Claudia Wagner-Riddle

BSc, MSc Sao Paulo, PhD Guelph - Associate Professor

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 graduate 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 Research Issues I, LRS*6900, and Research Issues II, LRS*6910, as the minimum course requirements. Additional courses will be determined by the advisory committee.

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 Micrometeorology 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 above.

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 F [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.

LRS*6300 Applied Soil Physics F [0.50]

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.

LRS*6320 Non-equilibrium Thermodynamics of Porous Media W [0.50]

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 alternate years.

LRS*6340 Soil Organic Matter and Biochemistry F [0.50]

(1) Soil organic matter characterization, (2) dynamics of soil organic matter, (0.5) nutrient cycling. Offered in odd-numbered years.

LRS*6360 Soil and Water Chemistry F [0.50]

Thermodynamics of soil solutions; solution-solid phase equilibria; reaction kinetics; computer modelling of solute-mineral interactions.

LRS*6380 Advanced Soil Chemistry W [0.50]

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.

LRS*6400 Soil Nitrogen Fertility and Crop Production W [0.50]

Emphasis will be placed on soil N transformations and processes, and N sources for crops; field experimentation methods; environmental issues.

LRS*6420 Soil Productivity F [0.50]

Soil physical, chemical and biological characteristics as they influence crop growth with emphasis on processes and mechanisms.

LRS*6440 Field Sampling Strategies and Geostatistics W [0.50]

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. (alternate years)

LRS*6581 Special Topics in Soil Science U [0.25]

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.

LRS*6582 Special Topics in Soil Science U [0.50]

See LRS*6581 above.

Environmental Earth Science**LRS*6280 Soil Physics F [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.

LRS*6360 Soil and Water Chemistry F [0.50]

Thermodynamics of soil solutions; solution-solid phase equilibria; reaction kinetics; computer modelling of solute-mineral interactions.

LRS*6730 Special Topics in Environmental Earth Science U [0.50]

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.

Land Resources Management**LRS*6760 Advanced Remote Sensing W [0.50]**

Critical review of the latest research papers on the use of remotely sensed data for temporal monitoring of the biosphere.

LRS*6881 Special Topics in Land Resources Management U [0.25]

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.

LRS*6882 Special Topics in Land Resources Management U [0.50]

See LRS*6881 above.

Other**LRS*6900 Research Issues I F [0.25]**

Principles and philosophy of scientific research including the development of superior communication skills.

LRS*6910 Research Issues II W [0.25]

A continuation of Research Issues I.

LRS*6941 Analytical Instrumentation and Techniques U [0.25]

Equipment and techniques of soil and plant analyses. Variable credit will be assigned based on the number of laboratory units covered.

LRS*6942 Analytical Instrumentation and Techniques U [0.50]

See LRS*6941 above.

Landscape Architecture

The Landscape Architecture program offers courses of study leading to the Master of Landscape Architecture (MLA) degree.

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Maurice Nelischer

MLA Guelph, CSLA, OALA - Associate Professor and Director of School of Environmental Design and Rural Development

Cecelia Paine

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Nathan H. Perkins

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

Admission to the MLA program is not restricted to holders of the BLA degree. Strongly motivated graduates of honours programs in a variety of disciplines may be admissible under the normal Faculty of Graduate Studies admission requirements. Well prepared applicants will have studied as broadly as possible in their undergraduate programs.

Application deadline and additional information on the MLA program at the University of Guelph can be obtained from our internet address at: <http://www.uoguelph.ca/sedr/LA/>

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	Research Seminar
LARC*6600	Critical Inquiry and Research Analysis
LARC*6610	Research Methods
LARC*6710	Special Study
1 Elective	
Thesis	

For the holder of a BLA without such professional experience

LARC*6380	Research Seminar
LARC*6430	Landscape Resource Analysis
LARC*6470	Integrative Environmental Planning

LARC*6600	Critical Inquiry and Research Analysis
LARC*6610	Research Methods
LARC*6710	Special Study
1 Elective	
Thesis	

For holders of degrees other than the BLA:

HORT*3260	Woody Plants (audit)
LARC*6010	Landscape Architecture Studio I
LARC*6020	Landscape Architecture Studio II
LARC*6030	Landscape Architecture Studio III
LARC*6040	Landscape Architecture Studio IV
LARC*6120	Community Design
LARC*6340	Landscape History Seminar
LARC*6360	Professional Practice Seminar
LARC*6380	Research Seminar
LARC*6430	Landscape Resource Analysis
LARC*6470	Integrative Environmental Planning
LARC*6440	Environmental Design
LARC*6600	Critical Inquiry and Research Analysis
LARC*6610	Research Methods
LARC*6710	Special Study
Thesis	

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

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, sculpture and model-building.

LARC*6020 Landscape Architecture Studio II F [0.50]

Studio and field instruction introduces the student to basic knowledge and skills of site engineering as it relates to landscape architecture. 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 continues the student's development of professional knowledge and skills at the site scale. Topics include site planning principles, social factors in design, introduction to principles of planting design and architectural structures, facilitation and computer applications in design.

LARC*6040 Landscape Architecture Studio IV W [0.50]

Studio instruction emphasizes design implementation, materials and methods of construction, principles of stormwater management, construction specifications and graphic communication using computer applications.

LARC*6120 Community Design W [0.50]

Studio and field instruction emphasizes integration of ecological, social, cultural and historical factors in the comprehensive design of urban and special use landscapes at the community scale.

LARC*6340 Landscape History Seminar F [0.25]

A lecture/seminar course focussed on the history of Landscape Architecture. Skills emphasize the development of oral and writing skills.

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 writing skills.

Landscape Analysis and Planning

LARC*6430 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.

LARC*6440 Environmental Design F [0.50]

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.

LARC*6470 Integrative Environmental Planning W [0.50]

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.

Research Techniques and Practice**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.

Prerequisite(s): RPD*6170 or REXT*6260 or LARC*6610

LARC*6380 Research Seminar W [0.25]

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.

LARC*6600 Critical Inquiry & Research Analysis W [0.50]

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.

LARC*6610 Research Methods F [0.50]

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.

RPD*6170 Philosophy and Methods in Rural Planning and Development Research 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.

Independent Study**LARC*6710 Special Study S,F,W [0.50]**

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

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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 three one-week residency programs and the completion of a major research project.

Admission Requirements

Admission as a student is granted, on recommendation of the Faculty of Management, to:

- i. The holder of an honours baccalaureate or its equivalent (from a recognized university or college) with an average standing of at least a "B" in the last four semesters or the last two undergraduate years (full-time or equivalent). Normally, at least five years of work experience involving leadership opportunity is required.
- ii. The holder of: - a general degree and/or; - a community college diploma and/or; - an acceptable professional designation, having completed at least seven years of work experience involving leadership opportunity.

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 Faculty of Management Office of Graduate Programs. Participants are solely responsible to arrange 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 25 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 four 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 interview, 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 management and leadership processes within organizations. Examples from history and current events are explored to illustrate theory.

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

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Pablo Ramirez

BA Yale; MFA Miami; MA, PhD Michigan - Assistant Professor

Jennifer Schacker

BA McGill, MA, PhD Indiana - Assistant Professor

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

Ann Wilson

BA, MA, PhD York - Associate Professor

Graduate Faculty from Wilfrid Laurier University

Andrea Austin

BA, MA, PhD Queen's - Assistant Professor

Viviana Comensoli

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Lynn Shakinovsky

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Paul Tiessen

BA Laurier, MA, PhD Alberta - Professor

Eleanor Ty

BA Toronto, MA, PhD McMaster - Professor

Robin Waugh

BA, MA Manitoba, PhD Queen's - Associate Professor

James Weldon

BA, MA New Brunswick, PhD Queen's - Associate Professor

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 general area seminar (0.5 credit) culminating in a written candidacy exam and a colloquium presentation; one intensive 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 intensive 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 general area seminar will normally be taken during the second and third semesters of the program (year one). The intensive 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).

General Area Seminar (Year One)

The general 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.

Intensive Area Seminar (Year Two)

The intensive 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 intensive 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 intensive 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.

Progress Reports

At the end of the first year of registration (usually in May) and once a year thereafter, a student is required to complete an annual research progress report detailing the achievements of the previous year and the objectives for the next year. The report must demonstrate satisfactory progress, and must be signed with comments by the advisor and PhD Director from the student's home university, and filed with both the program director and the Graduate Studies Office of the home university. Failure to submit a satisfactory report may result in the student being required to withdraw from the program.

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

LTS*7770 Language Requirement U [0.00]
A written demonstration of a student's reading knowledge of one language other than English, as approved by the Joint PhD Program Committee.
LTS*7800 General Area Seminar U [0.50]
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.
LTS*7820 Intensive Area Seminar U [1.00]
A reading course intended to provide concentrated training in the student's expected area of research concentration. This seminar involves individualized, directed study of the immediate literary, cultural, and theoretical contexts of the student's approved dissertation subject. The course is normally taken in the second year of a student's PhD program.
LTS*7900 Directed Studies U [0.50]
The study of a special topic under the guidance of a member of the graduate faculty.
LTS*7990 Doctoral Dissertation U [2.00]
Submission and defense of an acceptable thesis, written by the PhD candidate, on the research carried out by the candidate on an approved topic. The thesis is expected to be a significant contribution to knowledge in its field and the candidate must indicate in what ways it is a contribution.

Courses Offered at the University of Guelph*

DRMA*6020	Canadian Drama in English
DRMA*6040	Quebec and Franco-Canadian Drama
DRMA*6050	Special Studies in Canadian Drama
DRMA*6060	Aspects of Canadian Theatre History
DRMA*6080	Special Studies in Canadian Theatre
DRMA*6090	Aspects of Theatre in Early-Modern England
DRMA*6100	English Drama to 1642
DRMA*6120	Aspects of 20th-Century Theatre
DRMA*6130	Aspects of 19th-Century Drama
DRMA*6140	Aspects of 20th-Century Drama
DRMA*6150	Special Studies in Theatre History
DRMA*6180	Aspects of 19th Century Theatre
DRMA*6190	Special Studies in Drama
DRMA*6220	Aspects of the Theory of Drama, Theatre, and Performance
DRMA*6801	Reading Course I
DRMA*6802	Reading Course II
ENGL*6002	Topics in the History of Criticism
ENGL*6003	Problems of Literary Analysis
ENGL*6201	Topics in Canadian Literature
ENGL*6209	Topics in Commonwealth/Postcolonial Literature
ENGL*6412	Topics in Medieval/Renaissance Literature
ENGL*6421	Topics in 18th-Century and Romantic Literature
ENGL*6431	Topics in 19th-Century Literature
ENGL*6441	Topics in Modern British Literature
ENGL*6451	Topics in American Literature
ENGL*6611	Topics in Women's Writing
ENGL*6621	Topics in Children's Literature
ENGL*6641	Topics in Scottish Literature
ENGL*6691	Interdisciplinary Studies
ENGL*6811	Special Topics in English
ENGL*6801	Reading Course I
ENGL*6802	Reading Course II

Note

* N.B. all courses, except for the Intensive Area Seminar and the Dissertation, are weighted 0.5.

Courses Offered at Wilfrid Laurier University*

WLU*600E Research Methods, Theory, and Professional Issues U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*601E Fiction by Contemporary British Women U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*602E Gender and Genre in Renaissance Drama U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*603E American Women Writers U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*604E The Gender of Modernism U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*605E Representations of Gender in Victorian Literature U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*606E Theatrical Images of Gender U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*607E Ideologies of Genre in 19th-Century Literature U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*608E Women Writers of the 17th Century U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750

WLU*610E Feminist Theory and Women's Writing U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*621E The Nature Lyric: Genre and Gender U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*622E British Feminist Drama in the 20th Century U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*623E Film Genre and Feminist Theory U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*624E Medieval Dream Vision Narrative U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*625E Medieval Romance U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*626E Postcoloniality: Theory and Practice U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*628E The Dramatic Experience U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*629E Canadian Literary Forms U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*630E Modernism to Postmodernism U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*632E Renaissance Domestic Tragedy U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*634E Dramatic Comedy of the 17th Century U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*635E The Gothic U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*636E Canadian Literary Pluralities U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*640E Reading Theory U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*641E Voices of the Diaspora U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*642E Oral Performance and Oral Theory U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*690E Directed Studies U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*691E Special Topics in Gender U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*692E Special Topics in Genre U [0.50]
Descriptions of all Wifrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750

Note

* N.B. All courses, except for the Intensive Area Seminar and the Dissertation, are weighted 0.5.

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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Herb Kunze

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Anna T. Lawniczak

MSc Wroclaw, PhD Southern Illinois - Professor

Hristo Sendov

BA Sofia Univ. Bulgaria, MSc Michigan Technological Univ, PhD Waterloo - Assistant Professor

Radhey S. Singh

2006-2007 University of Guelph Graduate Calendar

BA, MA Banaras, MS, PhD Michigan State - Professor

Gary J. Umphrey

BSc, MSc Guelph, PhD Carleton - Assistant Professor

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 fulfils 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 of MSc Project in Mathematics, MATH*6998 or MSc Project in Statistics, STAT*6998.

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:

MATH*6011	Dynamical Systems I
MATH*6021	Optimization I
MATH*6400	Numerical Analysis I
MATH*6041	Partial Differential Equations I

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:

STAT*6801	Advanced Data Analysis I
STAT*6802	Advanced Data Analysis II
STAT*6860	Linear Statistical Models

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:

Applied Mathematics

Students must successfully complete 2.0 graduate-course credits. Depending upon the student's academic background, further courses may be prescribed. The required four courses must include at least two core courses selected from:

MATH*6012	Dynamical Systems II
MATH*6022	Optimization II
MATH*6410	Numerical Analysis II
MATH*6042	Partial Differential Equations II

All courses are chosen in consultation with the advisory committee. Additional courses may be required at the discretion of the advisory committee and/or the departmental graduate committee. With departmental approval, some courses given by other universities may be taken for credit. In addition to the courses, the student will be required to participate in the Graduate Seminar and make one oral presentation in each year of full-time enrolment.

Applied Statistics

Students must successfully complete 2.0 graduate-course credits. Depending upon the student's academic background, further courses may be prescribed. Students must take the following courses as part of the four required courses (providing that these courses were not taken as part of the student's master's-degree program):

STAT*6802	Advanced Data Analysis II
STAT*6860	Linear Statistical Models

All courses are chosen in consultation with the student's advisory committee. Additional courses may be required at the discretion of the advisory committee and/or the departmental graduate committee. With departmental approval, some courses given by other universities may be taken for credit. In addition to the courses, the student will be required to participate in the Graduate Seminar and make one oral presentation in each year of full-time enrolment.

Interdepartmental Programs

Biophysics MSc/PhD Program

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.

Toxicology MSc/PhD Collaborative Program

The Department of Mathematics and Statistics participates in the MSc/PhD programs in toxicology. Professor Hubert is a member of the Toxicology Interdepartmental Group. This faculty member's research and teaching expertise includes aspects of toxicology; he may serve as advisor for MSc and PhD students in toxicology. Please consult the Toxicology listing for a detailed description of the MSc/PhD collaborative program.

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; principle 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.

MATH*6051 Mathematical Modelling U [0.50]

Selected advanced topics in mathematical modelling, possibly in conjunction with the departmental Mathematics and Statistics Clinic.

MATH*6071 Biomathematics U [0.50]

The application of mathematics to model and analyze biological systems. Specific models to illustrate the different mathematical approaches employed when considering different levels of biological function.

MATH*6091 Topics in Analysis U [0.50]

Selected topics from topology, real analysis, complex analysis, and functional analysis.

MATH*6181 Topics in Applied Mathematics I U [0.50]

This course provides graduate students, either individually or in groups, with the opportunity to pursue topics in applied mathematics under the guidance of graduate faculty. Course topics will normally be advertised by faculty in the semester prior to their offering. Courses may be offered in any of lecture, reading/seminar, or individual project formats.

MATH*6182 Topics in Applied Mathematics II U [0.50]

This course provides graduate students, either individually or in groups, with the opportunity to pursue topics in applied mathematics under the guidance of graduate faculty. Course topics will normally be advertised by faculty in the semester prior to their offering. Courses may be offered in any of lecture, reading/seminar, or individual project formats.

MATH*6400 Numerical Analysis I U [0.50]

Topics selected from numerical problems in: matrix operations, interpolation, approximation theory, quadrature, ordinary differential equations, partial differential equations, integral equations, nonlinear algebraic and transcendental equations.

MATH*6410 Numerical Analysis II U [0.50]

One or more topics selected from those discussed in Numerical Analysis I, but in greater depth.

MATH*6990 Mathematics Seminar U [0.00]

Students will review mathematical literature and present a published paper.

MATH*6998 MSc Project in Mathematics U [1.00]

Statistics

STAT*6700 Stochastic Processes U [0.50]

The content of this course is to introduce Brownian motion leading to the development of stochastic integrals thus providing a stochastic calculus. The content of this course will be delivered using concepts from measure theory and so familiarity with measures, measurable spaces, etc., will be assumed.

STAT*6721 Stochastic Modelling U [0.50]

Topics include the Poisson process, renewal theory, Markov chains, Martingales, random walks, Brownian motion and other Markov processes. Methods will be applied to a variety of subject matter areas.

STAT*6741 Statistical Analysis for Reliability and Life Testing U [0.50]

Statistical failure models, order statistics, point and interval estimation procedures for life time distributions, testing reliability hypotheses, Bayes methods in reliability, system reliability.

STAT*6761 Survival Analysis U [0.50]

Kaplan-Meier estimation, life-table methods, the analysis of censored data, survival and hazard functions, a comparison of parametric and semi-parametric methods, longitudinal data analysis.

STAT*6801 Advanced Data Analysis I U [0.50]

Residual analysis, deletion residuals, influential points, added variable plots, constructed variables, families of transformations, jackknife and bootstrap methods, local linear regression, regression splines and cubic smoothing splines.

STAT*6802 Advanced Data Analysis II U [0.50]
Generalized linear and generalized additive models, linear and nonlinear mixed effects models, parametric and semiparametric analysis of longitudinal and clustered data, generalized estimating equations, applications to categorical and spatial data.
STAT*6821 Multivariate Analysis U [0.50]
This is an advanced course in multivariate analysis and one of the primary emphases will be on the derivation of some of the fundamental classical results of multivariate analysis. In addition, topics that are more current to the field will also be discussed such as: multivariate adaptive regression splines; projection pursuit regression; and wavelets.
STAT*6841 Statistical Inference U [0.50]
Bayesian and likelihood methods, large sample theory, nuisance parameters, profile, conditional and marginal likelihoods, EM algorithms and other optimization methods, estimating functions, MonteCarlo methods for exploring posterior distributions and likelihoods, data augmentation, importance sampling and MCMC methods.
STAT*6850 Advanced Biometry U [0.50]
Topics on advanced techniques for analyzing data from biological systems. In particular, univariate discrete models, stochastic processes as it relates to population dynamics and growth models with time dependencies, generalized discrete models for spatial patterns in wildlife, the theoretical foundation and recent results in aquatic bioassays, and other topics relating to the student's research interest.
STAT*6860 Linear Statistical Models U [0.50]
Generalized inverses of matrices; distribution of quadratic and linear forms; regression or full rank model; models not of full rank; hypothesis testing and estimation for full and non-full rank cases; estimability and testability; reduction sums of squares; balanced and unbalanced data; mixed models; components of variance.
STAT*6870 Experimental Design U [0.50]
This is an advanced course in experimental design which emphasizes proofs of some of the fundamental results in the topic. The topics will include: design principles; design linear models; designs with several factors; confounding in symmetrical factorials; fractional factorials.
STAT*6880 Sampling Theory U [0.50]
Theory of equal and unequal probability sampling. Topics in: simple random, systematic, and stratified sampling; ratio and regression estimates; cluster sampling and subsampling; double sampling procedure and repetitive surveys; nonsampling errors.
STAT*6920 Topics in Statistics U [0.50]
STAT*6950 Statistical Methods for the Life Sciences* F [0.50]
Analysis of variance, completely randomized, randomized complete block and latin square designs; planned and unplanned treatment comparisons; random and fixed effects; factorial treatment arrangements; simple and multiple linear regression; analysis of covariance with emphasis on the life sciences.
STAT*6960 Design of Experiments and Data Analysis for the Life Sciences * W [0.50]
Principles of design; randomized complete block; latin square and extensions the split plot and extension; incomplete block designs; confounding and fractional replication of factorial arrangements; response surfaces the analysis of series of experiments; the general linear model; multiple regression and data analytic techniques.
STAT*6970 Statistical Consulting Internship U [0.25]
This course provides experience in statistical consulting in a laboratory and seminar environment. The student will participate in providing statistical advice and/or statistical analyses and participate in seminar discussions of problems arising from research projects in various disciplines.
STAT*6990 Statistics Seminars by Graduate Students U [0.00]
STAT*6998 MSc Project in Statistics U [1.00]

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, Preston, Seah, van der Merwe, Whitfield, Wood
- **Pathogenesis and Immunity** -- Kaushik, Lam, Lo, Mutharia, Preston, 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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Matthew Kimber

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Peter J. Krell

BSc, MSc Carleton, PhD Dalhousie - Professor

Joseph S.L. Lam

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Reggie Y.C. Lo

BSc, PhD Alberta - Professor

Devakanand Mangroo

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Baozhong Meng

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Rod Merrill

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Lucy M. Mutharia

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Andrew Preston

BA, D.Phil. Oxford - Assistant Professor

Stephen Y.K. Seah

BSc, MSc National University of Singapore, PhD Sheffield - Assistant Professor

Frances Sharom

BSc Guelph, PhD Western Ontario - Professor

Rosalynn 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.

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.

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, Kimber, Keates, 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

MICR*6040 Advanced Microbial Physiology W [0.50]

A study of molecular structure-function relationships fundamental to the survival and growth of bacteria. Topics for study will be selected from the literature on bacterial cytology, bioenergetics, metabolism, enzymology and adaptation.

MICR*6070 Bacterial Structures and Virulence F [0.50]

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)

MICR*6500 Microbial Genetics W [0.50]

A study of recent research developments on the mechanisms of regulation of gene expression, DNA metabolism and genome analysis of microorganisms. (Offered in even-numbered years)

Virology

MICR*6130 Molecular Biology of Viruses W [0.50]

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.

Pathogenesis

MICR*6500 Microbial Genetics W [0.50]

A study of recent research developments on the mechanisms of regulation of gene expression, DNA metabolism and genome analysis of microorganisms. (Offered in even-numbered years)

MICR*6070 Bacterial Structures and Virulence F [0.50]

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)

MICR*6423 Advances in Immunology and Immunochemical Techniques W [0.50]

Concepts and current knowledge of the diversity of immune response, experimental systems used in studying immunology, antigen-antibody reaction methods, monoclonal antibodies, antibody engineering, hypersensitivity reactions, autoimmunity, adhesion molecules and homing of cells of the immune system.

General

MICR*6950 Selected Topics in Microbiology U [0.50]

This course, offered on an irregular basis, provides opportunities for graduate students to study special topics of mutual interest 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.

MICR*6540 Introductory Seminar F,W,S [0.25]

A literature review of a selected area of microbiological research concluding with a written research proposal, and a seminar on the information which is presented within the first two semesters of the program. The course is required for MSc students, but is optional for PhD students who have taken an equivalent course.

MICR*6590 Advanced Seminar F,W [0.25]

Public seminars on current microbiological or allied research topics. MSc students give one seminar while Ph.D. students give two seminars. The topics must be on subjects other than the student's area of research.

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, Lu, Mosser, Nazar, Phillips, Rothstein, Wildeman, Yankulov
- **Genetics** -- Baker, Bendall, Colasanti, Robb, Rothstein
- **Cell Biology** -- Bag, Bendall, Harauz, 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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Steven Rothstein

BA Swarthmore College, PhD Wisconsin - Professor

Alan 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.

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.

Degree Requirements

In addition to a research thesis, the minimum course requirement following an MSc degree includes the completion of the Research Topics Course, MBG*6080, and Seminars in February 8, 2007

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]

The 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.

MCB*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.

MCB*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]

The 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

MBG*6000 Seminars in Molecular Biology and Genetics F,W [0.00]

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.

MCB*6010 Advanced Topics in Biochemistry U [0.50]

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.

MBG*6080 Research Topics Course F,W,S [0.50]

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.

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, Smith; Laboratory animal medicine: Turner

- **Immunology:** Mallard, Sharif, Shewen.

- **Veterinary Infectious Diseases**

Veterinary bacteriology: Boerlin, Gray, MacInnes, Prescott; Veterinary parasitology: Barta, Peregrine; Veterinary Virology: Nagy, Yoo.

- **Veterinary Pathology**

Anatomic pathology: Barker, Brooks, Caswell, Foster, Hayes, Stalker; 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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Éva Nagy

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John F. Prescott

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Shayan Sharif

DVM Tehran, PhD Guelph - Assistant Professor

Patricia E. Shewen

2006-2007 University of Guelph Graduate Calendar

BSc, DVM, MSc, PhD Guelph - Professor

Dale A. Smith

DVM, DVSc Guelph - Professor

Margaret J. Stalker

BSc Queen's, DVM Saskatchewan, PhD Guelph, Dipl ACVP - Assistant Professor

Patricia V. Turner

BSc McMaster, MSc Dalhousie, DVM, DVSc Guelph, Dipl ACLAM - Associate Professor

Bruce N. Wilkie

DVM Guelph, PhD Cornell - Professor

R. Darren Wood

DVM Prince Edward Island, DVSc Guelph - Assistant Professor

Dongwan Yoo

DVM, MSc Seoul, PhD Ottawa - 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. 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

Applicants should have either a DVM (or equivalent) degree with at least a 'B' average over the four years of the program, or an honours 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 by the student in consultation with the advisor and advisory committee based on the student's background, and research and career objectives.

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

PABI*6400 Seminar F,W,S [0.00]

A thesis research plan to be presented orally to the department by the third week of the third semester.

PABI*6960 Special Topics in Pathobiology F,W,S [0.50]

In-depth independent study of subjects related to students' principal area of interest. Major paper(s), laboratory studies, and/or written and oral examination, with or without seminar preparation.

Comparative Pathology

PABI*6050 Applied Avian Pathology I F [0.50]

Examination and interpretation of gross and microscopic lesions of domestic birds.

PABI*6060 Applied Avian Pathology II W [0.50]

A continuation of PABI*6050, emphasizing seasonal differences in diseases as well as diseases more commonly associated with winter and early spring conditions.

PABI*6070 Applied Avian Pathology III S [0.50]

A continuation of PABI*6060, emphasizing seasonal differences in diseases as well as diseases more commonly associated with late spring and summer conditions.

PABI*6221 Comparative Veterinary Pathology I W [0.50]

Pathological changes associated with diseases of fish, amphibia, reptiles, wild and captive non-domestic birds, marine and wild mammals including fur-bearers. (even numbered years)

PABI*6222 Comparative Veterinary Pathology II F [0.50]

Pathological changes associated with diseases of poultry and pet birds, and various laboratory animals. (Even numbered years)

PABI*6630 Applied Comparative Pathology I F [0.50]

A study of problems in, as well as the examination of, lesions found in diseases of fish and wildlife, including amphibia and reptiles, drawn from naturally occurring cases assigned for detailed investigation. The student may be required to prepare a critical review of a specific disease entity.

PABI*6640 Applied Comparative Pathology II W [0.50]

A continuation of PABI*6630 emphasizing seasonal differences in diseases as well as diseases more commonly associated with winter and early spring conditions.

PABI*6650 Applied Comparative Pathology III F [0.50]

A continuation of PABI*6640 emphasizing seasonal difference in diseases as well as diseases more commonly associated with late spring and summer conditions.

PABI*6700 Laboratory Animal Science U [0.50]

Basic information on various aspects of laboratory animal science, including IACUC function, regulatory oversight, ethics, historical review of animal research, animal models and alternatives, experimental design and considerations, biology, management and uses of common species in research.

PABI*6710 Applied Laboratory Animal Science I U [0.50]

Continuation of I with emphasis on biohazard and personnel safety, monitoring for disease, quality control and diagnostic procedures.

PABI*6720 Applied Laboratory Animal Science II U [0.50]

Continuation of I with emphasis on biohazard and personnel safety, monitoring for disease, quality control and diagnostic procedures.

PABI*6730 Applied Laboratory Animal Science III U [0.50]

Continuation of I and II, with emphasis on a comparison of programs and procedures in other facilities in Canada, nonhuman primate medicine, and surgical, clinical and necropsy procedures.

PABI*6740 Avian Diseases W [0.50]

Detailed study of recent concepts of preventive medicine, diagnosis and therapeutics as applied to clinical recognition and control of avian diseases.

Immunology**PABI*6100 Immunobiology F [0.50]**

Major areas of immunology, including initiation, regulation, receptors, genetics, immune system development and function.

PABI*6190 Topics in Immunology W [0.50]

Aspects of immune and non-specific host resistance, diagnostic immunology and immune-mediated disease.

Veterinary Infectious Diseases**PABI*6000 Bacterial Pathogenesis W [0.50]**

Pathogenic bacteria with particular reference to pathogenesis, immunology, epidemiology and control.

PABI*6180 Clinical Bacteriology W [0.50]

Current techniques and approaches in diagnostic bacteriology.

PABI*6330 Viral Diseases F [0.50]

A study of important viral diseases of animals, with emphasis on etiology, host responses, diagnosis and control.

PABI*6350 Molecular Epidemiology of Bacterial Diseases F [0.50]

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.

Prerequisite(s): STAT*2040 Statistics I

Restriction(s): Lab component: limited number of participants and WHIMIS certificate compulsory.

PABI*6420 Diagnostic Parasitology F [0.50]

Study of the laboratory diagnosis of parasites of domestic animals. (Even numbered years)

MICR*6070 Bacterial Structures and Virulence F [0.50]

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)

MICR*6130 Molecular Biology of Viruses W [0.50]

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.

MICR*6500 Microbial Genetics W [0.50]

A study of recent research developments on the mechanisms of regulation of gene expression, DNA metabolism and genome analysis of microorganisms. (Offered in even-numbered years)

Veterinary Pathology**PABI*6030 Applied Clinical Pathology I F,W,S [0.50]**

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)

PABI*6040 Applied Clinical Pathology II U [0.50]

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).

PABI*6041 Applied Clinical Pathology III U [0.50]

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).

PABI*6080 Diagnostic Pathology I - Domestic Mammals S-F [0.50]

Examination and interpretation of gross and microscopic lesions of animal diseases.

PABI*6090 Diagnostic Pathology II - Domestic Mammals W [0.50]

A continuation of PABI*6080, emphasizing seasonal differences in diseases as well as diseases more commonly associated with winter and early spring conditions.

PABI*6091 Diagnostic Pathology III - Domestic Mammals S [0.50]

A continuation of PABI*6090, emphasizing seasonal differences in diseases as well as diseases more commonly associated with late spring and summer conditions.

PABI*6104 Mechanisms of Disease F [0.50]

Molecular, cellular and tissue processes involved in the pathogenesis of adaptive, degenerative, inflammatory, proliferative and neoplastic diseases. (Odd-numbered years)

PABI*6105 Integrative Pathology F [0.50]

Basic and interpretive tissue and biochemical concepts of disease in the liver, pancreas, kidney, endocrine and hemicymphatic systems. (Even-numbered years)

PABI*6110 Pathology I W [0.50]

Disease processes of the respiratory, integumentary, reproductive and skeletal systems. (Disease processes of the respiratory, integumentary, reproductive and skeletal systems)

PABI*6130 Pathology II W [0.50]

Disease processes of the alimentary, central-nervous, cardiovascular and muscular systems and special senses. (Odd-numbered years)

PABI*6300 Clinical Pathology I W [0.50]

A study of diagnostic hematology and cytology, with emphasis on the hematopoietic system.

PABI*6320 Clinical Pathology II W [0.50]

Clinical biochemistry of selected organ systems including the renal, hepatic, pancreatic and endocrine organ systems.

Philosophy

Administrative Staff

Chair

Andrew Wayne (347 MacKinnon, Ext. 56389)
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Graduate Co-ordinator

Mark McCullagh (356 MacKinnon, Ext. 53221)
mmcculla@uoguelph.ca

Graduate Secretary

Linda Stadig (348 MacKinnon, Ext. 53272)
lstadig@uoguelph.ca

Graduate Faculty

Andrew Bailey

BA, MA Oxford, PhD Calgary - Assistant 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

Karyn 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 - Assistant Professor

John Russon

BA Regina, MA, PhD Toronto - Associate 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

Graduate Faculty from McMaster and Wilfrid Laurier Universities

In addition to the aforementioned members of the Guelph graduate faculty who support the Guelph MA program, the Guelph-McMaster-Laurier joint PhD program includes the following faculty members from McMaster and Wilfrid Laurier Universities.

Barry G. Allen

BA Lethbridge, MA, PhD Princeton - Professor, McMaster

Richard T. W. Arthur

PhD Western Ontario - Professor and Chair of Philosophy Dept., McMaster

Neil Campbell

BA Toronto, PhD McMaster - Associate Professor, Wilfrid Laurier

Renato Cristi

PhD Toronto - Professor, Wilfrid Laurier

Diane Enns

PhD SUNY (Binghamton) - Assistant Professor, McMaster (cross-appointed with Women's Studies Program)

Brian Garrett

PhD McGill - Assistant Professor, McMaster

Elisabeth (Boetzkes) Gedge

PhD Calgary - Associate Professor, McMaster

Nicholas Griffin

BA Leicester, PhD Australian National - Professor, McMaster

Leo Groarke

PhD Western Ontario - Professor, Wilfrid Laurier

Stephen Haller

PhD Guelph - Assistant Professor, Wilfrid Laurier

David L. Hitchcock

BA McMaster, PhD Claremont - Professor, McMaster

Violetta Igheski

PhD Toronto - Assistant Professor, McMaster

Rockney Jacobsen

PhD Alberta - Associate Professor, Wilfrid Laurier

Rebekah Johnston

PhD Toronto - Assistant Professor, Wilfrid Laurier

Howard Jones

PhD Indiana - Professor (Classics), McMaster

Jill Leblanc

BA McMaster, MA, PhD Toronto - Associate Professor, McMaster

Robert Litke

PhD Michigan - Professor, Wilfrid Laurier

Spiro Panagiotou

BSc, MA Guelph, PhD St. Andrews - Associate Professor, McMaster

Jill Rusin

PhD John Hopkins - Assistant Professor, McMaster

Brigitte Sassen

BA Toronto, MA, PhD Pennsylvania State - Associate Professor, McMaster

Mark Vorobej

BA Carleton, MA, PhD Toronto - Associate Professor, McMaster

Wil Waluchow

MA Western Ontario, DPhil Oxford - Professor, McMaster

Allison Weir

PhD York - Associate Professor, Wilfrid Laurier

Byron Williston

PhD Toronto - Associate Professor, Wilfrid Laurier

James Wong

PhD Toronto - Assistant Professor, Wilfrid Laurier

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 take 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, jointly with McMaster University and Wilfrid Laurier University, 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 Guelph-Laurier-McMaster Doctoral Program in Philosophy, which consists of members drawn from all three university departments, is a semi-autonomous body responsible directly to the three graduate schools. It is responsible for admissions, for the program of instruction and for the naming of a student's advisory committee. Students in the program may enroll either at Guelph, McMaster or Wilfrid Laurier. A student comes under the general regulations of the university in which he or she is registered and the degree is granted by that university.

The program offers supervision in most of the traditional areas of philosophy but the special strengths of the program are in continental philosophy; epistemology and metaphysics; history of western philosophy; philosophy of science; language and logic; social, political and legal philosophy; and theoretical and applied ethics.

Admission Requirements

Admission to the program is restricted to those who have an MA 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 twentieth month 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). Further details can be found on the program website <http://www.glmphilosophy.ca>.

Courses

Except where specified, the courses listed below may be offered in any semester, subject to student demand and the availability of an instructor.

Guelph

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 Hobbes 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 Hobbes 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 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 of problems in biomedical ethics.

PHIL*6600 Social and Political Philosophy U [0.50]

A critical examination of some selected contemporary works or central problems in the field of social philosophy.

PHIL*6760 Science and Ethics U [0.50]

A consideration of the problems which arise in the conjunction of science and ethics.

Metaphysics/Epistemology

PHIL*6110 Philosophy of Religion U [0.50]

A critical examination of some selected major works or central problems in the philosophy of religion.

PHIL*6120 Philosophy of Mind U [0.50]

A study of contemporary theories of mind and philosophies of psychology.

PHIL*6140 Continental Theory I U [0.50]

A study of the historical and contemporary origins of existentialism, phenomenology and post-modernism, concentrating on one or several of the classic texts.

PHIL*6150 Continental Theory II U [0.50]

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.

PHIL*6200 Problems of Contemporary Philosophy U [0.50]

A study of a particular set of problems in contemporary philosophy.

PHIL*6210 Metaphysics U [0.50]

A critical examination of some selected major works or central problems in metaphysics.

PHIL*6220 Epistemology U [0.50]

A critical examination of some selected major works or central problems in epistemology.

Philosophy of Science

PHIL*6720 History of the Philosophy of Science U [0.50]

A survey of the history of the philosophy of science from the Presocratics to the Positivists.

PHIL*6730 Contemporary Philosophy of Science U [0.50]

An examination of the contemporary discipline of the philosophy of science.

PHIL*6740 Philosophy of Biology U [0.50]

A general introduction to the history and philosophy of biology.

PHIL*6750 Philosophy of Social Science U [0.50]

A critical examination of issues in the philosophy of social science

General

PHIL*6060 Logic U [0.50]

A course designed to bring the individual student to the level of competence in logical techniques and theory required for graduate studies.

PHIL*6770 Special Research Paper I U [0.50]

A research course in a topic of the student's choice, guided by an individual faculty member.

PHIL*6780 Special Research Paper II U [0.50]

A research course in a topic of the student's choice, guided by an individual faculty member.

PHIL*6900 Reading Course U [0.50]

PHIL*6930 Selected Topics I U [0.50]

Topics in this course will vary from offering to offering.

PHIL*6940 Selected Topics II U [0.50]

Topics in this course will vary from offering to offering.

PHIL*6950 MA Seminar U [0.50]

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.

PHIL*6960 PhD Graduate Seminar U [0.50]

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.

PHIL*6990 Guided Research Project U [1.00]

A guided research project undertaken by students doing an MA by course work, under the supervision of a faculty member.

McMaster University

Topics courses differ in content from year to year and, under different descriptions, may be taken a second time for credit. Candidates should consult the chair for the specific offerings in a given year.

MCM*6B03 Theory of Value U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*6D03 Twentieth Century Analytic Philosophy U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*706 Basic Symbolic Logic U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*719 Reading Course U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*720 Reading Course U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*731 Special Studies in Philosophy U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*743 Graduate Seminar I U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*744 Graduate Seminar II U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*750 Selected Topics in Ancient Philosophy U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*751 Selected Topics in Medieval Philosophy U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*752 Selected Topics in Modern British Philosophy (1600-1900) U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*753 Selected Topics in Early Modern European Philosophy (1600-1800) U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*754 Selected Topics in Kant U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*755 Selected Topics in Nineteenth Century European Philosophy U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*756 Selected Topics in Twentieth Century European Philosophy U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*757 Selected Topics in Twentieth Century British Philosophy U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*758 Selected Topics in American Philosophy U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*759 Selected Topics in Applied Ethics U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*760 Selected Topics in Logic & the Theory of Argumentation U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*761 Selected Topics in Philosophy of Language U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*762 Selected Topics in Metaphysics U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html

MCM*763 Selected Topics in Epistemology & Philosophy U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*764 Selected Topics in Social & Political Philosophy U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*765 Selected Topics in Ethical Theory U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*766 Selected Topics in Philosophy of Religion U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*767 Selected Topics in Aesthetics U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*768 Selected Topics in Existential Phenomenology & Hermeneutics U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*769 Selected Topics in Philosophy of Law U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*770 Selected Topics in Philosophy of Education U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html
MCM*771 Selected Topics in Philosophy of Science U [0.00]
Descriptions of all MacMaster University Graduate courses may be found at http://www.mcmaster.ca/graduate/calendar.html

Wilfrid Laurier University

WLU*780 Selected Topics in Social, Political & Legal Philosophy U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*781 Selected Topics in the History of Philosophy U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*782 Selected Topics in Continental Philosophy U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*783 Selected Topics in Ethics U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*784 Selected Topics in the Philosophy of Mind and Language U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*785 Selected Topics in Formal and Philosophical U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*786 Selected Topics in the Theory of Argumentation U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*787 Selected Topics in Metaphysics and Epistemology U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*788 Research Seminar U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750
WLU*789 Directed Study U [0.50]
Descriptions of all Wilfrid Laurier University Graduate courses may be found at http://www.wlu.ca/page.php?grp_id=36&s_id=750

Each year philosophy professors at Laurier offer courses in the Humanities/Religion and Culture M.A. program at WLU. Past topics have included Nietzsche, Feminist Theory, Virtues and Vices, and Trust and Authority. Philosophy PhD students can arrange to take

these courses for Philosophy credit. Consult the Laurier Philosophy Department for each year's offerings.

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 send applications for admission to the director of the Institute. 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.

Director of the Institute

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Administrative Assistant for the Program

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Departmental Chair

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Departmental Graduate Secretary

Reggi Vallillee (209 MacNaughton, Ext. 52262)
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Ralf Gellert

Dipl Phys, PhD Darmstadt - Assistant Professor

De-Tong Jiang

BSc Jilin, PhD Simon Fraser - Assistant Professor

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Vladimir Ladizhansky

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Anna T. Lawniczak

MSc Wroclaw, PhD Southern Illinois - Professor

Jacek Lipkowski

MSc, PhD, DSc Warsaw - Professor

Alejandro Marangoni

BSc McGill, PhD Guelph - Professor

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BE, MSc Saskatchewan, PhD California, FRSC - Professor

Elisabeth J. Nicol

BSc Mount Allison, MSc, PhD McMaster - Professor

Joanne M. O'Meara

BSc, PhD McMaster - Assistant Professor

Eric Poisson

BSc Laval, MSc, PhD Alberta - Professor

Xiao-Rong Qin

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Daniel F. Thomas

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BSc Toronto, MSc Waterloo, PhD Australian National, FAAO - Professor

Z.Y. 'Jeff' Chen

BSc Fuden, PhD Maryland - Professor

Marita C. Chidichimo

Licentiate Buenos Aires, PhD Cambridge - Associate Professor

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Michael Fich

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Jaume Gomis

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Bae-Yeun Ha

BSc, MS Korea, PhD Maryland - Assistant Professor

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Robert Hill

BSc, PhD Bristol - Assistant Professor

Michael Hudson

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S.H.J. Idziak

BSc McGill, PhD Pennsylvania - Associate Professor

Lyndon Jones

BSc Cardiff, PhD Birmingham - Associate Professor

Achim Kempf

BSc Heidelberg, PhD Munich - Associate Professor

Jan Kycia

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BSc Laval, PhD Cambridge - Professor

Robert LeRoy

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Tong K. Leung

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Stanley P. Lipshitz

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Wing-Ki Liu

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Qing-Bin Lu

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Fotini Markopoulou

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James Martin

BSc, MSc, PhD Waterloo - Assistant Professor

F.R.W. McCourt

BSc, PhD British Columbia, PhD Alberta - Professor

Robert G. McLenaghan

MSc Queen's, PhD Cambridge - Professor

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Robert C. Myers

PhD Princeton - Professor

Linda F. Nazar

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Hartwig Peemoeller

BSc Winnipeg, MSc Victoria, PhD Waterloo - Professor

Joseph Sanderson

BSc, PhD London - Assistant Professor

Gunter A. Scholz

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James J. Sloan

BSc, PhD Queen's - Professor

Lee Smolin

BA Hampshire AM, PhD Harvard - Professor

Donna Strickland

BEng McMaster, PhD Rochester - Associate Professor

Russell Thompson

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John Vanderkooy

BEng, PhD McMaster - Professor

Marek Wartak

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Li Wei

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Gregor Weihs

MSc Innsbruck, PhD Vienna - Associate Professor

Paul S. Wesson

BSc London, PhD Cambridge, FRAS London - Professor

Frank Wilhelm

BSc Vordiplom, MSc (Dipl.-Phys.), PhD Karlsruhe (Germany) - Associate Professor

David Yevick

AB Harvard, MA, PhD Princeton, Docuent Lund - Professor

MSc Program

The MSc programs provide for emphasis on astrophysics and gravitation, atomic, molecular and optical physics, biophysics, chemical physics, condensed matter and material physics, industrial and applied physics, subatomic physics, and quantum computing.

Three options are available for the MSc degree:

- A research-based option in which the student is required to complete four one-semester courses (at least 2.0 course credits) and a thesis.
- A course work option in which the student is required to complete eight one-semester courses (at least 4.0 course credits), one of which must be a research project course that includes a report.
- 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 (at least 2.0 course credits) and a thesis.

Admission Requirements

Application for admission should be made as early as possible on forms obtained from the director of the Guelph-Waterloo Physics Institute, available from the web-site <http://gwp.on.ca/>

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 discussed 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.

Basic Group

PHYS*7010 Quantum Mechanics I * U [0.50]

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.

PHYS*7020 Quantum Mechanics II U [0.50]

Concepts of relativistic quantum mechanics, elementary quantum field theory, and Feynman diagrams. Application to many-particle systems.

Prerequisite(s): 7010 or equivalent

PHYS*7040 Statistical Physics I* U [0.50]

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.

PHYS*7050 Statistical Physics II U [0.50]

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.

Prerequisite(s): PHYS*7040 or equivalent.

PHYS*7060 Electromagnetic Theory * U [0.50]

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.

PHYS*7080 Applications of Group Theory U [0.50]

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.

PHYS*7110 Scattering Theory U [0.50]

Review of potential theory of scattering. Applications chosen from elastic- and inelastic-neutron X-ray, light, charged-particle, and atomic and molecular beam scattering.

Subatomic and Nuclear

PHYS*7030 Quantum Field Theory U [0.50]

Review of relativistic quantum mechanics and classical field theory. Quantization of free quantum fields (the particle interpretation of field quanta). 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.

Prerequisite(s): PHYS*7010 or equivalent.

PHYS*7090 Green's Function Method U [0.50]

Review of essential quantum field theory. Zero and finite temperature. Green's functions. Applications.

PHYS*7150 Nuclear Physics U [0.50]

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.

PHYS*7170 Intermediate and High Energy Physics U [0.50]

Strong, electromagnetic and weak interactions. Isospin, strangeness, conservation laws and symmetry principles. Leptons, hadrons, quarks and their classification, formation, interactions and decay.

PHYS*7670 Introduction to Quantum Information Processing F [0.50]

Quantum superposition, interference, and entanglement. Postulates of Quantum Mechanics. Quantum computational complexity. Quantum Algorithms. Quantum communication and cryptography. Quantum error correction. Implementations.

Astronomy and Astrophysics

PHYS*7800 Galactic Structure U [0.50]

Introduction to statistical theory and distribution laws. Statistical theory of the galactic system. Stellar motions in the solar vicinity. Galactic rotation. Space distribution of stars and their relation to the galaxy. Distribution of various galactic objects. Application to extra-galactic systems.

PHYS*7810 Astrophysics U [0.50]

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.

PHYS*7840 Advanced General Relativity W [0.50]

Review of elementary general relativity. Timelike and null geodesic congruences. Hypersurfaces and junction conditions. Lagrangian and Hamiltonian formulations of general relativity. Mass and angular momentum of a gravitating body. The laws of black-hole mechanics.

PHYS*7850 Quantum Field Theory for Cosmology U [0.50]

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.

Prerequisite(s): PHYS*7010

PHYS*7860 General Relativity for Cosmology U [0.50]

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.

PHYS*7870 Cosmology U [0.50]

Friedmann-Robertson-Walker metric and dynamics; big bang thermodynamics; nucleosynthesis; recombination; perturbation theory and structure formation; anisotropies in the Cosmic Microwave Background; statistics of cosmological density and velocity fields; galaxy formation; inflation.

PHYS*7880 Selected Topics in Astronomy U [0.50]

Offered on demand

PHYS*7890 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 (Including Chemical Physics, and Conductivity and Superconductivity)**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]**

Electron processes in crystals, photoconductive processes. Electrode effects, imperfection and energy band transitions, scattering traps and trapping effects. Recombination kinetics, luminescence. Experimental methods and analysis.

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]

Physical properties and biological effects of different kinds of radiation: action of radiation on various cellular constituents: target theory, genetic effects, repair of radiation damage, physics of radiology and radiotherapy, isotropic tracers.

PHYS*7540 Selected Topics in Experimental Biophysics U [0.50]

Offered on demand

PHYS*7550 Biophysics of Organ Systems U [0.50]

Specialized cells and organs; the nerve impulse and its propagation, muscle contraction, sensory transducers, the central nervous system; haemodynamics, the red-blood corpuscle, homeostasis; selected topics of current interest, and seminar.

PHYS*7570 Special Topics in Biophysics U [0.50]

Offered on demand

PHYS*8900 Interuniversity Graduate Course in Biophysics U [0.50]

This graduate course is offered using the combined biophysical resources of the Universities of Brock, Guelph, McMaster and Waterloo. Three topics constitute the equivalent of a one-semester 3 hr./week graduate course. Information about the course and the selection of individual topics can be obtained from the departmental course co-ordinator. Registration and credit will occur in the semester of the last module.

Applied Physics (including Technical Methods)**PHYS*7410 Electron Microscopy and Electron Diffraction U [0.50]**

Introduction to electron optics and the electron microscope; kinematical and dynamical theories of electron diffraction by perfect crystals and by crystals containing lattice imperfections, limited-area electron diffraction, dark-field microscopy, interpretation of electron-diffraction patterns and diffraction-contrast effects in electron microscope images, selected experimental methods in electron microscopy.

PHYS*7420 Basic Theory of Nuclear Magnetic Resonance * U [0.50]

Quantum mechanics of spins in magnetic field; Bloch equations; NMR apparatus; the various nuclear-spin interactions; spin temperature; density matrix; spin-lattice relaxation; double resonance.

PHYS*7450 Selected Topics in Experimental Physics * U [0.50]

A modular course in which each module deals with an established technique of experimental physics. Four modules will be offered during the winter and spring semesters, but registration and credit will be in the spring semester. Typical topics are neutron diffraction, light scattering, acoustics, molecular beams, NMR, surface analysis, etc.

PHYS*7460 Nonlinear Optics U [0.50]

Classical and Quantum Mechanical descriptions of nonlinear susceptibility, nonlinear wave propagation, nonlinear effects such as Peckel's and Kerr effects, harmonic generation, phase conjugation and stimulated scattering processes.

PHYS*7470 Optical Electronics U [0.50]

Optoelectronic component fabrication, light propagation in linear and nonlinear media, optical fiber properties, electro-optic and acousto-optic modulation, spontaneous and stimulated emission, semiconductor lasers and detectors, noise effects in fiber systems.

PHYS*7480 Microprocessors in the Physics Laboratory U [0.50]

Interfacing and programming of microprocessors for applications in physics, including signal averaging, auto- and cross-correlation analysis, multichannel spectrum analysis, and Fourier transformation. Consideration of hardware versus software methods for optimization of speed and system size.

Special Courses (offered on demand only)**PHYS*7120 Selected Topics in Theoretical Physics U [0.50]****PHYS*7710 Special Lecture and Reading Course U [0.50]****PHYS*7720 Selected Seminar and Module Course (for inter-departmental students) U [0.50]****PHYS*7730 Special Topics in Physics U [0.50]****PHYS*7750 Interinstitution Exchange U [0.50]**

At the director's discretion, a PhD student may receive course credit for a term of specialized studies at another institution. Formal evaluation is required.

PHYS*7970 MSc Project U [1.00]

Study of a selected topic in physics presented in the form of a written report. For students whose MSc program consists entirely of courses

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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David J. Wolyn

BS 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

the thesis research. Students may be admitted into the fall, winter or spring semesters. In some instances (see MSc admission requirements) applicants who already hold an MSc may be required to initially register in the MSc program.)

Transfer from the MSc Program to the PhD Program

Students enrolled in the MSc program who demonstrate exceptional research and academic capabilities may request to be transferred to the PhD program. The request for transfer must be initiated by the student and must be done no sooner than the end of the second semester and no later than the end of the fourth semester.

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

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 Oilseed 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*6010 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.

External Course Code(s): Offered in even years.

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.

External Course Code(s): Offered in odd years.

PLNT*6220 Advanced Studies in Pomology W [0.50]

Discussion of current problems and research on fruit crop production and physiology.

External Course Code(s): Offered in even years

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.

External Course Code(s): Offered in odd years.

PLNT*6490 Colloquium in Physiology of Ornamental Crops F [0.50]

Current topics in the area of floriculture, turfgrass, and woody plant physiology.

External Course Code(s): Offered in even years.

General

PLNT*6020 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*6030 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.

External Course Code(s): Offered in odd years.

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 phylogenies, 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

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Kenneth B. Woodside

BA Toronto, MA, PhD Chicago - Professor

MA Program

The Department of Political Science offers programs of study leading to the MA degree. Students may pursue either a thesis option or a major paper option, both of which are research-based.

The MA program's focus is on three fields: the Americas, public policy and administration, and international and comparative development. The Americas field includes the study of the government and politics of Canada, the United States, and Latin America and the Caribbean from a comparative and theoretical perspective. The public policy and administration field includes the study of the operation and management of governmental institutions and selected areas of public policy. The international and comparative development field includes both area studies and theories of development which link these areas.

The department works jointly with the Department of Political Science at McMaster University in offering a collaborative program in public policy and administration. Faculty members in the department also participate in the Collaborative International Development Studies program. The MA program can be completed in three semesters. Students who are admitted will normally receive funding as a Graduate Teaching Assistant or a Graduate Research Assistant.

Application Procedure

Graduate students are admitted each fall semester (approximately 15 students). The deadline for all application is February 1 each year and the fee is currently \$75 in the form of a money order, payable to the University of Guelph. Personal cheques will be returned,

which will slow down the processing of your application. If you apply on-line, you can pay by credit card.

You may apply in one of two ways:

- On-line -- we encourage you to use this method
- Download an application form.

Both of these methods can be found at

www.uoguelph.ca/GraduateStudies/admission.htm

Information you are required to send to the Graduate Secretary, Department of Political Science, University of Guelph, Guelph, ON N1G 2W1.

- Application form from the downloaded application at the above web site

OR

The PDF summary of your on-line application **MUST** be printed out and submitted to the department with your other documents.

- A one-page Statement of Interest which clearly outlines your proposed area of interest. This statement is very important so that the members of the admissions committee can make their decisions.
- All official university transcripts. We do not require transcripts from community colleges.
- Two academic letters of reference - you must use the assessment forms from the downloadable application form.
- TOEFL scores or other English Language tests from all students whose first language is not English.

NOTE: This is a self-administered application process. Please have all materials (reference letters, transcripts, application form, letter of intent) returned to you and you put everything in one envelope and send to the Department of Political Studies Graduate Program Secretary.

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*3650, 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 the Fields of the Americas, Public Policy and Administration, and International and Comparative Development

In order to fulfill the requirements of the MA degree, 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 four courses plus Pro-Seminar and a thesis as described below for a total of 2.25 credits.

One professional development and orientation course:

POLS*6900	0.25	Pro-Seminar
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One core course:

POLS*6000	0.5	Comparative Approaches to Political Science
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One methodology course:

POLS*6940	0.5	Political Research: Theories and Approaches
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or an approved equivalent from another department.

Two departmental courses.

Courses from other departments with the approval of the department chair.

With the permission of the Graduate Committee, complete and successfully defend a thesis of no more than 20,000 words.

Major Paper option

Students pursuing the major paper option will select two major fields from the following: the Americas, Public Policy and Administration, or International and Comparative Development. In order to satisfy the degree requirements, the student will complete six courses plus 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
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One core course:

POLS*6000	0.5	Comparative Approaches to Political Science
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One methodology course:

POLS*6940	0.5	Political Research: Theories and Approaches
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or an approved equivalent from another department.

Four additional departmental courses.

Courses from other departments with the approval of the graduate coordinator or department chair.

Complete a major research paper of approximately 10,000 words:

POLS*6970	1.0	Research for Major Paper
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Interuniversity Program - Guelph-McMaster Collaborative MA Program in Political Science in the Field of 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 - like economics, law and sociology.

Graduates enjoy successful careers in the public services of Canada, Ontario and other provinces, plus local governments. Some work for businesses and others for interest associations and non-governmental organizations. A number of graduates have pursued PhD's and now teach in universities and colleges.

Course of Study

The fall and winter semesters consist of all core courses and 2 specialized electives. The summer semester differs for students who are formally enrolled at Guelph and those formally enrolled at McMaster.

Category A: Core Courses

Students must complete all core courses. Public Policy and Administration Research Seminar will be offered in alternating weeks at both universities during one of the fall or winter semesters.

POLS*6630 or MCM*7830	Policy Analysis
POLS*6640 or MCM*7850	Canadian Public Administration: Public Sector Management
POLS*6940 or MCM*7960	Political Research: Theories & Approaches
POLS*6950 or MCM*7940	Quantitative Research Design and Methods Public Policy & Admin. Research Seminar
POLS*6900	Proseminar (Guelph Students)

Category B: Specialized Electives

Students choose two additional courses from the annual listing of specialized courses offered at both McMaster and Guelph.

Category C: Summer Semester:

POLS*6970 Major Paper (Guelph students)
Students at Guelph will research and write a major paper (approximately 10,000 words) to be graded by the student's advisor and second reader (advisory committee).

Students at McMaster will write comprehensive examinations in mid July in the major field of Public Policy and Administration and in a minor field chosen from Canadian Politics, Comparative Politics or International Relations.

Interdepartmental Programs

Rural Studies PhD Program

The Department of Political Science is a participant in the PhD program in Rural Studies in the field of sustainable rural communities. Included in the graduate faculty for this program are J. Clark, C. Dauda, J. Diez, Craig Johnson, and I. Spears. PhD students will enroll in the interdepartmental rural studies program; those with advisors in the Department of Political Science will have access to departmental facilities. Please consult the Rural Studies listing for a detailed description.

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.

Thesis option in the CIDS program:

Students pursuing a thesis option will complete six courses plus 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
- Five CIDS core courses: (See the Collaborative International Development Program entry in this calendar (2.50))
- One methodology course:
POLS*6940 0.5 Political Research: Theories and Approaches
or an approved equivalent course from another department.
- One departmental graduate course (0.5).
- With the permission of the Graduate Committee, complete and successfully defend a thesis of no more than 20,000 words.

Major Paper option :

Students pursuing the major paper option will complete eight courses plus Proseminar and a major paper as described below for a total of 5.25 credits.

- One professional development and orientation course:
POLS*6900 0.25 Pro-Seminar
- Five CIDS core courses: See Collaborative International Development Program entry in this calendar (2.50)
- One methodology course:
POLS*6940 0.5 Political Research: Theories and Approaches
or an approved equivalent course from another department.
- Two departmental graduate courses (1.0).
- POLS*6970 1.0 Major Paper

Courses

(* core course)

The Americas

POLS*6210 Conceptions of Canada U [0.50]

This course will explore evolving conceptions of Canadian identity and nationalism through consideration of political culture, institutions and constitutional arrangements. Possible topics include: multiculturalism, aboriginal identity and community, Quebec nationalism, social citizenship, rights and representation, as well as Canada's global role and significance.

POLS*6250 Comparative Governments in the Americas U [0.50]

This course provides the theoretical and methodological foundation for the analysis of Canada, the United States, and Latin America and the Caribbean. Methodological issues in the analysis of constitutional regimes and theoretical frameworks for the comparative analysis of political institutions are examined.

POLS*6290 The American Political System U [0.50]

This course examines the institutions, processes and policies of the government and politics of the United States. Seminar discussion focuses on evaluating approaches to the study of the American system. Topics to be covered include Congress, interest groups, executive-legislative relations and reinventing government.

POLS*6370 Latin America and the Caribbean U [0.50]

The analysis of the political development of Latin America and the Caribbean looking at the context, ideologies, structures, processes and effects of policy formulation and implementation.

Public Policy and Administration

POLS*6390 Environmental Politics and Policy U [0.50]

This course analyses environmental actors, movements, institutions, processes and policies across national, sub-national regional and/or global levels of governance utilizing a range of environmental perspectives and theories. Depending on the instructor(s), different case studies of critical and contemporary environmental policy issues will be explored.

POLS*6450 International Political Economy U [0.50]

The course relies on theoretical approaches in IPE to examine the relationships between politics and economics across national and regional levels. The evolution of the global political economy and its globalization and state and non-state actors' responses. Issue areas may include: money and power, technology, trade, development and the environment.

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.

International and Comparative Development

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, feminist 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*6400 Comparative Social Policy U [0.50]

In this course, students will study social policy in comparative perspective. Theoretical models and various policy fields will be examined in order to understand welfare state development and retrenchment. Policy fields may include immigration, health, child care and income.

POLS*6730 The Politics of Development and Underdevelopment U [0.50]

This course, for MA students specializing in international and comparative development, has a primarily theoretical orientation, focusing on the main paradigms that have evolved to explain central problems and issues of development and underdevelopment, particularly modernization theory, dependency theory, world-systems theory and Marxist state- theory.

POLS*6750 Development in Practice U [0.50]

This course examines the politics of international development policy and practice. Drawing upon theories of development and underdevelopment, it examines the role of transnational regimes, international institutions, national governments, and NGOs in the provision of international development assistance.

Methodology and Research Courses**POLS*6940 Qualitative Research Design and Methods U [0.50]**

This course focuses on the elements of designing and writing a research question and proposal. It further examines a variety of research methods, such as the case study, comparative and survey methods. Data collection techniques also are examined.

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.

Other**POLS*6900 Pro-Seminar U [0.25]**

This course is a 0.25 credit course introducing students to graduate studies in the department and to the profession of political science. It includes information on the following: formation of a student's faculty advisory committee; preparation of research proposals for thesis and major papers; library orientation; research using the WWW and computers; and discussion of faculty research. All graduate students are required to take this course. The course is graded satisfactory (SAT) or unsatisfactory (UNS).

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.

Courses at McMaster University available to students in the collaborative MA program**MCM*7010 Theory and Practice of Policy Analysis: Frameworks and Models U [0.00]**

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*7470 Welfare States in Comparative Perspective U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*7480 Democracy and Diversity: Multicultural Policies in Comparative Perspective U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*753P Political Theory and Public Policy U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*7740 International Political Economy U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*7820 Development Theory and Administration U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*7830 Comparative Public Policy U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*7840 Statistical Analysis for Public Policy U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*7850 Canadian Public Administration: Public Sector Management U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*7860 Organizational Theory and the Public Sector U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*7870 Intergovernmental Relations and Public Policy-Making U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*7900 Politics of Economic Policy in Market Economies U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*7920 Public Choice U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*7930 Research Seminar in Public Administration U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*7940 Research Seminar in Public Policy U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*7950 Research Seminar in Public Policy U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*7960 Research Design and Methods for Comparative Public Policy U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*7970 Readings in Comparative Public Policy U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

MCM*798P Environmental Policies and Governance U [0.00]

Descriptions of all MacMaster University Graduate courses may be found at <http://www.mcmaster.ca/graduate/calendar.html>

Population Medicine

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.

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BA Goshen College (Indiana), DVM Saskatchewan, PhD Guelph - Professor

Jeffrey B. Wilson

DVM, DVSc, PhD Guelph - Associate Professor

MSc Program

The department offers research-based MSc programs in epidemiology, theriogenology, health management and a course work-based MSc program in epidemiology.

Admission Requirements

When reviewing transcripts, the department focuses on the applicant's performance in undergraduate and graduate-level courses relevant to the applicant's proposed area of specialization. Students admitted must have an honours or DVM degree (or its equivalent). In addition, the department considers the applicant's special circumstances and the referees' comments. Since the core of the course work MSc program builds on analytic skills, students entering the program should possess knowledge of basic statistical methods and their application.

All applicants should submit a one-page statement of research interests and career goals to assist in the identification of a faculty advisor who has the funding necessary to support the research. Students may be admitted into the fall, winter or summer semesters.

Degree Requirements

MSc by Thesis

The prescribed studies for our research-based MSc are a minimum of four courses (at least 2.0 course credits) appropriate to the discipline. Epidemiology I (POPM*6200) is a required course for students in epidemiology; students in health management and theriogenology must take either Epidemiology I (POPM*6200) or Applied Clinical Research (POPM*6230). A minimum of 'B-' average is required in the prescribed studies. The department seminar course, POPM*6100, is also required but does not count as one of the four courses. A thesis must be completed and successfully defended.

MSc in Epidemiology by Courses

For the MSc in Epidemiology by course work and project, no fewer than eight courses (at least 4.0 course credits) will be taken. These must be approved by the departmental graduate studies committee and the dean of Graduate Studies. Each student in the program will take three prescribed courses (including the Project in Epidemiology course, POPM*6250, which is equivalent to two courses), and at least four additional courses. The department seminar course, POPM*6100, is also required but does not count as one of the eight courses. Normally, the prescribed courses for the MSc in Epidemiology by course work will include:

Prescribed Courses:

POPM*6200	Epidemiology I (F)
POPM*6210	Epidemiology II (W)
POPM*6250	Project in Epidemiology (F, W, S)

Additional Courses

The four courses selected in this category will depend upon the student's background, specialty, interest and area of research.

Examples of courses suitable for inclusion in the student's program include:

POPM*6230	Applied Clinical Research
POPM*6290	Statistics for the Health Sciences (W)
POPM*6300	Epidemiology of Zoonoses (W)
POPM*6350	Safety of Foods of Animal Origin (F)
POPM*6950	Directed Studies in Population Medicine
STAT*6950	Statistical Methods for the Life Sciences (F)
STAT*6920	Topics in Statistics (Topics in Regression Analysis) (F) (or equivalent)
STAT*3510	Environmental Risk Assessment (W)
POPM*6700	Swine Health Management (W - alternate years)
POPM*6400	Dairy Health Management (S - alternate years)
STAT*6960	Design of Experiments and Data Analysis for the Life Sciences (W)

Additional courses other than those listed above may be deemed suitable for the student's program by the Departmental Graduate Coordinator after recommendations are received from the Advisory Committee.

At least three semesters of full-time study will be required for completion of the course work MSc program; two of these semesters must be at the University of Guelph. Normally, however, students take 4-5 semesters to complete the program.

PhD Program

Admission Requirements

A PhD program is available in epidemiology. Admission into this program is usually granted to holders of an MSc degree who have demonstrated superior performance, or to MSc students who have not completed their thesis but have performed exceptionally well in courses, shown exceptional aptitude and skill in research, and whose thesis research is suitable for expansion to the doctoral level. For direct transfer, a thesis proposal and strongly supportive letters of reference are required. Infrequently, well qualified DVM or honours degree holders may be accepted directly into the PhD program.

All applicants should submit a one-page statement of research interests and career goals to assist in the identification of a faculty advisor who has the funding necessary to support the thesis research. Students may be admitted into the fall, winter or summer semesters.

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, and 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.

POPM*6670 Theriogenology of Small Ruminants * U [0.50]

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.

Veterinary Medicine**POPM*6400 Dairy Health Management * S [0.50]**

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.

Veterinary Public Health/Food Safety**POPM*6350 Safety of Foods of Animal Origins F [0.50]**

The detection, epidemiology, human health risk, and control of hazards in food of animal origin.

Other**POPM*6100 Seminar F [0.00]**

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.

POPM*6950 Studies in Population Medicine U [0.50]

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.

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/nacs>

The Masters and PhD programs in Neuroscience and Applied Cognitive Science provides 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 seminar in Neuroscience and Applied Cognitive Science research seminar. 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. Contact the Graduate Secretary, Department of Psychology, at psygsec@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 (in exceptional cases) (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 Research Design and Statistics
PSYC*6880 Ethical Issues in Psychology
OR

UNIV*6600 Animal Care Short Course
PSYC*6471 Practicum I

At least one of the following electives:

PSYC*6780 Foundations of Cognitive Science
PSYC*6790 Memory and Cognition
PSYC*6800 Learning and Psychology
PSYC*6810 Neuropsychology
PSYC*6870 Human Factors

and MA Thesis.

Applied Social Psychology

PSYC*6640 Foundations of Applied Social Psychology
PSYC*6830 Applied Social Psychology
PSYC*6590 Social and Community Intervention; OR
PSYC*6522 Research Seminar II
PSYC*6840 Program Evaluation; OR

PSYC*6522 Research Seminar II
PSYC*6880 Ethical Issues in Psychology
PSYC*6060 Research Design and Statistics
PSYC*6670 Research Methods
PSYC*6471 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 Research Design and Statistics
PSYC*6630 Developmental Psychology
PSYC*6000 Developmental Psychopathology: Etiology and Assessment
PSYC*6580 Models of Child and Adolescent Psychotherapy
PSYC*6690 Cognitive Assessment of Children and Adolescents
PSYC*6700 Personality and Social Assessment of Children and Adolescents

PSYC*6010 Learning Disorders: Research and Clinical Practice
PSYC*6471 Practicum I
PSYC*6473 Practicum III
PSYC*6880 Ethical Issues in Psychology
and MA Thesis.

Industrial/Organizational Psychology

PSYC*7010 Personnel I: Foundations of Personal Decisions
PSYC*7030 Organizational Psychology I: Micro and Macro Influences
PSYC*6060 Research Design and Statistics
PSYC*6670 Research Methods
PSYC*7020 Personnel II: Recruitment, Selection, and Placement
PSYC*7070 Psychological Measurement
PSYC*6880 Ethical Issues in Psychology
PSYC*6380 Psychological Applications of Multivariate Analysis
PSYC*7040 Organizational Psychology II: Group and Intergroup Processes

PSYC*6471 Practicum I
PSYC*7160 Applications of I/O Psychology
PSYC*7080 Organizational Interventions, OR
PSYC*6840 Program Evaluation
and MA Thesis.

PhD Program

Admission Requirements PhD Program

Students must have completed MA requirements in the appropriate field of study (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 Philosophy and History of Psychology as a Science
Two elective courses

The option of taking:

PSYC*6472 Practicum II

Qualifying Examination
and PhD Thesis.

Applied Cognitive Science

PSYC*6900 Philosophy and History of Psychology as a Science;
two seminar courses (PSYC*6402 and PSYC*6412);
two elective courses with one chosen from List A and one from List B (see MA course lists A and B above);
the option of taking

PSYC*6472 Practicum II;

Qualifying exam;
and PhD Thesis

Applied Social Psychology

PSYC*6900 Philosophy and History of Psychology as a Science
PSYC*6380 Psychological Applications of Multivariate Analysis
PSYC*6522 Research Seminar II OR
PSYC*6471 Practicum I
PSYC*6270 Issues in Family Related Social Policy OR
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	Research Methods
PSYC*6900	Philosophy and History of Psychology as a Science
PSYC*6380	Psychological Applications of Multivariate Analysis
PSYC*6472	Practicum II
PSYC*6810	Neuropsychology
PSYC*7070	Psychological Measurement
PSYC*6840	Program Evaluation
PSYC*6610	Advanced Child and Adolescent Psychotherapy
PSYC*6890	Legislation and Professional Practice
PSYC*6020	Clinical and Diagnostic Interviewing Skills

One of PSYC*6590 Social and Community Intervention, or PSYC*6640 Foundations of Applied Social Psychology, or PSYC*6830 Applied Social Psychology for students without 2 senior level undergraduate courses in social psychology;

Qualifying Exam;

PSYC*8000 Clinical Internship;
and PhD Thesis.

Industrial/Organizational Psychology

PSYC*7130	I/O Psychology Doctoral Research Seminar I
PSYC*6900	Philosophy and History of Psychology as a Science
PSYC*7140	I/O Psychology Doctoral Research Seminar II

one elective from

PSYC*6840	Program Evaluation OR
PSYC*7080	Organizational Interventions OR
PSYC*7170	I/O Doctoral Research Internship I OR
PSYC*7180	I/O Doctoral Research Internship II

Qualifying Exam;

and PhD Thesis.

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 above. Students work four to five days a week in the selected setting.

PSYC*6473 Practicum III U [0.25]

See PSYC*6471 above. This course is intended for students who wish to gain additional practicum experience after completing the requirements for PSYC*6471/2. Students work one day a week in the selected setting.

PSYC*6521 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.

Co-requisite(s): PSYC*6880

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

Applied Cognitive Science

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*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

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 Learning and Physiology U [0.50]

This course reviews the major theories, issues, and methodologies guiding contemporary research in learning, comparative, and physiological psychology.

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 Social Psychology**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*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 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. PSYC*6472 may be taken concurrently with PSYC*6610.

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]

This course considers projectives, questionnaires, observations and interviews for assessing children's personality and behaviour. 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*8000 Clinical Internship U [0.00]

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.

PSYC*7130 Industrial/Organizational Psychology Doctoral Research Seminar I U [0.50]

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).

PSYC*7140 Industrial/Organizational Psychology Doctoral Research Seminar II U [0.50]

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.

Prerequisite(s): PSYC*7130.

PSYC*7160 Applications of Industrial/Organizational Psychology U [0.25]

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.

PSYC*7170 Industrial/Organizational Psychology Doctoral Research Internship I U [0.50]

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.

Prerequisite(s): PSYC*7130

Co-requisite(s): PSYC*7140

Restriction(s): Instructor's signature required

PSYC*7180 Industrial/Organizational Psychology Doctoral Research Internship II U [0.50]

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.

Prerequisite(s): PSYC*7130, PSYC*7140, PSYC*7170.

Restriction(s): Instructor's signature required

Resource and Environmental Economics

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Henry Thille

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Alfons J. Weersink

BSc Guelph, MSc Montana State, PhD Cornell - Associate Professor, Food, Agricultural and Resource Economics

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.

ECON 6000	Microeconomic Theory I
ECON 6010	Microeconomic Theory II
ECON 6020	Macroeconomic Theory I

Resource and Environmental Economics

All students must satisfy the field requirement in natural resource and environmental economics by successfully completing the following four courses.

AGEC 6610	Economics of Renewable Resources
AGEC 6700	Advanced Resource Economics
ECON 6800	Environmental Economics
ECON 6810	Economics of Nonrenewable Resources

Economic Research Methods:

All students must satisfy the economics research methods requirement by successfully completing a minimum of the following courses:

AGEC 6100	The Methodology of Economics
ECON 6140	Econometrics I
Plus ONE of:	
AGEC 6360	Mathematical Programming
ECON 6160	Econometrics II

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.

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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 either Canadian or international (developing areas) contexts. The program leads to an MSc (Planning) degree. It is a professionally oriented program that requires substantial commitment to professional performance and ethics.

Graduate students in Rural Planning and Development find employment in rural planning departments and with non-governmental organizations in Canada and in rural development agencies overseas. Graduates are prepared for both local development and planning as well as national-level research and policy planning.

The program objective 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.

Students interested in a rural planning and development program are registered in the school, although in keeping with the school's interdisciplinary philosophy they are encouraged to take courses and work with faculty in other units on campus. Where appropriate, faculty from other academic units participate in an advisory capacity in students' research programs.

Admission Requirements

The program is open to qualified graduates from a wide variety of 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. Students choose a general area of emphasis from: 1) community planning and development, 2) municipal land use planning, and 3) resource management planning.

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. These consist of the school core of three courses: 1) Planning and Development Theory, 2) Rural Research Methods - Foundations, and 3) Application of Quantitative Techniques in Rural Planning

and Development, and the Canadian planning and development core consisting of three courses: 1) Rural Planning Methods, 2) Rural Public Administration, and 3) Rural Planning Synthesis.

In addition, students are required to complete a minimum of either four courses and a thesis, or six courses and a major research paper.

The area of emphasis is developed by the students and 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.

In the delivery of the Canadian rural planning and development field, the school 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 six faculty in the school are Registered Professional Planners.

MSc (Planning) in Rural Development Planning (International)

This field prepares students for research and practice in rural development planning in the international context. 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. Four areas of emphasis are offered: 1) settlement and area development planning, 2) natural resources development planning, 3) human resources and social services development planning, and 4) program and project development planning.

All students enrolled in this field are required to complete a set of core courses that provide a foundation for international rural development planning research and practice. These consist of the school core of three courses: 1) Planning and Development Theory, 2) Rural Research Methods - Foundations, and 3) Application of Quantitative Techniques in Rural Planning and Development, and the international development planning core of two courses: 1) International Rural Development Planning: Principles and Practices and 2) Synthesis: Seminar in Integrated Rural Development Planning.

In addition, students are required to complete a minimum of either three courses and a thesis, or five courses and a major research paper.

The area of emphasis is developed by students and 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.

In the delivery of the international rural development planning field, the school draws on courses and faculty from other units on campus as well as on the resources of the school.

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.

Courses

Required Core

RPD*6170 Philosophy and Methods in Rural Planning and Development Research 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*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.

Required Canadian Planning and Development Core

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*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*6300 Rural Planning Synthesis U [0.50]

The application of planning techniques and methodologies to various kinds of rural planning problems. Students prepare and present specific solutions to a practical problem in rural planning.

Required International Rural Development Planning Core**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*6400 Synthesis: Seminar in Integrated Rural Development Planning U [0.50]

Field conditions for an integrated rural development project are simulated. Students work in multidisciplinary teams to plan, implement and evaluate the project. The Sulawesi Regional Development Project (Indonesia) is used (with other projects, as appropriate) as the case study.

Required Diploma Core**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*6850 Graduate Diploma Field Studies S [0.25]

Students participate in a number of field experiences within the program. These experiences include study tours of rural regions, meetings with leading professional Canadian counterparts in counterpart rural organizations; study-visits to rural farms and industries; farm-stays and internships; and participation in professional and scholarly conferences. They write a report on the above, examining the lessons learned and their applicability (or lack of) to their own work context.

RPD*6900 Graduate Diploma Major Professional Paper S [0.50]

The paper will focus on the major interest area of the student, likely one he/she will return to practice in after graduation. It includes a review of the international literature and experience on the topic and compares this with the personal experience of the student and his/her organization and work context. Where appropriate, for example, when the student is returning to a specific organization, the student is encouraged to develop in the paper a work plan examining how to apply what is proposed in the paper and/or what was learned in the program to the work context the student is returning to.

Elective Courses

Below are the commonly used courses for electives, including some of those encompassing the social, economic, biophysical, political/institutional and legal perspectives in the program.

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*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*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 Rural Resources Policy U [0.50]

Contemporary resource use and environmental policy decisions at various scales; historical development of policy decisions; sociological, ecological and ethical considerations; evaluation of present and emerging policies.

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*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 and natural resource management, agropastoral systems, and agro-ecosystem health.

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*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. This will normally be equivalent to a two-semester course.

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.

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.

Agricultural Economics and Business**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

Environmental Design and Rural Development

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.

Prerequisite(s): RPD*6170 or REXT*6260 or LARC*6610

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.

Geography

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.

Landscape Architecture

LARC*6430 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.

LARC*6470 Integrative Environmental Planning W [0.50]

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.

Rural Extension Studies

REXT*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.

REXT*6320 Capacity Building for Sustainable Development U [0.50]

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.

Sociology and Anthropology

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.

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.

Rural Studies

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Terisa Turner

Associate Professor, Sociology and Anthropology

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Professor, Population Medicine

Alfons J. Weersink

Professor, Food, Agricultural and Resource Economics

Anthony R. Winson

Professor, Sociology and Anthropology

Ken Woodside

Professor, Political Science

Nonita T. Yap

Professor, SEDRD

PhD Program

Rural Studies faculty are drawn from units across the university, incl. Food, Agricultural and Resource Economics, Environmental Design and Rural Development (Landscape Architecture, Rural Extension Studies, Rural Planning and Development), Geography, Political Science, and Sociology and Anthropology. The Program also has associated faculty from other units in the university.

The objective of the rural studies PhD program is to prepare specialists who will take leading roles in dealing with problems and opportunities in rural communities. Graduates will be expected to be highly proficient in some specific aspects of the many associated with the subject; to be able to integrate their area of emphasis with other aspects of the social, economic and biophysical scope of rural studies; and to be able to participate effectively in team efforts. Graduates will be prepared to carry out their roles through original research, integration of knowledge, teaching and other forms of education, and by providing services to members of the community.

The program focuses on a single field, sustainable rural communities. Sustainable rural communities are characterized by long-term well-being based on the integration of economic, social and environmental factors in their planning and activities. Four sectors have been designated: environment and sustainability, social structure and processes, human resource development, and sustainable rural economic development. Each represents an area of emphasis, not a specialization or discipline. A number of different disciplines are represented in each sector and in each an interdisciplinary approach is taken. Students will choose one sector for relatively more intensive study.

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, environmental science, rural extension studies 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 director 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. It is 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 Communities, 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 is used to determine 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.

It evaluates the student's ability to integrate knowledge in the field of sustainable rural communities and the student's particular sector within the field. The qualifying examination has both written and oral components. The written component is based on the common core area of the field and the student's selected sector. The oral examination is devoted to discussion of the written materials. It 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

RST*6000 Sustainable Rural Communities F-W [1.00]
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Sustainable development theory in the rural communities and environment context.
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RST*6100 Integrative Research Methods F-W [1.00]

Research design and evaluation with a focus on measures of sustainability and on interdisciplinary applications.
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RST*6300 Research Seminar U [0.25]

Sector Core Courses

RST*6500 Special Topics U [0.50]

Sociology

The Department of Sociology and Anthropology offers a graduate program leading to an MA degree in Sociology. The program offers both a research-based thesis option and a course work and major paper option.

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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 studies 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 and 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 students). The deadline for application is February 1 each year and the application fee is currently \$75 in the form of a money order payable to the University of Guelph. Personal cheques will be returned which will slow down the processing of your application. If you apply on-line, you can pay by credit card.

You may apply in one of three ways:

- On-line, which we encourage you to use
- Download an application form

Both of these methods can be found at

www.uoguelph.ca/GraduateStudies/admission.htm

Information you are required to send to the Graduate Secretary, Department of Sociology and Anthropology, University of Guelph, Guelph, ON N1G 2W1

- Application form from the downloaded application at the above web site

OR

The PDF summary of your on-line application **MUST** be printed out and submitted to the department with your other documents.

- A one-page Statement of Interest which clearly outlines your proposed area of interest. This is very important for the members of the admissions committee to make their decisions.
- All official university transcripts. We do not require transcripts from community colleges.
- Two academic letters of reference - you must use the assessment forms from the downloadable application form.
- TOEFL scores or other English Language tests from all students whose first language is not English.

NOTE: This is a self-administered application process. Please have all materials (reference letters, transcripts, application form, letter of intent) returned to you and you put everything in one envelope and send to the Department of Sociology and Anthropology Graduate Program Secretary.

Admission Requirements

Applicants must possess an Honours BA (4 years) degree or its equivalent with at least a second-class standing or 'B-' average in the final two undergraduate years. Generally, those admitted have a much higher average. 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 SOC*6070 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 by the end of the first semester and the rest of your committee by the middle of the second semester.

In their first fall semester, all students are required to pass the Pro-Seminar (ANTH*6700 or SOC*6700), a course graded on a satisfactory/unsatisfactory basis which is intended to introduce students to the department, the university, and the professions of sociology and anthropology.

Interdepartmental Program

Rural Studies PhD Program

The Department of Sociology and Anthropology is a major participant in the PhD program in rural studies in the field of sustainable rural communities. Included in the graduate faculty for this program are J.I. Bakker, S. Humphries, B. Leach, L. McDonald, M. Rohatynskyj, F.J. Schryer, T. Turner and A.R. Winson. This program will provide opportunities for students to be advised by these departmental faculty. PhD students will enroll in the interdepartmental rural studies program; those with advisors in the Department of Sociology and Anthropology will have access to some departmental facilities. Please consult the Rural Studies listing for a detailed description.

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 for a detailed description of the MA collaborative program and the special additional requirements for each of the participating departments.

Courses

NOTE: Courses in this department are designated as anthropology (prefix ANTH*-), sociology (prefix SOC*-) or either anthropology or sociology (ANTH*- or SOC*-).

Core courses

ANTH*6000 Public Issues Anthropology F [0.50]

This course will examine the interface between anthropological and public understandings of public issues, with sensitivity to the presence or absence of anthropological insights. The course will assure that students become well versed in how to synthesize the resources of various branches of the discipline.

Restriction(s): Restricted to incoming students in the program.

ANTH*6140 Qualitative Research Methods W [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*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.

ANTH*6080 Anthropological Theory F [0.50]

An examination of classical and contemporary anthropological theory, including an emphasis on the most recent directions in the discipline.

Rural, Community and Development Studies

ANTH*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.

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 Global Context

ANTH*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.

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.

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 critical assess recent empirical research relevant to each perspective.

Gender, Diversity and Social Equality

ANTH*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.

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**ANTH*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*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.

ANTH*6550 Selected Topics in Theory and Research U [0.50]

This course will be offered with varying content focusing on theory or research.

SOC*6550 Selected Topics in Theory and Research U [0.50]

This course will be offered with varying content focusing on theory or research.

ANTH*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.

SOC*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.

ANTH*6660 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.

SOC*6660 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.

Studio Art

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Will Gorlitz

BFA Nova Scotia College of Art & Design - Professor

John D. Kissick

BFA Queen's, MFA Cornell, MDP Harvard Graduate School of Education - Professor and Director

Kim Kozzi (FASTWÜRMS)

AOCA Ontario College of Art - Associate Professor

Suzanne M. Lake

MFA Concordia - Professor

Jean Maddison

Dip. AD Coventry College of Art England, MFA Royal College of Art - Associate Professor

Ben Reeves

BFA British Columbia, MFA Chelsea College of Art and Design - Assistant Professor

Dai Skuse (FASTWÜRMS)

BFA Queen's - Associate Professor

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Laurel Woodcock

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Susan Douglas

BA Western, MA Carleton, PhD Concordia - Assistant Professor

Christian Giroux

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John Potvin

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Sandra Rechico

BEd Alberta - Assistant Professor

Arthur Renwick

MFA Concordia - Assistant Professor

Ellen Waterman

BMus Manitoba, MA, PhD California (San Diego) - Assistant Professor

MFA Program

The MFA program in the field of studio art offers specializations in drawing, painting, printmaking, sculpture, and alternative practices. Though emphasizing studio practice, the program includes courses in art theory, criticism, history and pedagogy. A thesis exhibition is also required. The objective of the program is to prepare students as professional artists and artist-teachers.

The MFA is intended to represent a high level of professional competence and personal originality in the informed practice of a studio discipline. In response to the numerous and divergent approaches to the making of visual art, the MFA program provides an

individually oriented education that is primarily concerned with the development of independent studio work while encouraging a critical awareness of the cultural context and its ideological complexities.

In addition to their intense involvement with studio practice, students will be required to demonstrate their pertinent knowledge and judgment about the visual arts in presentations, discussions, and written papers within the required course work.

Admission Requirements

Admission to the master of fine arts program in studio art may be granted on the recommendation of the School of Fine Art and Music to:

1. the holder of a BFA degree (honours equivalent), or an honours BA (or its equivalent in fine or visual arts); or
2. in exceptional cases, the holder of a degree in another field who has completed a minimum of six one-semester courses in fine or visual art; or
3. a student who has satisfied the requirements for transfer from the provisional-student category.

Specific Application Materials for Admission. Each applicant must submit the following:

1. Documentation of artwork: 20 digital images or 10 minutes DVD. (For formatting information please see the 'GRADUATE STUDIES' section of the School of Fine Art and Music website.)
2. A single-page statement that outlines the applicant's career objectives and reasons for wishing to study in the University of Guelph's master of fine arts program in studio art.
3. Letters of reference from two studio professors. The applicant must have taken a significant proportion of course work from at least one of the professors. An acceptable alternative to one such letter may be from the department chair on behalf of the department in which the applicant has studied, or from a professional in the field who is familiar with the applicant's abilities.

It is highly recommended that applicants complete at least eight semesters of courses in art history, cultural studies, or related areas prior to applying. Serious interest in, and substantial familiarity with contemporary issues in the visual arts is expected.

Degree Requirements

The MFA degree 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 significant aesthetic investigation, as approved by the candidate's master's examination committee.

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

FINA*6510 Introduction to Graduate Studio F [1.50]

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.

FINA*6515 MFA Studio I W [1.50]

Sustained work at an independent level under the supervision of the chair of the student's advisory committee.

Prerequisite(s): FINA*6510.

FINA*6530 MFA Teaching Practicum I F [0.50]

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.

FINA*6531 MFA Teaching Practicum II F [0.50]

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

FINA*6540 MFA Seminar I F [0.50]

Examination of critical issues in the visual arts relevant to studio practice

FINA*6545 MFA Seminar II W [0.50]

Continuation of issues examined in FINA*6540.

Prerequisite(s): FINA*6540.

FINA*6551 Seminar in Art Theory and Criticism I W [0.50]

Selected topics in art theory and criticism with particular relevance to studio practice.

Prerequisite(s): Admission to MFA program or permission of instructor.

FINA*6610 MFA Studio II F [1.50]

Continuation of FINA*6515

Prerequisite(s): FINA*6515

FINA*6615 MFA Studio III W [1.50]

Continuation of FINA*6610

Prerequisite(s): FINA*6610

FINA*6640 MFA Seminar III F [0.50]

Continuation of FINA*6545

Prerequisite(s): FINA*6545

FINA*6641 MFA Seminar IV W [0.50]

Continuation of FINA*6640.

FINA*6652 Individual Study in Art Theory and Criticism W [0.50]

Students will pursue special study under the guidance of a faculty member with appropriate expertise.

Prerequisite(s): Approval of the co-ordinator of the MFA program.

Additional and Elective Courses

FINA*6550 Selected Topics in Fine Art U [0.50]

Seminar in a fine art topic in a subject to be specified by the instructor.

Prerequisite(s): Admission to the MFA program.

FINA*6552 Seminar in Canadian Art U [0.50]

Selected topics in Canadian Art

Prerequisite(s): Admission to the MFA program and permission of instructor.

FINA*6554 Seminar in Nineteenth Century Art U [0.50]

Selected topics of the period.

Prerequisite(s): Admission to the MFA program and permission of instructor.

FINA*6555 Seminar in Twentieth Century Art U [0.50]

Selected topics of the period.

Prerequisite(s): Admission to MFA program and permission of instructor.

FINA*6650 Individual Study in Art History U [0.50]

Students will pursue special study under the guidance of a faculty member with appropriate expertise

Prerequisite(s): Approval of the co-ordinator of the MFA program.

FINA*6651 Individual Study in Contemporary Art U [0.50]

Students will pursue special study under the guidance of a faculty member with appropriate expertise

Prerequisite(s): Approval of the co-ordinator of the MFA program.

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

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Secretary

Beth Baker (2603 OVC, Ext. 52644)

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Nigel J. Bunce

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Professor, Land Resource Science

Beverley Hale

Associate Professor, Land Resource Science

Christopher J. Hall

Professor, Environmental Biology

M. Anthony Hayes

Professor, Pathobiology

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Hung Lee

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Francesco Leri

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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

TOX*6000 Toxicology S [0.50]

An intensive course in the principles of modern aspects of toxicology, taught in a lecture/case study format.

TOX*6200 Advanced Topics in Toxicology W [0.50]

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.

TOX*6530 Ecotoxicological Risk Characterization W [0.50]

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 TOX6530, ENVB6530 and TOX4550.) Department of Environmental Biology

ENVB*6530 Ecotoxicological Risk Characterization W [0.50]

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 TOX6530, ENVB6530 and TOX4550.) Department of Environmental Biology

TOX*6590 Biochemical Toxicology F [0.50]

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 TOX4590 and 9406590.) Department of Chemistry and Biochemistry

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*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
ENVB*6180 Physiology and Biochemistry of Herbicides W [0.50]
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
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*6721 Special Topics in Pharmacology-Toxicology U [0.25]
This course will comprise a combination of an experimental procedure (or project), seminars, selected reading or a literature review outside the thesis subject, developed based on the student's requirements. Topics could include clinical pharmacology/toxicology, pharmaco-epidemiology/economics, gerontological or perinatal pharmacology and toxicokinetics. Department of Biomedical Sciences
BIOM*6722 Special Topics in Biomedical Pharmacology-Toxicology U [0.50]
See BIOM*6721 above.

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

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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, 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

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Elizabeth G. Boulding

BSc British Columbia, MSc Alberta, PhD Washington - Associate Professor

Karl A. Cottenie

MSc, MS, PhD Katholieke - Assistant Professor

Teresa J.D. Crease

BSc, MSc Windsor, PhD Washington - Associate Professor

Roy G. Danzmann

BSc, MSc Guelph, PhD Montana - Associate Professor

Moira M. Ferguson

BSc, MSc Guelph, PhD Montana - Professor and Chair of Integrative Biology

John M. Fryxell

BSc, PhD British Columbia - Professor

Jinzhong Fu

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Douglas S. Fudge

BA, MAT Cornell, MSc Guelph, PhD British Columbia - Assistant Professor

Todd E. Gillis

BSc, MSc Guelph, PhD Simon Fraser - Assistant Professor

Paul D.N. Hebert

BSc Queen's, PhD Cambridge, FRSC - Professor

Denis H. Lynn

BSc Guelph, PhD Toronto - Professor

Kevin S. McCann

BA Dartmouth, MSc, PhD Guelph - Associate Professor

D. Gordon McDonald

BSc Western Ontario, MSc, PhD Calgary - Professor

Robert L. McLaughlin

BSc Windsor, MSc Queen's, PhD McGill - Assistant Professor

Ryan Norris

BES Waterloo, MSc York, PhD Queen's - Assistant Professor

Thomas D. Nudds

BSc, MSc Windsor, PhD Western Ontario - Professor

Beren W. Robinson

BSc, MSc Dalhousie, PhD Binghamton - Associate Professor

Vernon G. Thomas

BA Oxford, MSc, PhD Guelph - Associate Professor

Glen J. Van Der Kraak

BSc, MSc Manitoba, PhD British Columbia - Professor

Patricia A. Wright

BSc McMaster, PhD British Columbia - Professor

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 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 (four 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 not 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 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 fulfilment 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 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.

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. Paola Mayer, 255 MacKinnon, ext.58562/53883

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 does not presently offer programs for graduate students. Graduate students who are required by their departments to fulfil a language requirement should consult the Undergraduate Calendar. Classes in French, 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:

Daniel Chouinard

BaSp, MA, PhD (Montréal) for SLAPSIE (MA in English/SETS) -

Stephen Henighan

BA (Swarthmore), MA (C'DIA), PhD (Oxford) (MA in English/SETS) -

Padraig O'Cleirigh

BA, MA National Univ. of Ireland, PhD (Cornell) Associate Professor (MA/PhD in History) -

Dana Paramskas

BSL, MSL (Georgetown), PhD (Laval) (MA in English and Drama/SETS) -

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.