2004-2006 Graduate Calendar

The information published in this Graduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2004-2006 academic years, including the Summer Semester 2005, the Fall Semester 2005 and the Winter Semester 2006.

For your convenience the Graduate Calendar is available in PDF format.

If you wish to link to the Graduate Calendar please refer to the Linking Guidelines.

The University is a full member of:

- The Association of Universities and Colleges of Canada

Contact Information:

University of Guelph
Guelph, Ontario, Canada
N1G 2W1

519-824-4120
http://www.uoguelph.ca

Revision Information:	
March 25, 2004	Initial Publication
June 18, 2004	Revision I
September 17, 2004	Revision II
December 10, 2004	Revision III
May 10, 2005	Revision IV
June 28, 2005	Revision V
September 2, 2005	Revision VI
December 1, 2005	Revision VII
December 23, 2005	Revision VIII
February 17, 2006	Revision IX

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.

Table of Contents

Appendix A - Courses

Courses are listed in the appendix in alphabetic order and may also be found listed under the program in which they are offered.

Agricultural Business

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.

Agricultural Economics

AGEC*6020 Economics of Food Safety and Quality U [0.50]

The overall aim of the course is to explore economic aspects of food safety and quality and the ways in which economics can aid understanding of food safety and quality issues.

Prerequisite(s): ECON*3710 or ECON*6000.

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*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*6110 Marketing Research W [0.50]

A study of marketing research analysis in agribusiness firms, with emphasis on the marketing research function and the application of quantitative problem solving techniques.

AGEC*6120 Marketing Management F [0.50]

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

AGEC*6130 Special Topics in Financial Management U [0.50]

An advanced course for students who wish to explore current and future topics in financial management, trends and problems in financial management, and capital and investment theory related to food and agribusiness firms.

AGEC*6140 Food and Agribusiness Strategic Management U [0.50]

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

AGEC*6180 Financial and Managerial Accounting F [0.50]

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

AGEC*6200 Financial Management W [0.50]

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

Prerequisite(s): AGEC*6180
Restriction(s): Non MBA students only by permission of instructor

AGEC*6220 Agricultural Policy W [0.50]

A critical analysis of contemporary issues in the agricultural policy of affluent economies, with emphasis on Canadian policies.

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*6240 Agricultural Trade F [0.50]

An examination of conceptual and empirical problems, policies, and institutional arrangements in international trade of agricultural products.

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*6320 Cost Benefit Analysis S [0.50]

A presentation of the theory and methods used in cost benefit analysis. The course will examine selected case studies; and it will include a discussion of both renewable and non-renewable resources.

AGEC*6360 Mathematical Programming F [0.50]

A study of the algebra, assumptions and economic logic of important optimizing techniques and their application to problems in quantitative economics.

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*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*6420 The Economic of the Firm: Concepts and Applications F [0.50]

This course examines the traditional production economics literature on production functions, cost functions and profit functions as those relationships are used in applied economics analysis. The theory behind the certainty equivalent profit model and its application to decision making under risk is introduced. Optimal capital replacement models used agricultural economics are studied. Finally, selected new developments in the economic theory of the firm are examined.

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*6540 Advanced Price Analysis W [0.50]

The application of microeconomic theory to agricultural commodity modelling, with emphasis on the specification, estimation and interpretation of supply, demand and market equilibrium models.

AGEC*6570 Advanced Agricultural Marketing Analysis S [0.50]

A study of agricultural and food marketing problems with particular emphasis on the application of economic theory and research methods to selected empirical problems.

Prerequisite(s): ECON*3710 or ECON*6000

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*6610 Economics of Renewable Resources F [0.50]

This course is concerned with the optimal use of renewable resources, i.e., resources that exhibit growth or regeneration over a cycle. Models of dynamic allocation are discussed and the role of government in altering the market allocation is considered.

AGEC*6630 Regional Economic 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.

AGEC*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.

AGEC*6700 Advanced Resource Economics W [0.50]

Seminar on the literature, current research, and methods of analysis in natural resource economics.

AGEC*6720 Readings in Agricultural Economics F,S,W [0.00]

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

AGEC*6750 Problems in Agricultural Business F [0.50]

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

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 o the project to faculty and students.

AGEC*6800 Seminar in Agricultural Economics F,S [0.50]

Students in the MSc and PhD programs must present a department seminar on a topic of the student's choice in agricultural economics. For MSc students the seminar must be presented by the completion of their fourth semester in the program.

Animal Science

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*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*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*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.

ANSC*6260 Digestion and Metabolism in the Ruminant (even years only) W [0.50]

A review of current research on rumen function, post-ruminal digestion and host tissue metabolism, integrating fundamental principles so as to formulate models of nutrient utilization. The course consists of assigned readings, lectures and tutorial

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*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*6400 Mammalian Reproduction (odd years only) F [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*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.

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.

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.

Anthropology

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.

ANTH*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.

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.

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.

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.

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.

ANTH*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.

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.

ANTH*6700 Pro-seminar F-W [0.00]

The pro-seminar concerns matters involved in graduate studies and later work as a professional sociologist or anthropologist, including how to form a graduate advisory committee, assistantship responsibilities, presentation skills, exploration of careers in sociology and anthropology, writing grant proposals, reports and articles, and teaching. In the first semester students will begin to prepare research proposals for theses and major papers.

Aquaculture

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 core program faculty. 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 models 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.

Biomedical Science

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

BIOP*6000 Concepts in Biophysics W [0.50]

This course will emphasis basic concepts in molecular, cellular and structural biophysics arising from key journal publications and their impact on present day research trends.

BIOP*6010 Biophysics Seminar U [0.00]

Public seminar presented by all PhD students in the Biophysics program. This seminar is to be presented within four semesters from entry to the program. The course is optional for MSc students.

Prerequisite(s): Prerequisite BIOP*6000.

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.

Botany

BOT*6030 Plant Cell Biology (odd years, first offered in 2003) 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. Offered in conjunction with PBIO*4030. Extra work is required of graduate students.

BOT*6403 Seed Development and Germination (even years) 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*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.

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.

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.

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

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

IBIO*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.

IBIO*6070 Topics in Advanced Integative 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.

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.

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

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.

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.

Chemistry

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, Hueckel and extended Hueckel 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 hybrides, 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.

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]

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.

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.

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.

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

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]

Computing and Information Science

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, Demster-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.

Restriction(s): Requires instructor's signature.

CIS*6890 Technical Communication and Research Methodology F-W [0.50]

This course aims to develop students' ability in technical communication and general research methodology. Each student is expected to present a short lecture, review a conference paper, write a literature survey and critique fellow students' talks and lectures.

Clinical Studies

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*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*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*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*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.

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*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.

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*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*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.

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.

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]

Marketing and Consumer Studies

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

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

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

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*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.

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.

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.

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

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*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*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.

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.

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*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*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*6350 Economic Development U [0.50]

This course examines economic development from an international perspective: theories, history, policies and prospects.

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.

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*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.

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.

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*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.

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.

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

Engineering

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*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.

Prerequisite(s): ENGG*3390 or equivalent

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.

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*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*6140 Optimization Techniques for Engineering W [0.50]

This course serves as a graduate introduction into combinatorics and optimization. Oprimization 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*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.

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 optimizastion.

Prerequisite(s): ENGG*4430 or equivalent

ENGG*6580 Advanced Control Systems F [0.50]

This course will start with state space analysis of multi-input multi-output control systems. Then state space design will be presented. After that, non linear control systems and soft computing based intelligent control systems will be studied. Finally, hybrid control systems, H infinite control and uncertainty and robustness in control systems will be addressed. .

ENGG*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, radical 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*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*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*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.

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.

English

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

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.

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 wil 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.

Fine Art

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*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*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*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*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*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.

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.

Food Science

FOOD*6110 Food Rheology 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*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*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*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 recombinanant DNA technology; enzymes in analysis (ELSA, DNA-probes, reporter genes, microbial analysis); enzymes in food production, food analysis.

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, impediometry, immunological techniques, gene probes and other emerging technologies.

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

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 vintification 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.

Family Relations and Applied Nutrition

FRAN*6030 Quantitative Research Methods U [0.25]

This module focuses on how to critically appraise the quantitative research literature and design and applied quantitative study. The module examines the logic and steps involved in conducting research, research ethics, measurement issues, survey design, experimental and quasi-experimental designs, cross-sectional and longitudinal designs, and sampling

Restriction(s): Available only to FRAN graduate students

FRAN*6040 Introduction to Qualitative Methods U [0.25]

This module focuses on the design of a qualitative research project with attention given to theory-method linkages, researcher roles and data collection methods.

Restriction(s): Available only to FRAN graduate students

FRAN*6050 Qualitative Analysis U [0.25]

This module focuses on analysis procedures when working with qualitative data. Attention will be given to different forms of analysis, use of analytic memos, theoretical sampling and generating theory. Instructor's signature required.

FRAN*6070 Sexual Issues and Clinical Interventions Across the Life Span U [0.50]

This course examines sexual issues and clinical interventions from a life span perspective. Focusing upon theory, research and clinical interventions it explores the relationship between issues in sexual development and sexual functioning.

Restriction(s): Signature required.

FRAN*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*6200 Research Topics in Family Relations and Human Development U [0.50]

Contemporary research in family relations and human development.

Restriction(s): Available only to FRAN graduate students.

FRAN*6210 Program Evaluation in Child and Family Services U [0.50]

An examination of the theoretical principles and practical applications of evaluation issues and strategies. Special attention is given to services for children and families across the life span. Group involvement in an actual program evaluation is a requirement for the course.

FRAN*6220 Family, Interpersonal and Social Issues in Mid and Later Life U [0.50]

This course examines conceptual, methodological and policy issues involving inter- and intra-generational family and social relationships throughout mid and later life.

FRAN*6221 Concepts and Strategies of Primary Prevention U [0.50]

The course explores selected concepts and strategies of primary prevention. Students examine research and current practice related to individual and family health and well-being, including education, community organization, competency promotion, natural care giving, and consultation.

FRAN*6260 Practicum U [0.50]

Supervised practicum experience in a variety of agencies or services. Placements are arranged on an individual basis subject to the requirements of students' programs of study and must be negotiated with faculty in advance of registration.

FRAN*6270 Issues in Family-Related Social Policy U [0.50]

This course investigates definitions of social policy, comparative family-related social policy, selected issues in Canadian family policy and frameworks for analysis of social policy. Issues in policy-related research are also explored.

FRAN*6280 Theorizing in Family Relations and Human Development U [0.50]

An examination of the meaning of science and theory in relation to the study of families and human development. Included is a discussion of the major social science paradigms including positivism, critical theory, social constructionism and post-modernity. This course is designed for doctoral students.

FRAN*6300 Theories of Development and Change Across the Life Span U [0.50]

An interdisciplinary examination of sociological and psychological theories of development and change across the life span. Critical comparisons among theories with competing assumptions at different points over individual and family life cycles is discussed.

FRAN*6310 Parent-Child Relations Across the Life Span U [0.50]

Considers theory and research on parent-child interactions, relationships and intergenerational transmission across the life span. (Offered in alternate years.)

FRAN*6320 Human Sexuality Across the Life Span U [0.50]

This course covers research, theoretical and substantive issues relevant to studying human sexuality across the life span. Topics include: child and adolescent sexuality, sexual identity, sexuality in adulthood and old age, sexual assault, international research and sex education.

FRAN*6330 Research Seminar U [0.25]

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*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.

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*6420 Introductory Applied Statistics U [0.25]

Background theory and knowledge components required to understand introductory parametric and non-parametric statistics appropriate in applied social/health science research. Students will learn conceptual and practical applications of statistical analyses with emphasis on hypothesis formation, data screening and description analysis and interpretation.

Restriction(s): Available only to FRAN graduate students

FRAN*6430 Advanced Applied Statistics I: Regression & Multivariate ANOVA Designs U [0.25]

Introduction to advanced regression modelling strategies, logistic regression analysis, multivariate analysis of variance/covariance, and repeated measures analysis of variance/covariance models appropriate in applied social/health science research. The course covers conceptual and practical applications of statistical analyses with emphasis on selection of appropriate methods and models to address complex, multi-factorial data.

Restriction(s): Available only to FRAN graduate students

FRAN*6440 Advanced Applied Statistics II: Factor Analysis U [0.25]

A theoretical and computational introduction to factor analysis as a method for understanding complex multivariate data in applied social/health science research. Principal components analysis (PCA), exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and applications of structural equation modeling (SEM) will be examined. Additional topics may include scale development, multi-group analysis, and methods/concerns about measurement invariance.

Restriction(s): Available only to FRAN graduate students

FRAN*6450 Cultural Perspectives on the Family U [0.50]

Family relationships throughout the life span are considered drawing from the persepctives 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.

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.

Prerequisite(s): 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.

Restriction(s): For MAN students only.

FRAN*6720 Practicum in Applied Human Nutrition II U [1.50]

This course provides a practicum of 3 days per week with a dietetic-related agency or organization to develop and perform dietetic competencies (internship experience). In weekly seminars, students discuss and reflect on theory and dietetic practice issues

Prerequisite(s): FRAN*6710
Restriction(s): For MAN students only.

FRAN*6730 Practicum in Applied Human Nutrition III U [1.50]

This course provides a practicum of 3 days per week with a dietetic-related agency or organization to develop and perform dietetic competencies (internship experience). In weekly seminars, students discuss and reflect on theory and dietetic practice issues.

Prerequisite(s): FRAN*6720
Restriction(s): For MAN students only.

FRAN*6750 Final Project in Applied Human Nutrition U [0.50]

This project (usually related to an activity during the Practicum in Applied Human Nutrition) consists of a written report of an applied research project in dietetic practice or a proposal for a research project, including literature review, purpose, methodology, and analysis and analysis plan.

Restriction(s): For MAN students only.

Food Safety and Quality Assurance

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.

Geography

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.

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 9506020.

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*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*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.

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.

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.

Human Health and Nutritional Sciences

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*6020 Biodynamics F [0.50]

This course considers the integrated activities of the human organism, spanning from the cellular level to the whole body. The purpose is to further develop concepts that comprise a foundation for understanding neuromuscular and musculoskeletal systems.

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

History

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*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*6150 Scottish Archival Research U [0.50]

This course wil 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*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*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*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*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*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*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*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*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*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*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*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*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*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*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]

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*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]

Hospitality and Tourism Management

HTM*6050 Management Communications F [0.50]

Examination of the theory, function and practice of managerial ommunications 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 organizaitonal 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.

Integrative Biology

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

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

IBIO*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.

IBIO*6070 Topics in Advanced Integative 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.

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.

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

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.

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.

International Development Studies

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

Landscape Architecture

LARC*6010 Landscape Architecture Studio I F [0.50]

Integrated field and studio instruction introduces the student to landscape architecture through acquisition of basic skills and knowledge. Topics include history, site surveying, landscape inventory and analysis, site design, graphic communication, introductory design, sculpture, and model building.

LARC*6020 Landscape Architecture Studio II F [0.50]

Integrated field and studio instruction, and case studies leads the student through advanced site design, basic materials and techniques, design theory, and design principles.

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]

Integrated field and studio instruction emphasizes design concept formulation, visual communication, computer application in design, and introductions to urban and rural greenways design, community design, facilitation, and presentation.

LARC*6040 Landscape Architecture Studio IV W [0.50]

Integrated field and studio instruction emphasizes design implementation, materials, construction, specifications, and professional practice.

LARC*6120 Advanced Design W [0.50]

Theory, methods and practice in site planning and design, human settlement, and planting design. Projects typically address open space design, conservation and community design at the small and intermediate scale in urban, suburban or rural settings. Case study component will include some travel at the student's expense.

LARC*6370 Graduate Seminar F,W [0.25]

A seminar course emphasizing the development of oral and writing skills.

LARC*6380 Research Seminar W [0.25]

A capstone course whose content is directed by the research of the participants. Participants will organize a conference at which they will present their research results.

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 Plants and Environment 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.

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. The focus of the course is on the connections between research and design and is context-based learning. The emphasis is on developing foundations for the creation of appropriate research questions.

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 Studies

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.

Land Resource 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 meterology. 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. Offered in odd-numbered years.

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.

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 descrete 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.

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.

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.

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.

Literature and Theatre Studies

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.

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; nonlnear operators and the Frechet derivative; Baire category theorem; principle of uniform boundedness; open mapping theorem; principle ot 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*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]

Molecular Biology and Genetics

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*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.

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*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.

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.

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.

Microbiology

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 Microbiology 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

Restriction(s): Credit can NOT be obtained for both MICR*4130 and MICR*6130.

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.

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*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.

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 Microbiology on an ad hoc basis.

Pathobiology

PABI*6000 Bacterial Pathogenesis F [0.50]

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

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*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*6080 Diagnostic Pathology I - Domestic Mammals 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*6100 Immunobiology F [0.50]

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

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 hemiclymphatic 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*6180 Clinical Bacteriology W [0.50]

Current techniques and approaches in diagnostic bacteriology.

PABI*6190 Topics in Immunology W [0.50]

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

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*6300 Clinical Pathology I W [0.50]

A study of diagnostic hematology and cytology, with emphasis on the hematopoietic system. (even numbered years)

PABI*6320 Clinical Pathology II W [0.50]

Clinical biochemistry of selected organ systems including the renal, hepatic, pancreatic and endocrine organ systems. (odd numbered years)

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 U [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*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*6420 Diagnostic Parasitology F [0.50]

Study of the laboratory diagnosis of parasites of domestic 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.

PABI*6960 Special Topics in Pathobiology F,W,S [0.00]

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.

Philosophy

PHIL*6000 Value Theory U [0.50]

A critical examination of some selected contemporary works in value theory or aesthetics.

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*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.

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*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*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*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*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

PHIL*6760 Science and Ethics U [0.50]

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

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*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.

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.

Physics

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*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 quants). Canonical quantization of interacting fields (Feynman rules). Application of the formalism of interacting quantum fields to lowest-order quantum electrodynamic processes. Radiative corrections and renormalization.

Prerequisite(s): PHYS*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*7090 Green's Function Method U [0.50]

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

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*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.

PHYS*7120 Selected Topics in Theoretical Physics U [0.50]

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.).

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*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*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 propogation, 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 propogation in linear and nonlinear media, optical fiber properties, electro-optic and acousto-optic modulation, spontaneous and stimulated emission, semiconductor lasers and detectors, nose 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.

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*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.

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.

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*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-Lemaitre 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; nucelosynthesis; 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

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

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.

Plant Agriculture

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*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*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*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*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*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*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*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.

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*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*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.

PLNT*6500 Applied Bioinformatics W [0.50]

The goal of this course is to provide an introductory understanding of the databases and methods used in computational molecular biology research. Topics covered will include: reviewing major molecular databases and their structures, constructing sequence alignments, constructing phylogenics, and finding motifs and genes in biological sequences. Lab sessions will include an introduction to Unix and Perl for the biologist and hands-on use of several molecular data analysis programs.

Prerequisite(s): Undergraduate level statistics class (such as STAT*2040 or STAT*2100) and undergraduate level molecular biology class (such as MBG*2020).

Political Science

POLS*6210 Canadian Politics: Process and Culture U [0.50]

This course begins with a study of the works of democratic theorists, Canadian and foreign. Conclusions drawn from this analysis are then applied to our political institutions and processes with a view to their evaluation and reform in accordance with the democratic ideal.

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.

POLS*6390 Environmental Policy and Law U [0.50]

Examination of the policy, institutions, processes and legal procedures which encompass the field of environmental policy-making and law in Canada.

POLS*6450 The Political Economy of Trade Policy U [0.50]

This course examines international trade policies - multilateral, bilateral and unilateral - from a political economy perspective with particular attention to the evolving World Trade Organization as well as regional experiences under NAFTA and the European Union.

POLS*6630 Public Policy and Administration: Theory and Practice U [0.50]

This course provides an overview of important contributions in the study of public policy and public administration. It reviews a number of theories of the state and the literatures which have grown up around them. It also covers a range of narrower areas of public policy and administration such as organization theory, public budgeting and regulation and the literatures which they have generated.

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

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

POLS*6650 Organization and Decision-Making Theory U [0.50]

This course reviews a variety of theories and models used for explaining public sector organization behaviour. The models include economics, political science, contingency and institutional approaches. The theories and models are then used to examine actual behaviour in a variety of public sector organizations.

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 Administration U [0.50]

This course traces the roots of the developmental paradigm and the emergence of a unique administrative mechanism to handle the development goals of Third World nations. Special issues for discussion include: the cultural context of development administration, sustainable development, technology transfer, corruption and administrative accountability.

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*6940 Political Research: Theories and Approaches U [0.50]

This course provides an introduction to the nature of empirical social science by examining the major theoretical approaches to the study of politics. It is designed to encourage students to understand and critically assess the potential and limitations in each. Accordingly, a comprehensive survey of the philosophical assumptions and the methodological issues underlying political inquiry and analysis are undertaken, with a focus on the fields of study in the departmental graduate program.

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

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

POLS*6960 Directed Readings U [0.50]

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

POLS*6970 Major Paper U [1.00]

The major paper is an extensive research paper for those who do not elect to complete a thesis. It may be taken over two semesters. The length of the major paper is not to exceed 10,000 words.

Population Medicine

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*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 man and animals.

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.

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.

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.

POPM*6700 Swine Health Management * U [0.50]

Diseases of swine are studied with particular emphasis on preventive medicine and herd-health management.

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.

Psychology

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*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.

Restriction(s): Restricted to Psychology graduate students; all others by permission only

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*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*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.

Restriction(s): For Clinical Psychology: Applied Developmental Emphasis students, registration is dependent on permission of the instructor and the successful completion (passing grade and satisfactory rating on the practical component) of PSYC*6010, PSYC*6690 and PSYC*6700.

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*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*6590 Social and Community Intervention U [0.50]

Discussion focuses on strategies of preventing mental illness and promoting mental health and social competence. Stressful life event theory, social support, coping, and the epidemiology of mental illness are reviewed.

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*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*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*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*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.

Restriction(s): Restricted to Psychology graduate students; all others by permission only

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*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

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.

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*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*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

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 Organizatonal 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 Organizatonal 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

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 appllication, one year in advance of beginning the clinical internship.

Rural Extension Studies

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*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*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*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.

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*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.

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*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.

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.

Rural Planning and Development

RPD*6020 Rural Community Systems U [0.50]

This course familiarizes students with the particular characteristics of local rural community systems in Canada and how these vary over space and time. Emphasis is placed on defining rurality, the measurement of rural systems and on recognizing and dealing with informal elements in the rural community. A special section deals with preparing, as a professional, for work in such conditions. Credit may not be obtained for both GEOG*6270 and RPD*6020.

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*6040 Settlement Systems and Area Development Planning: Policies and Procedures U [0.50]

This course examines the issues, policies and procedures in settlement and area development. The focus is on lagging subnational rural areas in the international context. It discusses the determinants of settlement and area development and policies and strategies adopted to accelerate development. It presents procedures and selected techniques to develop such settlements and areas.

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*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*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*6240 Planning and Development Theory U [0.50]

Examines basic concepts, theories and perspectives in rural planning and development. A conceptual examination of 'rural', 'planning' and 'development' precedes an examination of how rural planning and development is viewed from alternative, often conflicting theories of rural change and planned intervention. The implications for practice are discussed.

RPD*6250 Public Administration in Rural Communities U [0.50]

An introduction to the nature and problems of government and administration in the small municipality (less than 25,000). Major topics include: municipal law, capital budget and implementation, public services and infrastructure, personnel management.

RPD*6260 Land Use Planning Law U [0.50]

An introduction to the legal tools used to regulate the use of land and other resources. Zoning, subdivision controls, development control, land banking, expropriation, planning appeals, official maps, etc. An intensive study of the Ontario Planning Act and related legislation.

RPD*6280 Rural Planning Methods U [0.50]

Basics of rural planning practice, including communications, graphics, group dynamics, interviews and community surveys, questionnaire design and non-parametric statistics and role of citizen participation.

RPD*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*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.

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*6350 Northern and Native Development and Planning U [0.50]

A critical analysis of development and planning in Northern Canada, including examination of policies and implementation strategies of governments and private enterprise; their impacts upon northern and native communities; and consideration of proactive locally based planning for community development.

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*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.

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*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.

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.

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.

Rural Studies

RST*6000 Sustainable Rural Communities F-W [1.00]

Sustainable development theory in the rural communities and environment context.

RST*6100 Integrative Research Methods F-W [1.00]

Research design and evaluation with a focus on measures of sustainability and on interdisciplinary applications.

RST*6300 Research Seminar U [0.25]

RST*6500 Special Topics U [0.50]

Sociology

SOC*6070 Sociological Theory F [0.50]

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

SOC*6130 Quantitative Research Methods W [0.50]

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

SOC*6140 Qualitative Research Methods F [0.50]

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

SOC*6270 Diversity and Social Equality U [0.50]

This course will examine a range of approaches used in the study of intergroup relations, with special emphasis on struggles over influence and power. Students will acquire a deeper understanding of the complex 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*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.

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.

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.

SOC*6550 Selected Topics in Theory and Research U [0.50]

This course will be offered with varying content focusing on theory or research.

SOC*6600 Reading Course 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*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*6700 Pro-seminar F-W [0.00]

The pro-seminar concerns matters involved in graduate studies and later work as a professional sociologist or anthropologist, including how to form a graduate advisory committee, assistantship responsibilities, presentation skills, exploration of careers in sociology and anthropology, writing grant proposals, reports and articles, and teaching. In the first semester students will begin to prepare research proposals for theses and major papers.

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 sem-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, parameteric 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 samling 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]

Toxicology

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

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

University Courses

UNIV*6000 The Structure and Function of Muscle U [0.50]

An interdisciplinary course covering basic aspects of muscle from a range of viewpoints: structure, metabolism, protein content, energetics, mechanics, biological adaptations, growth and development. The course is designed for graduate students from a wide range of specific disciplines and will provide a broad background to muscle biology as well as more detailed insights into specific aspects of each area covered.

UNIV*6010 Regulation in Muscle Metabolism U [0.50]

An interdisciplinary course emphasizing the regulation of muscle metabolism in vivo. The course focuses on the integration of metabolic fuel utilization to meet cellular energy demands under a variety of conditions in the whole animal. Topics include: sources of energy demand, integration of energy supply to meet energy demands, and regulation of cell growth, maintenance and adaptation.

UNIV*6030 Selected Topics in Animal Welfare U [0.50]

This course provides for an interdisciplinary forum for the discussion of topics in animal welfare. Selected topics will be analyzed in depth with input from various disciplines such as animal science, biology, philosophy, psychology, and economics. An introductory lecture for registered students will be followed by six 2-hour seminars which will be open to the university community (advertised through the Centre for the Study of Animal Welfare, CSAW). Proceedings from the course, including papers prepared by registered students, will be published.

UNIV*6500 International Study Option U [0.00]

A period of study in another country as part of a graduate program at the University of Guelph. Details may be obtained from Graduate Program Services.

UNIV*6600 Animal Care Short Course W [0.00]

A one-day seminar covering the following topics: Animal Welfare Philosophy, Ethological Considerations in Animal Management, Assessing Animal Welfare, Ethical Dilemmas, Regulations and Legislation, Euthanasia, Improving Statistical Power, Zoonoses and Biohazards, Recognition and Alleviation of Pain and Distress in Animals, Case Study Evaluation.

UNIV*6710 Commercialization of Innovation F [0.50]

This course is designed to help participants better understand the process, the analytical tools that can assist the process and how best to prepare technologies to survive commercialization. The course includes elements of entrepreneurship, relationship building, organizational change, as well as project and personnel management.

UNIV*6800 University Teaching: Theory and Practice F-W [0.50]

Participants will critically examine aspects of teaching in higher education and develop teaching skills such as lecturing, demonstrating, leading discussions, and problem solving. Satisfactory (SAT) or unsatisfactory (UNS) will be used to evaluate the student's performance in this course.

Zoology

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

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

IBIO*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.

IBIO*6070 Topics in Advanced Integative 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.

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.

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

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.

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.

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.