2012-2013 Graduate Calendar

The information published in this Graduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2012-2013 academic years, including the Fall Semester 2012, the Winter Semester 2013 and the Summer Semester 2013.

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

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

The University is a full member of:

• The Association of Universities and Colleges of Canada

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November 28, 2012	Revision
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May 13, 2014	Updates for AODA Compliance



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Disclaimer

The Office of Graduate Studies 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, Public Health Emergencies, 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.

Collection, Use and Disclosure of Personal Information

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

Statistics Canada - Notification of Disclosure

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

Address for University Communication

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

Email Address

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

Home Address

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

Name Changes

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

Student Confidentiality and Release of Student Information Policy Excerpt

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

Table of Contents

Appendix A - Courses 207
Agricultural Business 207
Animal Science 207
Anthropology 208
Art History and Visual Culture 208
Bioinformatics
Biomedical Science
Biophysics 209
Business
Capacity Development and Extension 210
Chemistry 210
Computing and Information Science 212
Clinical Studies
Creative Writing
Criminology and Criminal Justice Policy 214
Economics
Environmental Design and Rural Development
Engineering
English
Environmental Sciences
European Studies
Family Relations and Applied Nutrition
Food, Agricultural and Resource Economics
Food Safety and Quality Assurance
Food Science
French
Geography
History
Hospitanty and Tourism Management
Integrative Dielogy 227
Integrative Diology
International Development Studies
Lanuscape Architecture
Laun American and Caribbean Studies
Literature and Theatre Studies
Nanagement 229
Marketing and Consumer Studies 229
Nathematics
Molecular and Cellular Biology
Neuroscience
Pathobiology
Philosophy
Physics
Plant Agriculture
Political Science
Population Medicine
Psychology
Rural Planning and Development 240
Rural Studies
Sociology 241
Statistics
Studio Art
Theatre Studies
Toxicology
University Courses 243

i

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): CME Executive Programs 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): CME Executive Programs 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): CME Executive Programs 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.

Restriction(s): CME Executive Programs students only

AGBU*6400 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): CME Executive Programs 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): CME Executive Programs 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.

Restriction(s): CME Executive Programs students only

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.

Restriction(s): CME Executive Programs students only

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.

Restriction(s): CME Executive Programs students only

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.

Restriction(s): CME Executive Programs students only

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. A nutritional case study will be conducted to allow students to solve practical feeding problems by applying basic nutritional principles. The course is offered every other year on even years.

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*6050 Biometry for Animal Sciences F [0.50]

For students involved in animal research. The course will provide outlines of appropriate presentation and analysis of experimental data with emphasis on different analytical techniques.

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 Animal Genetics and Genomics F [0.50]

Current literature and classical papers pertaining to quantitative genetics, animal breeding and animal genomics are reviewed in detail through presentation, discussion and critical analysis.

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*6360 Techniques in Animal Nutrition Research W [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*6390 QTL and Markers W [0.50]

Advanced training in QTL mapping and selection assisted by genetic markers.

ANSC*6400 Mammalian Reproduction W [0.50]

Discussions and applications of methodology for collection and examination of gametes and embryos and for measurements of hormones in biological fluids. (Odd years only.)

ANSC*6440 Advanced Critical Analysis in Applied Ethology F [0.50]

Students explore the process of scientific inquiry and experimental design within the context of applied ethology research. Discussions include the peer review process, critical analyses and applications of methods for applied 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*6470 Advanced Animal Nutrition and Metabolism I F [0.50]

A systematic review of key aspects of energy, protein, amino acid and carbohydrate utilization and metabolism in farm animals.

Appendix A - Courses, Anthropology

ANSC*6480 Advanced Animal Nutrition and Metabolism II W [0.50]	ANTH*6420 Global Agro-Food Systems, Communities and Rural Change U [0.50]
A systematic review of key aspects of lipid, vitamin and mineral utilization and metabolism in farm animals	This course will reflect recent sociological interests in food studies and global agro-food systems, resources and the environment, community sustainability, rural-urban linkages.
ANSC*6600 Seminar F W [0 00]	the transnationalization of labour regimes, and social movements in the rural context.
This course is required for successful completion of MSc and PhD programs. The major	The course will encourage students to take a comparative and historical approach, focussing on cross-national and inter-regional studies where possible, and to examine
findings of the thesis or major paper are presented to the department.	how class, gender, race and ethnicity play out in each particular substantive topic
ANSC*6700 Animals in Society: Historical and Global Perspectives on Animal	comprising the rural field.
A seminar course covering society's duties to animals. Students will learn about the major	ANTH*6460 Gender and Development F [0.50] Cross cultural and historical changes in gender relations and the roles/positions of women
ethical theories that deal with society's duties towards animals, the main scientific	brought about by industrialization and the development of the world system. Critical
approaches to animal welfare, and the relationship of science to ethics. A brief history of human-animal relationships will be covered and cultural differences described. Students	examination of the predominant theories of gender relations, in so far as these inform
will use this to analyze some current issues.	Introduction to the latest theories and research in the area of women and development,
ANSC*6710 Assessing Animal Welfare in Practice W,S [0.50]	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
A lecture/seminar course covering the principles of applied animal welfare assessment.	Studies program.
the components necessary to create an effective and targeted animal welfare program for	ANTH*6480 Work, Gender and Change in a Global Context U [0.50]
industry or regulatory application.	This course will consider some of the theoretical frameworks available for examining
<i>Prerequisite(s):</i> ANSC*6700 <i>External Course Code(s):</i> Winter offering on-campus, Summer offering Distance	work, workers and work places in the context of globalization, economic restructuring, and shifts in public policy. Using case studies of particular work worlds, the course may
Education.	include topics such as changing patterns of work and employment in comparative contexts,
ANSC*6720 Scientific Assessment of Affective States in Animals W [0.50]	for work, and the regulation of work. The course will focus on the dialectical relationship
Graduate students will explore the biology and validity of behavioural and physiological techniques used in animal welfare assessment of such phenomenon as: sympathetic	between the configurations of gender, class, race and ethnicity and the transformation of
activation, HPA functioning, stereotypic behaviour and preference responses. A	WOIN.
combination of lecture, instructor-led discussion and student-led discussion will explore these areas of animal welfare assessment.	This course will be offered with varying content focusing on theory or research.
ANSC*6730 Applied Environmental Physiology: Applications to Animal Care	ANTH*6600 Reading Course U [0.50]
Standards W [0.50]	A program of directed reading, complemented with the writing of papers or participation
A lecture/seminar course covering the principles of applied environmental physiology including temperature regulation, space requirements, animal responses to light and other	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
aspects of the physical environment. Students pursue a topic in depth to develop or update	repeated provided different content is involved.
recommended codes of practice and resource-based standards.	ANTH*6660 Major Paper U [1.00]
ANSC*6740 Special Topics in Applied Animal Welfare Science S [0.50]	The major paper is an extensive research paper for those who do not elect to complete a thesis. It may be taken over two competers
course will review the scientific research into the welfare of a specific animal species or	A st History and Visual Culture
a specific animal welfare problem common across species, focusing on the main threats to welfare, relevant indicators of welfare, and possible solutions to improve welfare.	
ANSC*6900 Major Paper in Animal and Poultry Science F.W.S [1.00]	AVC*6100 Proseminar: Critical Methods 1 F [0.50] This proseminar explores the histories, theories, and methodologies of the fields of art
A detailed, critical review of an area of study related to the specialization of students in	history, visual culture, and material culture.
the MSc by course work and major paper option that includes analysis and interpretation	AVC*6200 Proseminar: Critical Methods II W [0.50]
Anthronology	This seminar is a multi-disciplinary survey of critical theory. The aim is to consider which
	thought in relation to visual culture, especially post-1968. The course explores issues
ANTH*6000 Public Issues Anthropology F [0.50]	which also possess cultural, social and political relevance, theories which affected all the
of public issues, with sensitivity to the presence or absence of anthropological insights.	academy. These include: the institutions and networks of knowledge, identity politics,
The course will assure that students become well versed in how to synthesize the resources of various branches of the discipline.	race, sexuality, gender and class, amongst others.
<i>Restriction(s):</i> Restricted to incoming students in the program.	AVC*6300 Special Tonics in Art History and Visual Culture F [0.50]
ANTH*6080 Anthropological Theory F [0.50]	This seminar explores issues of historical and critical method by focusing them through
An examination of classical and contemporary anthropological theory, including an emphasis on the most recent directions in the discipline.	the lens of a particular area of concern within the fields of art history, visual culture, and/or material culture.
ANTH*6140 Qualitative Research Methods W [0.50]	AVC*6400 Practicum: Art Institutions W [0.50]
An examination of the methods of qualitative research, including participant observation and unstructured interviews, as well as the ethical considerations of fieldwork. Other	The practicum provides students with an opportunity to gain practical experience through work with an artist, curator, or other museum or arts professional.
topics, such as comparative and historical methods, may be included.	AVC*6500 Directed Reading U [0.50]
ANTH*6270 Diversity and Social Equality U [0.50]	Each student establishes, in consultation with the faculty member chosen, the content of
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	this special study within the instructor's area of expertise. Faculty varies.
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,	RINE*6110 Conomic Methods for Riginformatics F [0 50]
racial and other forms of social division. The course may also cover native issues and	This course provides an introduction to current and emerging methods used to generate
poncies related to multiculturalism, equity and local or regional autonomy.	genomic data analyzed in bioinformatics. This may include techniques for DNA sequencing as well as transcriptome, proteome and metabolome analysis. The objective is to develop an appreciation for the challenges of producing data.

BINF*6210 Software Tools for Biological Data Analysis and Organization F [0.50]	BIOM*6480 Pharmacodynamics and Pharmacokinetics U [0.50]
The objective of this course is to familiarize students with the tools for the computational acquisition and analysis of molecular biological data. Lectures will focus on key software for gene expression analyses, biological sequence analysis, and data acquisition and management. Laboratory exercises will guide students through application of tools relevant to topics discussed in lecture.	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.
<i>Prerequisite(s):</i> Introductory molecular biology or genetics course, undergraduate	BIOM*6570 Biochemical Regulation of Physiological Processes U [0.50]
statistics course Restriction(s): Instructor's Consent	This course focuses on the regulation of vertebrate physiological processes, such as
BINF*6410 Algorithms and Programming in Bioinformatics W [0.50]	electrolyte and water balance, temperature regulation, growth and energy metabolism, by hormones and other biological regulators that act through cellular recentors and
This course will teach students to develop and use programming tools for bioinformatics.	intracellular biochemical-control pathways.
The topics covered present a recourse for bioinformaticians who find that existing software	BIOM*6601 Special Topics in Reproductive Biology and Biotechnology U [0.25]
does not satisfy their needs.	Permits in-depth exploration of interdisciplinary aspects of biomedical research. Topics
Prerequisite(s): BINF*6210	such as inflammation, reproductive immunology and neoplasia have been offered.
This course is an overview course on different approaches to analyze biological sequences	BIOM*6602 Special Topics in Reproductive Biology and Biotechnology U [0.50]
Basic concepts are introduced, as well as related algorithms.	See BIOM*6601 above.
Prerequisite(s): BINF*6210	BIOM*6610 Vascular Biology U [0.50]
BINF*6890 Topics in Bioinformatics U [0.50]	An interdisciplinary course in which the interrelationships between vascular proteins, cellular elements and the maintenance of vascular integrity are examined
Selected topics in bioinformatics will be covered. The course might focus on biological	Structural-functional relationships in vascular biology are explored through seminar
or mominance topics, or upon a mixture of both.	presentations, group discussions and small group participation in problem based examples of vascular dysfunction
RINE*6970 Statistical Bioinformatics W [0 50]	BIOM*6701 Special Topics in Development Call and Tsome Membalagy U (0.25)
This course presents a selection of advanced approaches for the statistical analysis of	Permits further in depth study of developmental and morphological sciences
data that arise in bioinformatics, especially genomic data. A central theme to this course	BIOM*6702 Special Topics in Development. Cell and Tissue Morphology IJ [0.50]
is the modelling of complex, often high-dimensional, data structures.	See BIOM*6701
<i>Prerequisite(s):</i> Introductory courses in statistics, mathematics and programming <i>Restriction(s):</i> Instructor's Consent	BIOM*6711 Special Topics in Physiology & Biochemistry U [0.25]
BINF*6999 Bioinformatics Master's Project F,W,S [1.00]	This course involves an appropriate combination of an experimental procedure (or project),
A major research paper is completed by students in the Master of Bioinformatics program.	seminars, selected reading or a literature review outside the thesis subject, developed
Prerequisite(s): BINF*6110, BINF*6210	according to the student's requirements.
Restriction(s): Instructor's Consent	BIOM*6712 Special Topics in Physiology & Biochemistry U [0.50]
Riomodical Science	See DIUMED/11
	DIOM#4721 Encoiel Tenics in Dheumencleur, Teniceleur, U.0.251
BIOM*6060 Functional Neuroanatomy U [0.50]	BIOM*6721 Special Topics in Pharmacology-Toxicology U [0.25] This course will comprise a combination of an experimental procedure (or project).
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*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
BIOM*6060 Functional Neuroanatomy U [0.50] A course emphasizing the structure and function of the mammalian nervous system and organs of special sense. BIOM*6070 Pregnancy, Birth and Perinatal Adaptations S [0.50] This course promotes understanding of the physiology of the placenta, and its role in	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
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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.

Business

BUS*6130 General Environment of Business W [0.50]

The objective of this course is to assist managers to better understand and develop strategies for dealing with their political and economic environments. This course has a comprehensive and international perspective that looks at how Canadian industries and businesses are part of a worldwide economics and political system. This course provides a detailed examination of how specific policies affect business and strategy in different industries for different commodities.

Restriction(s): CME Executive Programs Students

BUS*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.

BUS*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): BUS*6180

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

BUS*6300 Business Practices for Sustainability U [0.50]

This course focuses on critical strategic and managerial issues related to sustainability and introduces students to concepts linking organizational strategies and sustainability principles. It explores how managers can integrate consideration of the environment and society into business strategies and business practices to improve competitive advantage and create environmental, social and economic value.

BUS*6800 Readings in Leadership I F,W,S [0.50]

This course is available to individuals or groups of graduate students. Students will complete a set of readings and an associated paper as approved by designated faculty. Specific learning objectives consistent with the University's will be developed each time the course is offered.

BUS*6810 Readings in Leadership II F,W,S [0.50]

This course is available to individuals or groups of graduate students. Students will complete a set of readings and an associated paper as approved by designated faculty. Specific learning objectives consistent with the University's will be developed each time the course is offered.

Prerequisite(s): BUS*6800 (or may be taken concurrently)

BUS*6820 Readings in Management F,W,S [0.50]

This course is available to individuals or groups of graduate students. Students will complete a set of readings and an associated paper as approved by designated faculty. Specific learning objectives consistent with the University's will be developed each time the course is offered.

Capacity Development and Extension

CDE*6070 Foundations of Capacity Building and Extension U [0.50]

Contemporary issues and changes in rural communities and the implications for building community capacity. Students will be introduced to and examine dominant paradigms of community capacity building for meeting rural needs.

CDE*6260 Research Design U [0.50]

Provides students with abilities and knowledge to undertake, formulate and implement research in their chosen area of development. Students are expected to acquire the ability to identify research question and the appropriate designs to answer such questions.

CDE*6290 Special Topics in Capacity Building and Extension U [0.50]

Selected study topics which may be pursued in accordance with the special needs of students in the program.

CDE*6311 Community Engagement and Public Participation U [0.50]

This course will explore the philosophy and principles of public participation. An emphasis will be placed on those practices and methods that can be used to engage communities and organizations within a participatory framework.

Prerequisite(s): CDE*6070

CDE*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.

CDE*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. Service learning through facilitation of community meetings will be part of the course.

Restriction(s): Instructor's signature required

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

A program of supervised independent study related to the student's area of concentration. *Restriction(s):* Instructor's signature required.

CDE*6420 Communication for Social and Environmental Change U [0.50]

Communication process for social change and development including participatory media. Students engage in community-based work involving multi-media projects. Course covers the history of development communication and current praxis in Canada and internationally.

Restriction(s): Instructor's signature required.

CDE*6690 Community Environmental Leadership F [0.50]

This course explores the relationships between the environment and socio-economic issues at the community level and the resulting conflict. Using the social change model, this ecourse examines the linages between advocacy, decision-making and conflict and the development of strategies to mitigate community confict.

Restriction(s): Instructor's signature required.

CDE*6900 Major Research Paper U [1.00]

Students select a topic and write a paper that does not necessarily include original data but is an analysis and synthesis of materials dealing with the topic selected.

Restriction(s): Instructor's signature required.

Chemistry

CHEM*7100 Selected Topics in Inorganic Chemistry 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 U [0.50]	CHEM*7500 Selected Topics in Physical Chemistry 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.	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
CHEM*7240 Chemical Instrumentation U [0.50]	systems; thermodynamics.
Instrumental components and optimum application; rudiments of design; electrical, spectral, migrational and other methods.	CHEM*7550 Kinetics - Dynamics U [0.50]
CHEM*7260 Topics in Analytical Spectroscopy U [0.50]	Empirical analysis. Kinetic theory of gases. Potential energy surfaces. Unimolecular
Atomic emission and absorption spectroscopy; methods of excitation and detection;	Energy transfer.
quantitative applications. Molecular electronic spectroscopy, UV, visible and Raman;	CHEM*7560 Spectroscopy U [0 50]
measurements of equilibrium, etc. Sources and control of errors and interferences. Determination and description of colour.	Aspects of electronic vibrational and rotational spectroscopy of atoms, molecules, and the solid state. Relevant aspects of quantum mechanics, Dirac notation, and angular
CHEM*7270 Separations U [0.50]	momentum will be discussed. Group Theory will be presented and its implications for
Material to be covered is drawn from the following topics: diffusion; isolation of organic	spectroscopy introduced. Prerequisites: one semester-long undergraduate course in quantum mechanics or the approval of the instructor.
material from the matrix; chromatographic techniques - principles of chromatographic separation gas (GLC GSC) liquid (LLC LSC GPC JEC) supercritical fluid (SEC)	CHEM*7600 Selected Topics in Organic Chemistry U [0.50]
chromatographies; GC-MS, CG-FTIR; electrophoresis, flow field fractionation. Prerequisites: undergraduate level course in instrumental analysis.	Two or three topics from a range including: bio-organic chemistry; environmental organic chemistry; free radicals; heterocyclic molecules; molecular rearrangements; organometallic
CHEM*7280 Electroanalytical Chemistry U [0.50]	chemistry; photochemistry; natural products. Department of Chemistry
A study of electroanalytical techniques and their role in modern analytical chemistry.	CHEM*7640 Synthetic Organic Reactions U [0.50]
The underlying principles are developed. Techniques include chronamperometry,	Named organic reactions and other synthetically useful reactions are discussed. The
chronocoulometry, polarography, voltammetry, chronopotentiometry, coulometric titrations flow techniques electrochemical sensors and chemically modified electrodes	will be presented. Examples from the organic literature will be used to illustrate these
CHEM*7290 Surface Analysis U [0.50]	aspects.
	CHEM*7650 Strategies in Organic Synthesis U [0.50]
CHEM*7300 Proteins and Nucleic Acids U [0.50]	The synthesis of organic compounds is discussed and emphasis is placed on the design
Determination of protein sequence and 5-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; enRNPs and ribozumes; protein-nucleic acid interactions	of synthetic routes. Examples drawn from the literature are used to illustrate this synthetic planning. <i>Prerequisite(s):</i> CHEM*7640
CHEM\$7210 Selected Tenics in Dischamister: U [0 50]	CHEM*7660 Organic Spectroscopy U [0.50]
Discussion of specialized topics related to the research interests of members of the centre:	Ultraviolet, infrared, resonance spectroscopy and mass spectrometry, with emphasis or
for example, recent offerings have included peptide and protein chemistry, biochemical	
toxicology, medical aspects of biochemistry, glycolipids and glycoproteins, redox	CHEM*/690 Physical Organic Chemistry U [0.50]
CHEM\$72(0.D	Linear free energy relationships; substituent effects and reactive intermediates.
CHEM ^{*/} 7500 Regulation in Biological Systems U [0.50]	CHEM*7700 Principles of Polymer Science 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.	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 o polymers. Theory and experimental methods for the molecular characterization o
Mechanisms of rate enhancement. Enzyme kinetics - steady state: inhibitors: hisubstrate	polymers.
enzymes; fast reaction kinetics. Enzyme reaction mechanisms. Structural and genetic	CHEM*7710 Physical Properties of Polymers U [0.50]
modification of enzymes. Catalytic antibodies. Binding processes. Multiple sites and co-operativity. Allosteric enzymes and metabolic control. Catalysis by RNA.	The physical properties of polymers are considered in depth from a molecular viewpoint Rubber elasticity, mechanical properties, rheology and solution behaviour are
CHEM*7380 Cell Membranes and Cell Surfaces U [0.50]	quantitatively treated.
Membrane proteins and lipids - structure and function; dynamics; techniques for their	Prerequisite(s): CHEM*7700 or equivalent
study; model membrane systems. Membrane transport. The cytoskeleton. Membrane	CHEM*7720 Polymerization and Polymer Reactions U [0.50]
cell surface in immune responses.	The reactions leading to the production of polymers are considered with emphasis of emploien and succession polymerization and polymerization reaction and reaction and polymerization
CHEM*7400 Selected Topics in Theoretical Chemistry U [0.50]	degradation, stabilization and modification reactions are also considered in depth.
Discussion of specialized topics related to the research interests of the members of the	Prerequisite(s): CHEM*7700 or equivalent.
centre. Special topics could include for example: theory of intermolecular forces; density	CHEM*7730 Selected Topics in Polymer Chemistry U [0.50]
matrices; configuration interaction; correlation energies of open and closed shell systems;	Discussion of specialized topics of polymer chemistry related to the research interests
kinetic theory and gas transport properties; theory of the chemical bond.	of the faculty or prominent scientific visitors. Special topics could include, for example
CHEM*7450 Statistical Mechanics U [0.50]	polymer stabilization and degradation; mechanical properties; polymer principles in

properties; reactions of polymers; polymerization kinetics. 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.

surface coatings; organic chemistry of synthetic high polymers; estimation of polymer

CHEM*7270 Separations U [0.50]

CHEM*7280 Electroanalytical Chemistry U [0.50]

CHEM*7290 Surface Analysis U [0.50]

CHEM*7300 Proteins and Nucleic Acids U [0.50]

CHEM*7310 Selected Topics in Biochemistry U [0.50]

CHEM*7360 Regulation in Biological Systems U [0.50]

CHEM*7370 Enzymes U [0.50]

CHEM*7380 Cell Membranes and Cell Surfaces U [0.50]

CHEM*7400 Selected Topics in Theoretical Chemistry U [0.50]

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*7950 PhD Seminar U [0.00]	CIS*6140 Software Engineering U [0.50]
CHEM*7960 Comprehensive Examination U [0.00]	This course will discuss problems where optimization is required and describes the most
PhD students are required to take an oral examination in their major field. The specific	common techniques for discrete optimization such as the use of linear programming, constraint satisfaction methods, and meta-heuristics.
content and format are specified by a centre examining committee. The examination must	CIS*6160 Multiagent Systems II [0 50]
be first attempted no later than eight months after entering the regular PhD program. For	Intelligent systems consisting of multiple autonomous and interacting subsystems with
after their return from the work year.	emphasis on distributed reasoning and decision making. Deductive reasoning agents.
CHEM*7070 MSc Decearch Dapar II [0 50]	practical reasoning agents, probabilistic reasoning agents, reactive and hybrid agents,
An experimental project normally based on the CHEM*7040 research proposal supervised	negotiation and agreement, cooperation and coordination, multiagent search, distributed
by the advisor, taking three to four months to complete. This project may be completed	MDP, game theory, and modal logics.
at any time during the student's program, but it must follow CHEM*7940. A written	CIS*6200 Design Automation in Digital Systems U [0.50]
report is required, and a seminar based on the content of the report will be presented. The	Techniques and software tools for design of digital systems. Material covered includes
on which the student is registered. This course normally will follow the course.	nign-level synthesis, design for testability, and FPGAs in design and prototyping.
CHEM*7940 MSc Seminar.	CIS*6320 Image Processing Algorithms and Applications U [0.50]
CHEM*7980 MSc Thesis U [0.00]	Brightness transformation, image smoothing, image enhancement, thresholding,
CHEM*7000 PhD Thesis II [0.00]	and biology.
	CIS*6420 Soft Computing U [0.50]
Computing and Information Science	Neural networks, artificial intelligence, connectionist model, back propagation, resonance
CIS*6000 Distributed Systems U [0.50]	theory, sequence processing, software engineering concepts.
The evolution of distributed computer systems. Models for distributed processing.	CIS*6490 Analysis and Design of Computer Algorithms U [0.25]
laxonomy of multiprocessor systems. Interconnection networks. Memory and I/O for distributed architectures. Performance of distributed systems. Architectural issues of	The design and analysis of efficient computer algorithms: standard methodologies, asymptotic behaviour optimality lower bounds implementation considerations, graph
distributed systems	algorithms, matrix computations (e.g. Strassen's method), NP-completeness.
CIS*6020 Artificial Intelligence U [0.50]	CIS*6650 Topics in Computer Science I U [0 50]
An examination of Artificial Intelligence principles and techniques such as: logic and	This special topics course examines selected advanced topics in computer science that
rule based systems; forward and backward chaining; frames, scripts, semantic nets and	are not covered by existing courses. The topic(s) will vary depending on the need and
the object-oriented approach; the evaluation of intelligent systems and knowledge	the instructor.
acquisition. A sizeable project is required and applications in other areas are encouraged.	CIS*6660 Topics in Computer Science II U [0.50]
CIS*6030 Information Systems U [0.50]	This is a reading course. Its aim is to provide background knowledge to students who
Relational and other database systems, web information concurrency protocols, data integrity transaction management distributed databases remote access data warehousing	need to get a head-start in their thesis research fields early during their program while
data mining.	instructor.
CIS*6050 Neural Networks U [0.50]	<i>Restriction(s):</i> Requires instructor's signature.
Artificial neural networks, dynamical recurrent networks, dynamic input/output sequences,	CIS*6890 Technical Communication and Research Methodology U [0.50]
communications signal identification, syntactic pattern recognition.	This course aims to develop students' ability in technical communication and general
CIS*6060 Bioinformatics U [0.50]	research methodology. Each student is expected to present a short talk, give a mini lecture,
Data mining and bioinformatics, molecular biology databases, taxonomic groupings,	review a conference paper, write a literature survey and critique fellow students' talks
sequences, feature extraction, Bayesian inference, cluster analysis, information theory,	
machine learning, feature selection.	Clinical Studies
CIS*6070 Discrete Optimization U [0.50]	CLIN*6010 Clinical Medicine F [0.50]
I his course will discuss problems where optimization is required and describes the most	These are in-service clinical training courses based on case material presented to the
constraint satisfaction methods, and genetic algorithms.	student in the Veterinary Teaching Hospital. Under supervision, the student is expected
CIS*6080 Genetic Algorithms U [0.50]	diagnosis, therapy and client/referring veterinarian communications. Case material studied
This course introduces the student to basic genetic algorithms, which are based on the	in each course reflects a different clinical subspecialty commonly occurring in the Fall
process of natural evolution. It is explored in terms of its mathematical foundation and	(F), Winter (W), and Summer (S) semesters respectively.
applications to optimization in various domains.	CLIN*6030 Clinical Medicine W [0.50]
CIS*6090 Hardware/Software Co-design of Embedded Systems U [0.50]	These are in-service clinical training courses based on case material presented to the
Specification and design of embedded systems, system-on-a-chip paradigm, specification	student in the Veterinary Teaching Hospital. Under supervision, the student is expected to take primary responsibility for case management including decisions related to
languages, hardware/software co-design, performance estimation, co-simulation and	diagnosis, therapy and client/referring veterinarian communications. Case material studied
valuation, processes architectures and software synthesis, retargetable code generation and optimization.	in each course reflects a different clinical subspecialty commonly occurring in the Fall
CIS*6100 Parallel Processing Architectures 11 [0 50]	(F), Winter (W), and Summer (S) semesters respectively.
Parallelism in uninforcessor systems narallel architectures memory structures ninelined	CLIN*6031 Clinical Medicine S [0.50]
architectures, performance issues, multiprocessor architectures.	These are in-service clinical training courses based on case material presented to the
CIS*6120 Uncertainty Reasoning in Knowledge Representation 11 [0 50]	student in the Veterinary Teaching Hospital. Under supervision, the student is expected to take primary responsibility for case management including decisions related to
Representation of uncertainty. Demoster-Schafer theory fuzzy logic Bayesian belief	diagnosis, therapy and client/referring veterinarian communications. Case material studied
networks, decision networks, dynamic networks, probabilistic models, utility theory.	in each course reflects a different clinical subspecialty commonly occurring in the Fall
CIS*6130 Object-Oriented Modeling. Design and Programming U [0.50]	(F), Winter (W), and Summer (S) semesters respectively.
Objects, modeling, program design, object-oriented methodology. UML. CORBA.	

CLIN*6170 Clinical Surgery F [0.50]

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

Restriction(s): Instructor's signature required.

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 F,W,S [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.

Prerequisite(s): CLIN*6420 is normally a prerequisite

CLIN*6460 Anesthesiology III: Species Specific and Coexisting Disease Considerations F-W [0.50]

A course in advanced veterinary anesthesia that focuses on the scientific literature related to the anesthesia of specific species and veterinary patients with varying underlying diseases.

Prerequisite(s): DVM; CLIN*6420 and CLIN*6440

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 W [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 W [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 W [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*6661 Respiratory Physiology & Pathophysiology U [0.50]

This is a graduate course designed for veterinarians pursuing advanced training in residency and DVSc programs. The course will cover normal respiratory anatomy, physiology and pulmonary function. A focus on respiratory pathophysiology will include respiratory failure, oxygen therapy and positive pressure ventilation. (offered every three years).

CLIN*6670 Structure & Function of Animal Skin F,W,S [0.50]

A review of structure and function of skin in veterinary dermatology including the epidermis, dermis, subcutis and adnexal tissue. Application of knowledge in a clinical setting will follow with attention to modalities that will improve the epidermal barrier *Restriction(s):* Instructor's signature required

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]	CRWR*6100 Poetry Workshop F-W [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.	The Poetry Workshop engages students in an intensive program of reading and writing work. The workshops will be strongly focused on writing and on responding to the work of students in the course with productive, constructive criticism. Students will have the
CLIN*6800 Surgical Oncology Procedures F,W [0.50]	opportunity to work closely with a nationally recognized poet to develop their own skills as poets and editors. Students are expected to read widely and to develop their
This is a combined reading and laboratory course that will cover the major surgical	understanding of the technical aspects of their craft.
laboratory to teach the students the important features of each procedure. (Offered in alternate years)	Restriction(s): MFA.CW students only CRWR*6200 Fiction Workshop F-W [0.50]
<i>Restriction(s):</i> Restricted to DVSc students in small animal surgery, Instructor's	The Fiction Workshop engages students in an intensive program of reading and writing work. The workshops will be strongly focused on writing and on responding to the work
CI IN*6000 Clinical "Grand Bounds" Seminar F-W [0.25]	of students in the course with productive, constructive criticism. Students will have the
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	opportunity to work closely with a nationally recognized author to develop their skills as writers and editors. Students are expected to read widely and to develop their understanding of the technical aspects of their craft.
suitable for submission to a veterinary journal.	Restriction(s): MFA.CW students only
CLIN*6920 Veterinary Clinical Practice I F [0.50]	CRWR*6300 Drama Workshop U [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-priented approach	The Drama Workshop engages students in an intensive program of writing and reading work. Students will produce a substantial amount of dramatic writing and will also provide constructive criticism of the work of other workshop participants. Required reading will cover a wide range of dramatic literature and the study of dramatic forms and techniques. <i>Restriction(s):</i> MFA.CW students only
to health management and disease. Case material studied in each course reflects the	CRWR*6400 Practicum in Creative Writing U [0.50]
clinical problems commonly occurring in the Fall, Winter and Summer semesters respectively.	In this course of guided study, the student will work on a creative project with a mentor who is a recognized member of the professional writing community
Restriction(s): Instructor's Consent Required	Restriction(s): MFA CW students only
CLIN*6930 Veterinary Clinical Practice II W [0.50]	CRWR*6500 Non-Fiction Workshop U [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	The Non-Fiction Workshop engages students in a reading and writing intensive program of creative non-fiction. The workshops will be strongly focused on writing and will involve the creation and revision of a substantial body of new work in the genre, as well as critiquing the work of other students in the course. The reading component will focus on texts from a varied social and cultural range (e.g. family memoir, travel narrative, cultural memoir, themed meditation).
clinical problems commonly occurring in the Fall, Winter and Summer semesters	Restriction(s): MFA CW students only
respectively.	CRWR*6600 Special Topics in Creative Writing U [0.50]
CLIN#6040 Veterinery Clinical Practice III S [0 50]	A variable-content course focusing on a particular issue or approach to writing within
These are in-service clinical training courses for intern/graduate-diploma students based	one genre of creative writing (fiction, poetry, drama, etc.) or a particular issue or approach
on case material presented to the Veterinary Teaching Hospital. Under supervision, the	to writing that is at work across multiple genres.
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	Criminology and Criminal Justice Policy
with animal restraint and nursing care. They will also develop a problem-oriented approach	CCJP*6000 Courts W [0.50]
to health management and disease. Case material studied in each course reflects the clinical problems commonly occurring in the Fall, Winter and Summer semesters respectively.	This course examines courts from a variety of political, social, and socio-legal perspectives depending on the interest of the instructor(s). Particular attention will be paid to the role of courts in shaping criminal justice policy through such means as constitutional decisions
Restriction(s): Instructor's Consent Required	and sentencing decisions.
CLIN*6950 Special Topics in Clinical Studies F,W,S [0.50]	<i>Restriction(s):</i> CCJP students. Instructor's signature required if not in the CCJP program
CLIN*6990 Project in Clinical Studies F,W,S [0.50]	CCJP*6100 Governing Criminal Justice F [0.50]
This course involves participation in a clinical research project or clinical retrospective study. A review of the relevant literature will be performed. A manuscript suitable for	This course analyzes criminal justice policy and governance of the criminal justice system from applied and theoretical perspectives. Particular attention is paid to the interplay

study. A review of the relevant literature will be performed. A manuscript suitable for publication in a peer-reviewed journal will be prepared, and the study will be presented in a departmental seminar.

Restriction(s): Only available to students enrolled in the MSc by Coursework Program.

Creative Writing

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

This required plenary course addresses important historical and contemporary perspectives on creative writing as an art, a practice, and a profession. Readings, discussion and visits from writers and other literary professionals will help students to articulate effectively their own literary aesthetic and to develop professional skills.

Restriction(s): MFA.CW students only

CRWR*6010 Plenary Course: Writers in the World F [0.50]

This required plenary course addresses changing and conflicting ideas about the responsibilities of the writer in the world. Readings, discussion, and visits from writers and other literary professionals will help students to articulate effectively their own positions and to develop professional skills.

Restriction(s): MFA.CW students only

between criminal justice policy and management and the larger political process.

This course introduces students to the primary methods, data sources and statistical methods used in criminal justice and criminology research. Particular attention will be

paid to the role research and methods and statistics play in shaping criminal

The major paper is an extensive research paper for those who do not elect to complete a

CCJP students or instructor's signature

Restricted to CCJP graduate students

CCJP students

justice/criminological theory, research and policy.

CCJP*6660 Major Research Paper S,F,W [1.00]

thesis. It may be taken over two semesters.

CCJP*6300 Research Methods in Criminal Justice F [0.50]

Restriction(s).

Restriction(s):

Restriction(s):

215

Economics	ECON*6200 Economic History U [0.50]
ECON*6000 Microeconomic Theory I U [0.50] A first graduate course in microeconomics, presenting a rigorous treatment of consumer	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.
theory, producer theory, applications of duality, partial equilibrium, general equilibrium and the fundamental theorems of welfare economics.	ECON*6300 International Trade Theory U [0.50]
ECON*6010 Microeconomic Theory II 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
Advanced topics in modern microeconomics to include elements of game theory,	Topics may also include barriers to trade, international factor movements, growth and
information economics, economics of risk and uncertainty, the theory of incentives and others.	development, and strategic trade policy.
Prerequisite(s): ECON*6000	ECON*6320 International Finance U [0.50]
ECON*6020 Macroeconomic Theory I 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
A first graduate course in macroeconomics, presenting a rigorous introduction to the	financing of trade flows, and open economy macroeconomic models and policy issues.
tools and basic models of dynamic general equilibrium theory. The topics covered include economic growth and development economic fluctuations and monetary and fiscal	ECON*6350 Economic Development U [0.50]
policies.	This course examines economic development from an international perspective: theories,
ECON*6040 Macroeconomic Theory II U [0.50]	history, policies and prospects.
This course considers the dynamics resulting from intertemporal optimization models.	ECON*6370 Economic Development in Historical Perspective U [0.50] This course will examine the experience of economic development focusing on the
Foundations of unemployment theory. Approaches to business cycles. Models of long-run growth.	emergence of the Third World. Topics for discussion will vary from year to year; they
Prerequisite(s): ECON*6020	may include the impact of trade expansion during the eighteenth and nineteenth centuries,
ECON*6050 Introduction to Econometric Methods U [0.50]	government policy, and others.
Introduction to the specification, estimation and testing of economic models. Topics	ECON*6380 Financial Economics U [0.50]
include the classical linear regression model, t tests, structure tests, specification error, the consequences of the violation of the classical assumptions, detection and correction	This course has three objectives: (i) build a common background for all students in asset
of autocorrelation and heteroscedasticity.	pricing and corporate finance in order to facilitate discussion of finance research; (ii)
ECON*6060 Mathematical Methods for Economics F [0.00]	published research papers.
This course is designed to provide students with the necessary mathematical tools to	ECON*6390 Empirical Finance and Financial Econometrics U [0.50]
and successfully complete them. The material covered will include advanced topics in	This course covers topics in empirical finance, involving the integration of financial
linear algebra, multivariate optimization techniques and comparative statics.	theory, financial econometrics, and data analysis. Students will learn how empirical research in finance is conducted through reading involving both textbooks and journal
ECON*6090 Game Theory U [0.50]	articles and from conducting an independent research project.
This course introduces the student to game theory, which is an important tool for modelling	Co-requisite(s): ECON*6140
economic situations with multi-person interaction. Economic applications such as oligopoly, bargaining, auctions, and public goods provision will be discussed. Broader	ECON*6400 Public Finance U [0.50]
applications to voting games, candidate strategy, war games, and parlour games will also	This course surveys the normative theory of the public sector. Topics may include public
be briefly discussed. Students need to be very familiar with optimization and single person decision-making.	ECON*(400 Money and Dephing U [0 50]
ECON*6100 Experimental Economics U [0.50]	This course studies monetary economies using overlapping generations models. MIU
This course examines the use of the experimental methodology in economics. We will	models and CIA models. More specifically, we will study major issues in money and
study how experiments have been used to test theories in many subfields within economics.	banking, such as the role of money and banks, the cost of inflation, and the optimal monetary policies
analyze experimental data.	FCON*6600 Labour Economics II [0 50]
ECON*6110 Mathematical Economics U [0.50]	Major themes in labour market theory including static and dynamic labour demand and
This course introduces students to the mathematical techniques used in advanced economic	supply, migration and wage structures and dynamics, unemployment, migration and the
analysis. Topics covered in any year: analysis of dynamic economic models and	role of social programs.
	ECON*6610 Topics in Labour Economics U [0.50]
ECON*0140 Econometrics 1 U [0.50] Tonics include a review of the classical linear regression model applications of generalized	supply, human capital, wage bargaining and contract theory, search theory, duration
least squares, maximum likelihood methods and various statistical test procedures.	analysis and its application to major labour market spells such as employment and
ECON*6160 Econometrics II U [0.50]	
Topics include maximum likelihood as a method of estimation and inference, nonlinear	ECON*6650 Economics of Social Welfare U [0.50]
estimation and simultaneous equations. Also more specialized topics such as limited-dependent-variable models and non-parametric regression methods may be	health insurance. It covers their structure, incentives and distribution effects, and includes
covered.	empirical analysis of existing programs.
ECON*6170 Topics in Econometrics U [0.50]	ECON*6700 Industrial and Market Organization U [0.50]
This is an advanced econometrics topics course that covers the area of non-parametric	The major topics of industrial organization are analyzed from both a game theoretic
and semiparametric estimation and testing of econometrics models, including time series and panel data semiparametric models	include: oligopoly theory, determinants of industrial structure, Coase theorem, market
ECON*6180 Econometric Methods U [0.50]	entry, advertising, research and development, product differentiation, and price
This course follows ECON*6050. It covers estimation by instrumental variables.	
estimations of simultaneous systems, asymptotic distribution theory, maximum likelihood	EUUN*0/50 Managerial Economics U [0.50] The course introduces students to the latest developments in the according archivin of
estimation, binary choice and limited dependent variable models, and issues in time series analysis.	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 and Finance.

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 and Finance.

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 Economic Theory of Natural Resources Use 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 the Office of Graduate Studies.

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.

EDRD*6050 Farming Systems Analysis and Development W [0.50]

An introduction to the Farming Systems Research/Extension approach to solving problems in tropical and sub-tropical agricultural and livestock production systems including problem diagnosis, stakeholder identification and the process of generation, adaption and validation of solutions.

EDRD*6100 Disaster Planning and Management U [0.50]

This course take a multi-hazard perspective and is designed to challenge the students to examine the relationship between disaster and development, to learn how hazards become disasters, as well as the techniques for effective planning and managing disasters from a long-term development perspective. Offered through Distance Format only.

EDRD*6150 Economic Development Policy and Practice for Rural and Smaller Communities U [0.50]

Critically examines the issues and challenges of local economic development policies, programs, planning and practice in North American and European rural and smaller communities. Local and community economic development theories and concepts, comparative case study analysis, community economic analysis (CEA), strategic planning and management. To be offered in distance format only.

EDRD*6630 Regional Planning S [0.50]

An examination of the theory and practice of regional planning in an international and Canadian environment, including a discussion of the various tools available to analysis the regional economy.

EDRD*6690 Program Evaluation U [0.50]

An advanced seminar dealing with the theory and practice of program evaluation focusing on public sector programs in agriculture and rural development, international and domestic case studies.

Engineering

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

Basic physical principles of transport phenomena. Heat and mass transfer methods for physical systems. Time and volume averaging. Dimensional analysis.

ENGG*6010 Assessment of Engineering Risk U [0.50]

The question of "how safe is safe enough?" has no simple answer. In response, this course develops the bases by which we can assess and manage risk in engineering. Course deals with fate and transport issues associated with risk, as relevant to engineering and how these aspects are employed in the making of decisions.

Prerequisite(s): STAT*2040 or STAT*2120

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 U [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 U [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 U [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 U [0.00]

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 U [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 U [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 U [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 U [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 U [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 U [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 U [0.50]

Instrumentation systems. Transducers. Amplifier circuits. Recording methods. Spectroscopy & colorimetry. Radiation, humidity, pH and noise measurements. Chromatography.

Restriction(s): ENGG*3450 or equivalent.

ENGG*6160 Advanced Food Engineering U [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.

Prerequisite(s): ENGG*3450 or equivalent.

design flow; Verilog intergration, ASIC case studies.

ENGG*6530 Reconfigurable Computing U [0.50]

 ENGG*6170 Special Topics in Food Engineering U (0.50) A course of directed study involving selected readings and analyses in developing is established, an investgation is performed, and a final design or solution is presented. ENGG*6180 Final Project in Biological Engineering U (0.50) Sorteet-inte signals and systems, there have the chine signals and system is for your interval and the selected study involving selected readings and analyses in developing in the selected readings and analyses in developing in the selected study involving selected readings and analyses in developing in the selected study involving selected readings and analyses in developing in control systems in Engineering. ENGG*6260 Advanced Digital Signal Processing U (0.50) A course of directed study involving selected readings and analyses in developing in control systems in control systems in a projection. Bioinclaina engineering. ENGG*6300 Research Methods in Bioengineering U (0.50) ENGG*6300 Research Methods in Bioengineering U (0.50) ENGG*6300 Research Methods in Bioengineering (U.50) ENGG*6300 Research Methods in Bioengineering (U.50) ENGG*6300 Research Methods in Bioengineering environmentation environ a single neuron to a neural network and applications. Soft computing upproaches to uncert and system is net systems will be a study of edig with the study of analysis in the analysis of a fill analysis of a fill analysis of a single analysis in the analysis of a single analysis in the analysis of a single analysis in the analysis of a single analysis of a fill analysis of a single analysis in the analysis of a single analysis of a single analysis in the analysis of a single analysis in the analysis of a single analysis of a single analysis in the analysis of a single analysis of a single analysis in the analysis of a single analysis of a single analysis in the analysis of a single analysis and an	Appendix A - Courses, Engineering	2
A coarse of directed study involving selected readings and analyses in developing showhere and a direct of study involving selected readings and analyses in developing in the systems, reading, the systems, task scheduling and allocation, full-tolerance, resumangement, relevant incredingues, rule yearding years of tological engineering. It is course is open only to students in the biological angles in the years of the systems, stransform, frequency analysis of signals and systems, stransform, fast fourier transform, fast fourier	ENGG*6170 Special Topics in Food Engineering U [0.50]	ENGG*6550 Intelligent Real-Time Systems U [0.50]
 ExcG*6100 Finil Project in Biological Engineering (1000) A project course in which a problem of advanced design or analysis in the area of a final design or solution is presented. EXGG*6500 Advanced Digital Signal Processing U (0.50) Course of directed study involving selected readings and analyses in developing. EXGG*6500 Advanced Soft Computing U (0.50) Course of directed study involving selected readings and analyses in developing. EXGG*6500 Advanced Soft Computing U (0.50) Course of directed study involving selected readings and analyses in developing. EXGG*6500 Research Methods in Bioengineering U (0.50) EXGG*6500 Research Methods in Bioengineering are reviewed and assessed in the context of advance do dasley. The scientific method is discussed in terms of a drawing conclusions. The objective is to guids students as they develope a coherent research problems, appropriate tests and hypotheses, experimental methods, data analysis and deepen their understanding of the breadth of the b	A course of directed study involving selected readings and analyses in developing knowledge areas of food engineering.	Soft real-time systems, hard real-time systems, embedded systems, time handling synchronization, deadlines, preemption, interruption, rts languages, rts/ operating syst system life-cycle, petri nets, task scheduling and allocation, fault-tolerance, reso
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 spectra transform. A serie signals and systems, z transform, frequency analysis of signals and system experimental methods of biological engineering. U (0.50) A course of directed study involving selected readings and analyses in developing knowledge areas of ancicultural engineering. U (0.50) A course of directed study involving selected readings and analyses in developing knowledge areas of ancicultural engineering. U (0.50) A course of directed study involving selected readings and analyses in developing knowledge areas of ancicultural engineering. U (0.50) Research methodologies used in bioengineering are reviewed and assessed in the contex of directed study involving selectar engineering are reviewed and assessed in terms of discussed or propicat icsts and hypotheses, experimental methods, to discussed in terms of defining research problems and prophate icsts and hypotheses, experimental method side studes in terms of discussed in terms of defining research propostal and deepen their understanding of the breadth of the discipline. (Offered in alternate years) Restriction(s): Instructor's signature required ENGC6*640 Advanced Biomechanical Design U (0.50) Restriction(s): Instructor's signature required ENGC6*640 Advanced Biomechanical Design of not concept through prototyping and analysis and area and prostice signals and analysis in the an engineering graduae studes or consent of instructor: Restriction(s): This course is only open to students in the engineering systems and Computing U (0.50) Restriction(s): The generging graduae stude	ENGG*6180 Final Project in Biological Engineering U [1.00]	management, rts/search techniques, dealing with uncertainty.
ENGG*6190 Special Topics in Biological Engineering U [0.50] Image: Control System State Stat	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. <i>Restriction(s):</i> This course is open only to students in the biological MEng program.	ENGG*6560 Advanced Digital Signal Processing U [0.50] Discrete-time signals and systems, z transform, frequency analysis of signals and system fourier transform, fast fourier transform, design of digital filters, signal reconstruction power spectrum estimation
A course of directed study involving selected readings and analyses in developing knowledge areas of biological engineering. ENGG*620 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*6300 Research Methods in Bioengineering are reviewed and assessed in the context of a diverse range of applications. Siomechanics, control and instrumentation, ergonomics, diagnostic tools, biomaterials and food safety. The scientific methode a coherent research proposal and deepen their understanding of the breadth of the discipline. (Offered in alternate years) Biomechanical Design from concept through prototyping and testing. This course will investigate and apply techniques used for biomechanical design including reviewed endenancial Design from concept through prototyping and testing. This course will investigate and apply techniques used for biomechanical Design including reviewed endenancial Design from concept through prototyping and testing. This course will investigate and apply techniques used for biomechanical Design including reviewers engineering, solid modelling. geometric tolerancing, testing and rapid prototyping. Instructor's signature required. ENGG*6400 Auvanced Biomechanical Design U (0.50) Network traffic modeling. Transient and steady-state analysis of Markov chains, Queueing analysis. Admission and access control. Flow control protocols. Congestion control enchiques ensistical and leaf gates and transient receiving water conditions (including in Biomechanical Segnering problems, while assignments and project will provide hands-on experime ENGG*6610 Urban Stormwater Management U (0.50) Network traffic modeling. Transient and steady-state analysis of Markov chains, Queueing analysis. Admission and access control. Flow control protocols. Congestion control engineering problems, while assignments and project will provide hands-on experime with some of the tools. E	ENGG*6190 Special Topics in Biological Engineering U [0.50]	ENCC*<570 Advanced Soft Computing U[0 50]
ENGG*6290 Special Topics in Agricultural Engineering U [0.50] A course of directed study involving selected readings and analyses in developing a knowledge areas of agricultural engineering. ENGG*6300 Research Methods in Bioengineering U [0.50] Research methodologies used in bioengineering are reviewed and assessed in the context of a diverse range of applications: biomechanics, control and instrumentation, ergonomics diagnostic tools, biomaterials and food safety. The scientific method is discussed in terms of defining research problems, appropriate tests and hypotheses, experimental methods, diactanalysis and farwing conclusions. The objective is to guide students as they develop a coherent research proposal and deepen their understanding of the breadth of the discipline. (Offreed in alternate years) ENGG*6430 Advanced Control ad uncertainty and robustness in control systems will be studied. Finally, hybrid cc. ENGG*6430 Advanced Control ad uncertainty and robustness in control systems will be created by the student. A ninvestigating and analysis of multi-input multi-output control systems will daressed. Biomechanical Design from concept through protoryping and testing. This course will har with a problem of advanced design or analysis in the angineering Systems and Computing is established by the student, an investigating analysis. Admission and access control. Flow control protocols. Congestion control. ENGG*6500 Introduction to Machine Learning U (0.50) The aim of this course is to provide students or consent of instructor. ENGG*6500 Introduction to Machine Learning U (0.50) The aim of this course is to provide students and project will provi	A course of directed study involving selected readings and analyses in developing knowledge areas of biological engineering.	Neural dynamics and computation from a single neuron to a neural network architectur
knowledge areas of agricultural engineering. Prerequisite(3): ENGG*430 or equivalent ENGG*6300 Research Methods in Bioengineering ure previewed and assessed in the context FRGG*6580 Advanced Control Systems UI (0.50) This course will start with state space analysis or multi-input multi-output control systems and for dotsers range or applications: biomechanics, control and instrumentation, espece design will be presented. After that, non linear control systems will a start with state space analysis or multi-input multi-output control systems and computing based intelligent, control and uncertainty and robustness in control systems will a discipline. (Offered in alternate years) a coherent research proposal and deepen their understanding of the breadth of the discipline. (Offered in alternate years) FRGG*6450 Final Project in Engineering Systems and Computing U [1.00] Biomechanical Design U[0.50] ENGG*6450 Queueing Theory & Traffic Modeling in Data Networks U [0.50] Restriction(s): Engineering Systems and computing. ENGG*650 Queueing Theory & Traffic Modeling in Data Networks U [0.50] Netwick traffic modelling, transient and acteady students or consent of instructor. ENGG*6500 Introduction to Machine Learning U[0.50] The aim of this course is to provide students with an introduction to algorithms and techniques of machine learning particularly in engineering applications. The engineering problems, while assignments and project will provide hands-on experience in genering structor sign and not specific approach or software tool. ENGG*6610 Urban Stormwater Management Ulo30	ENGG*6290 Special Topics in Agricultural Engineering U [0.50] A course of directed study involving selected readings and analyses in developing	representation, multi-agents and optimization.
ENGG*6300 Research Methods in Bioengineering U [0.50] ENGG*6300 Avaaced Control Systems U [0.50] This course vill state space design will be presented. After that, non linear control systems and computing based intelligent control and uncertainty and robustness in control systems will be studied. Finally, hybrid courd and analysis and food safety. The scientific method is discussed in terms of defining research proposal and deepen their understanding of the breadth of the discipline. (Offered in alternate years) ENGG*6400 Avanced Biomechanical Design U [0.50] Biomechanical Design from concept through prototyping and testing. This course is multi-input multi-output court systems and computing is established by the student, an investigati performed, and a report on the final design or solution selected is presented. ENGG*6440 Avanced Biomechanical Design U [0.50] Biomechanical Design from concept through prototyping and testing. This course is only open to students in the engineering. Systems and Computing U [0.50] Network traffic modeling. Transite and steady-state analysis of Markov chains. Queueing analysis. Admission and access control. Flow control protocols. Congestion control. ENGG*6610 Urban Stormwater Management U [0.50] Network traffic modeling. Transite and steady-state analysis of Markov chains. Queueing in course, is to provide students or consent of instructor. ENGG*6610 Urban Stormwater Management udels and model structure. Catchment discretiz and process disagregation. Pollutant temoval in sever neetworks, storage facilities and transport. Flow and policy including the polytechanic entroris of and transport. Flow and policy including to the store structure, stransverse a	knowledge areas of agricultural engineering.	Prerequisite(s): ENGG*4430 or equivalent
Research methodologies used in bioengineering are reviewed and assessed in the context of a diverse range of applications: biomechanics, control and instrumentation, ergonomics, diagnostic tools, biomaterials and food safety. The scientific method is discussed in terms of defining research problems, appropriate tests and hypotheses, experimental methods, data analysis and drawing conclusions. The objective is to guide students as they develop a coherent research proposal and deepen their understanding of the breadth of the discipline. (Offered in alternate years) <i>Restriction(s):</i> Instructor's signature required ENGG*6440 Advanced Biomechanical Design U [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*6450 Queueing Theory & Trafic Modeling in Data Networks U [0.50] Network traffic modeling. Transient and steady-state analysis of Markov chains. Queueing analysis. Admission and access control. How control protocols. Congestion control. ENGG*6610 Introduction to Machine Learning U [0.50] The aim of this course is to provide students with an introduction to algorithms and techniques of machine learning particularly in engineering approaches and their applicability to various will cover and compare all current major approaches and their applicability to various engineering, problems, while assignments and project will provide hands-on experience with some of the tools. ENGG*6510 Analog Integrated Circuit Design U [0.50] In this course, operating principles and design techniques of analog integrated circuits ENGG*6610 Introduction tone and being approaches and their applicability to various engineering problems, while assignments and project will provide hands-on experience with some of the tools.	ENGG*6300 Research Methods in Bioengineering U [0.50]	ENGG*6580 Advanced Control Systems U [0.50]
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 ENGG*640 Advanced Biomechanical Design U [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*6450 Queueing Theory & Traffic Modeling in Data Networks U [0.50] Network traffic modeling. Transient and steady-state analysis of Markov chains. Queueing analysis. Admission and access control. Flow control protocols. Congestion control. End-to-end performance bounds analysis. Restriction(s): Engineering graduate students or consent of instructor. ENGG*6500 Introduction to Machine Learning U [0.50] The aim of this course is to provide students with an introduction to algorithms and techniques of machine learning particularly in engineering applications. The emphasis will be on the fundamentals and not specific approaches and their applicability to various engineering problems, while assignments and project will provide hands-on experience with some of the tools. ENGG*6510 Analog Integrated Circuit Design U [0.50] In this course, operating principles and design techniques of analog integrated circuit period in the involuence of the tools. ENGG*6610 Environmental Contaminants: Fate Mechanisms U [0.50] Analysis of fate mechanisma associated with environmental contaminants. Focce of the paradrow to which are appearably concidend to he horardow to the paradrow to the paragraphy of the paragran	Restriction(s): Instructor's signature required	Engineering Systems and Computing is established by the student, an investigation
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The aim of this course is to provide students with an introduction to algorithms and techniques of machine learning particularly in engineering applications. The emphasis will be on the fundamentals and not specific approach or software tool. Class discussions will cover and compare all current major approaches and their applicability to various engineering problems, while assignments and project will provide hands-on experience with some of the tools. ENGG*6510 Analog Integrated Circuit Design U [0.50] In this course, operating principles and design techniques of analog integrated circuit to be been being in the principles and design techniques of analog integrated circuit to the principles and design techniques of analog integrated circuit to the principles and design techniques of analog integrated circuit to the principles and design techniques of analog integrated circuit to the principles and design techniques of analog integrated circuit to the principles and design techniques of analog integrated circuit to the principles and design techniques of analog integrated circuit to the principles and design techniques of analog integrated circuit to the principles and design techniques of analog integrated circuit to the principles and design techniques of analog integrated circuit to the principles and design techniques of analog integrated circuit to the principles and the	ENGG*6500 Introduction to Machine Learning U [0.50]	orifices, radical and leaf gates and transient receiving water conditions (including tides
techniques of machine learning particularly in engineering applications. The emphasis will be on the fundamentals and not specific approach or software tool. Class discussions will cover and compare all current major approaches and their applicability to various engineering problems, while assignments and project will provide hands-on experience with some of the tools.ENGG*6620 Water Pollution Control Planning U [0.50]ENGG*6510 Analog Integrated Circuit Design U [0.50]Methods of developing area-wide pollution control plans and sustainable use pla Ontario and elsewhere. Quantitative and non-quantitative information is examined is context of planning, using continuous models such as HSP-F. Field trips.ENGG*6510 Analog Integrated Circuit Design U [0.50]ENGG*6630 Environmental Contaminants: Fate Mechanisms U [0.50]In this course, operating principles and design techniques of analog integrated circuit being which are generally considered to be bazardous to burgans, or other at substances which are generally considered to be bazardous to burgans, or other at	The aim of this course is to provide students with an introduction to algorithms and techniques of machine learning particularly in engineering applications. The emphasis will be on the fundamentals and not specific approach or software tool. Class discussions will cover and compare all current major approaches and their applicability to various engineering problems, while assignments and project will provide hands-on experience with some of the tools.	Pollutant removal in sewer networks, storage facilities and treatment plants.
Will cover and compare all current major approaches and their applicability to various engineering problems, while assignments and project will provide hands-on experience with some of the tools. Methods of developing area-wide pollution control plans and sustainable use pla Ontario and elsewhere. Quantitative and non-quantitative information is examined is context of planning, using continuous models such as HSP-F. Field trips. ENGG*6510 Analog Integrated Circuit Design U [0.50] ENGG*6630 Environmental Contaminants: Fate Mechanisms U [0.50] In this course, operating principles and design techniques of analog integrated circuit to the planardous to humans. Focus which are conservable considered to be bazardous to humans. Focus which are conservable considered to be bazardous to humans. Focus which are conservable considered to be bazardous to humans.		ENGG*6620 Water Pollution Control Planning U [0.50]
engineering problems, while assignments and project will provide hands-on experience with some of the tools. Ontario and elsewhere. Quantitative and non-quantitative information is examined is context of planning, using continuous models such as HSP-F. Field trips. ENGG*6510 Analog Integrated Circuit Design U [0.50] ENGG*6630 Environmental Contaminants: Fate Mechanisms U [0.50] In this course, operating principles and design techniques of analog integrated circuits with an one-quantitative information is examined is context of planning, using continuous models such as HSP-F. Field trips.		Methods of developing area-wide pollution control plans and sustainable use plans
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In this course, operating principles and design techniques of analog integrated circuits Analysis of fate mechanisms associated with environmental contaminants. Focus	ENGG*6510 Analog Integrated Circuit Design U [0.50]	ENGG*6630 Environmental Contaminants: Fate Mechanisms U [0.50]
are introduced with emphasis on device and system modelling. These circuits include analog and switched-capacitor filters, data converters, amplifiers, oscillators, modulators, circuits for communications, sensor readout channels, and circuits for integrated memories. <i>Prerequisite(s):</i> ENGG*3450 or equivalent.	In this course, operating principles and design techniques of analog integrated circuits are introduced with emphasis on device and system modelling. These circuits include analog and switched-capacitor filters, data converters, amplifiers, oscillators, modulators, circuits for communications, sensor readout channels, and circuits for integrated memories. <i>Prerequisite(s):</i> ENGG*3450 or equivalent.	Analysis of fate mechanisms associated with environmental contaminants. Focus of substances which are generally considered to be hazardous to humans, or other anim life at low concentrations. Study of physicochemical properties and fate estimation of control and remediation strategies. Quantitative analysis of contaminant partitioning an mass flows, including cross-media transport and simultaneous action of contaminant fa mechanisms.
ENGG*6520 VLSI Digital Systems Design U [0.50]	ENGG*6520 VLSI Digital Systems Design U [0.50]	Inconanisms.

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 U [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.

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.

This course will introduce the principles of VLSI MOSFET digital design from a circuit

and system perspective. Advanced topics include: power issues related to each level of

design abstraction; voltage and frequency scaling; power to speed trade offs; ASIC digital

This course serves as a graduate introduction into reconfigurable computing systems. It

introduces students to the analyses, synthesis and design of embedded systems and

implementing them using Field Programmable Gate Arrays. Topics include: Programmable Logic devices, Hardware Description Languages, Computer Aided Design Flow, Hardware

Accelerators, Hardware/Software Co-design techniques, Run Time Reconfiguration,

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High Level Synthesis.

ENGG*6660 Renewable Energy U [0.50]

The engineering principles of renewable energy technologies including wind, solar, geothermal and biomass will be examined, including technology-specific design, economic and environmental constraints. Students will compare the relative merits of different energy technologies and gain a knowledge base for further study in the field.

Restriction(s): Engineering graduate students or consent of instructor.

ENGG*6670 Hazardous Waste Management U [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 U [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 U [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 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 U [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 U [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 U [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*6860 Stream and Wetland Restoration Design U [0.50]

Explores the multi-disciplinary principles of stream and wetland restoration and the tools and techniques for restoration design. Restoration design is approached from a water resources engineering perspective with emphasis on hydrological and hydraulic techniques. Numerous case studies are examined as a means to identify more successful design approaches.

Prerequisite(s): ENGG*3650 or equivalent.

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 nonstructural 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.

Restriction(s): This course is open only to students in the water resources MEng program.

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.

Restriction(s): This course is only open to students in the environmental MEng program.

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*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 Colonial, Postcolonial and Diasporic 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]

An examination of the literature of Britain in the medieval and/or early modern periods. 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.

219

ENVS*6060 Meteorological Instrumentation W [0.50] 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 Theoretical and practical aspects of electronic circuits, sensors, and equipment used in consideration of the interaction between literature and culture in the period - sometimes meteorological research. through the examination of a specific author, sometimes through the study of a particular Prerequisite(s): ENVS*4120 or equivalent genre or issue. ENVS*6190 Environmental Microbial Technology W [0.50] ENGL*6451 Topics in American Literature U [0.50] Current topics in selected areas of environmental microbial technology. An emphasis Topics may include a focus on a single region, such as the American West, on a single will be placed on the physiology and genetics of microorganisms useful in environmental time period, such as the Civil War, on a specific genre, such as the novels of frontier biotechnology. The course involves extensive use of current journal articles. (Offered in women, or other issues in American literary studies. alternate odd years.) ENGL*6611 Topics in Women's Writing U [0.50] Undergraduate degree in microbiology or related discipline. Restriction(s): In the past the course has dealt with Victorian women poets, with the place of women in ENVS*6241 Special Topics in Atmospheric Science F,U [0.25] the literature of the American West, and with other issues of interest to students of The content is determined by the interests of the students and the availability of instructors women's writing and the broader issues of feminist theory. Topics may include aspects of statistics for climatology, animal biometeorology, air ENGL*6621 Topics in Children's Literature U [0.50] pollution meteorology, and hydrometeorology. ENVS*6242 Special Topics in Atmospheric Science F,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. See ENVS*6241 ENGL*6641 Topics in Scottish Literature U [0.50] ENVS*6250 Soil Genesis and Classification F [0.50] Courses under this rubric are concerned with the various literatures produced by Scots A discussion of world soil regions for students not specializing in soil genesis. both within and beyond the boundaries of Scotland. The course could involve the study ENVS*6280 Soil Physics W [0.50] of a specific genre, the investigation of a specific theme, or the examination of a particular author over the course of her/his career. 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 ENGL*6691 Interdisciplinary Studies U [0.50] will be developed. Designed to provide the opportunity to explore alternative fields and modes of critical ENVS*6340 Colloquium in Insect Systematics W [0.25] 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 Weekly discussions and seminars dealing with current topics in systematic entomology sociology, between critical theory and psychology, between literary history and historical (Offered in alternate odd years according to demand) fact. ENVS*6350 Soil Organic Matter and Biochemistry F [0.50] ENGL*6801 Reading Course I U [0.50] (1) Soil organic matter characterization, (2) dynamics of soil organic matter, (0.5) nutrient An independent study course, the nature and content of which is agreed upon between cycling. Offered in odd-numbered years. the individual student and the person offering the course. Subject to the approval of the ENVS*6360 Soil and Water Chemistry F [0.50] student's advisory committee and the graduate committee. Thermodynamics of soil solutions; solution-solid phase equilibria; reaction kinetics; ENGL*6802 Reading Course II U [0.50] computer modelling of solute-mineral interactions. An independent study course, the nature and content of which is agreed upon between ENVS*6380 Advanced Soil Chemistry W [0.50] the individual student and the person offering the course. Subject to the approval of the student's advisory committee and the graduate committee. The mathematical development of solute speciation models for aqueous solutions, surface complexation models for inorganic soil constituents and descrete and continuous functional ENGL*6803 Research Project U [1.00] group models for humic materials. An independent study course, the content of which is agreed upon between the individual ENVS*6400 Soil Nitrogen Fertility and Crop Production W [0.50] 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 Emphasis will be placed on soil N transformations and processes, and N sources for with the opportunity to conduct an extended research project that, while not as complex crops; field experimentation methods; environmental issues. or as extensive as a thesis, still provides the student with training in research methodology. ENVS*6440 Field Sampling Strategies and Geostatistics W [0.50] ENGL*6811 Special Topics in English U [0.50] Concepts and practical aspects of collecting, synthesizing and interpreting data from Depending on the research interests of the instructor, courses under this rubric explore spatially and temporally variable and/or correlated fields. Hands-on experience in topics in the study of literature that do not fall neatly under the rubrics above. In the past describing spatial structure of large data sets (supplied by student or instructor) using the course has dealt with literature and aging, and with issues in the field of popular available software. Offered in even-numbered years. culture. ENVS*6451 Special Topics in Environmental Biology F,W,S [0.25] **Environmental Sciences** This course provides graduate students, either individually or in groups, with the opportunity to pursue topics in the major areas of departmental specialization such as ENVS*6000 Physical Environment of Crops and Forests F [0.50] plant protection, entomology, and environmental management. This course may be offered Recent literature on temperature, humidity, radiation, wind, gases and particles in crop in any of lecture, reading/seminar, or individual project formats. and forest environments; evapotranspiration and photosynthesis of plant communities; ENVS*6452 Topics in Environmental Biology F,W,S [0.50] modification of microclimates; applied micrometeorology. Offered in even-numbered See ENVS*6451 vears. ENVS*6040 Molecular Basis of Plant-Microbe Interactions F [0.50] ENVS*6500 Environmental Sciences Research Project U [1.00] A concise, critical review of an area of study related to the field chosen by the student 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 including analyses and interpretation of relevant data. The project will be written in the form of a scientific paper and presented to the department as a seminar. 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. Restriction(s): Available only to students registered in the Environmental Sciences: MES program. Credit may be obtained for only one of ENVS*6040 or PBIO*4000 Restriction(s): ENVS*6501 Advanced Topics in Environmental Science F [0.50] ENVS*6050 Micrometeorology W [0.50] Using a case-study approach with material drawn from current and historical issues, 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 students will develop an advanced understanding of current issues in environmental sciences, including the underlying science basis, how the issues was managed, and the above plant canopies will be examined from theoretical and practical perspectives. Topics effectiveness of associated policies. include time-series analysis, micrometeorological measurement theory, and basic principles of atmospheric science. Offered in even-numbered years.

ENVS*6502 Seminar in Environmental Sciences W [0.50]

This course will provide an interactive and critical forum for students to participate in an advanced discussions and debate on current environmental issues, and to learn about the practical skill set(s) required by various employment sectors in solving these issues.

ENVS*6503 Biogeochemistry of Wetlands S [0.50]

A two-week course covering concepts and techniques related to the geology and geomorphology of the southern Ontario landscape. Focus will be given to the characterization and interpretation of geology and Earth materials and their influence on soil and water processes at the landscape level.

ENVS*6504 Classification and Assessment of Aquatic Systems S [0.50]

A two-week course covering concepts and techniques related to the physiographical, hydrological, and biological characterization of aquatic systems. The course will involve periodic excursions to regional water bodies in southern Ontario for the purpose of demonstrating sampling techniques and conducting biological assessments.

ENVS*6505 Soil Survey and Interpretation S [0.50]

A two-week course covering concepts and techniques related to the characterization of soil in the landscape. Focus will be given to soilscapes encountered in southern Ontario, and involves a multi-day excursion to examine the distribution of soils in this region.

ENVS*6506 Forest Ecosystems Patterns and Processes S [0.50]

A two-week course covering concepts and techniques related to the ecological characterization of forests. Focus will be on southern and mid-central Ontario forests and will involve periodic excursions to various locations for the purpose of demonstrating theoretical principles, sampling techniques, in-field measurements, and collecting samples for in-lab assessment and metric determination.

ENVS*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.)

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

Concepts associated with integrated pest management of insect pests of various plant hosts will be introduced to students in an interactive lecture and laboratory format. Experiential learning and skill development, associated with economic entomology, will also be emphasized. (Offered in alternate even years.)

Restriction(s): Credit may be obtained for only one of ENVS*6540 and ENVB*4100

ENVS*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). Students in this course are expected to attend the lectures for ENVS*4240.

ENVS*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.

ENVS*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.

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

See ENVS*6581

ENVS*6700 Glacial Sedimentary Environments U [0.50]

Students will learn about the processes and deposits of glacial environments as well as the use of sedimentary records to reconstruct past glacial environments. Case studies from modern to ancient glacial seimentary environments will be used. Field trip included. (Offered only as needed)

ENVS*6710 Advanced Sedimentology U [0.50]

Topics covered through case studies of sedimentary deposits and environments include facies analysis, large scale controls, and novel techniques in sedimentology. Topics may also include specific sedimentary environments or specific sedimentary deposits such as turbidites, cross-bedded strata or seismites depending on student interest. (Offered only as needed)

ENVS*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.

ENVS*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.

ENVS*6882 Special Topics in Land Resources Management U [0.50] See ENVS*6881

ENVS*6900 Seminar F-W [0.25]

This course provides information and training in scientific presentations. Students will prepare a written essay based on their research and make an oral presentation of the proposed studies. Students are expected to take this course in their second or third semester of study.

European Studies

EURO*6000 Research Methods F [0.50]

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

EURO*6010 European Identities W [0.50]

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

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

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

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

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

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

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

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

This course examines the contributions of international relations, comparative politics and/or governance/public policy to the study of European integration and the EU. Students will learn about the major concepts and theories of these sub-disciplines of political science to analyze the development, institutions, policy processes, policies and politics of the EU.

EURO*6070 Topics in Comparative European Culture I U [0.50]

An examination of a topic, period, or region in any aspect of European culture. The content of the course will vary according to the topic and the professor teaching the course at any given time. It will also differ from the content of Topics in Comparative European Culture II.

EURO*6072 Topics in Comparative European Culture II U [0.50]

An examination of a topic, period, or region in any aspect of European culture. The content of the course will vary according to the topic and the professor teaching the course at any given time. It will also differ from the content of Topics in Comparative European Culture I.

EURO*6080 Directed Reading Course F,W,S [0.50]

An independent reading project carried out by the student under the supervision of a European Studies graduate faculty member.

EURO*6100 Research Project U [1.00]

This research project will result in a major paper of about 12,000 words. The student chooses a topic with the guidance of a faculty member. The topic must be approved by the Graduate Committee.

Family Relations and Applied Nutrition

FRAN*6000 Research Methods F [0.50]

This course includes critical appraisal of the research literature. Research ethics, subject selection, measurement issues, survey design, experimental and quasi-experimental designs, cross-sectional and longitudinal designs, scale development, questionnaire development and sampling strategies are discussed.

FRAN*6010 Applied Statistics F [0.50]	FRAN*6180 Research Issues in Couple and Family Therapy F [0.50]
Students will learn conceptual and practical applications of statistical analyses with	The focus of this course is on research in Couple & Family Therapy, including issues
emphasis on hypothesis formation, data screening, test selection, inferential statistics,	related to evidence-based practice, therapeutic outcome, and therapeutic process. A
designs), simple and multiple regression, logistic regression, regression diagnostics	is included (Offered in alternate years)
model building and path analytic techniques.	$P_{\text{setulation}}(a)$, Available to EDAN another students only
Co-requisite(s): FRAN*6000	
Restriction(s): Instructor consent required for non-FRAN students	FRAN*6200 Special Topics in Family Relations and Human Development U [0.50]
FRAN*6020 Qualitative Methods W [0.50]	Contemporary research in family relations and human development. Research topics vary
This course teaches students how to use qualitative methods as a mode of inquiry for	Restriction(s): Instructor consent required for non-FRAN graduate students
understanding issues in human development, nutrition and family relationships. The	FDAN*6210 Program Evaluation II [0.50]
emphasis is on project design, data collection techniques, analysis strategies and	An examination of the theoretical principles and practical applications of evaluation
procedures for final write-up.	issues and strategies. Special attention is given to services for children and families across
FRAN*6070 Sexual Issues and Clinical Interventions Across the Life Span S [0.50]	the life span. (Offered in alternate years.)
This course examines sexual issues and clinical interventions from a life span perspective.	FRAN*6221 Evidence-Based Practice and Knowledge Translation U [0.50]
between issues in sexual development and sexual functioning. This course is offered in	The principles of evidence-based practice are examined using various examples of
a one-week intensive format in coordination with the Guelph Sexuality Conference.	psychosocial, behavioural and health interventions. The levels of evidence, criteria for
<i>Restriction(s):</i> Signature required.	efficacy and effectiveness, and the importance and limitations of evidence-based practice
FRAN*6080 Special Topics in Couple and Family Therapy U [0.50]	will be evaluated. The process of moving knowledge derived from high quality evidence into practice will be appraised throughout the course. Students will have the opportunity
This graduate seminar will feature research and practice issues in selected areas pertinent	to build knowledge in their own areas of interest. (Offered in alternate years.)
to the field of Couple and Family Therapy. Selected topics may vary from offering to	FRAN*6260 Practicum in Family Relations and Human Development U [0.50]
	Supervised practicum experience in a variety of agencies or services. Interested students
FRAN*6090 Practicum in Couple and Family Therapy* U [0.50]	are encouraged to discuss this option with their faculty advisor. Placements are arranged
This course features supervised clinical practice in couple and family therapy. It involves	on an individual basis subject to the requirements of students' programs of study and
each week for up to six hours of supervision. Supervision over the semester will involve	must be negotiated with faculty in advance of registration.
both group and individual/dyadic meetings.	Restriction(s): Available to FRAIN graduate students only.
<i>Restriction(s):</i> Available only to students in the Couple and Family Therapy program	FRAN*6270 Issues in Family-Related Social Policy U [0.50]
FRAN*6095 Externship in Couple and Family Therapy S [0.50]	This course investigates definitions of social policy, comparative family-related social
This is an advanced clinical practicum in Couple and Family Therapy. Students are placed	policy, selected issues in canadian rainity policy and nameworks for analysis of social policy. Issues in policy-related research are also explored. (Offered in alternate years.)
in a community agency where they accumulate 10-15 hours per week (over 3 days) of	EDAN*6280 Theorizing in Family Polations and Human Davalanment II [0.50]
direct clinical contact time. All clinical work is supervised by a clinical supervisor on	An avamination of the meaning of science and theory in relation to the study of families
site. Travel to the community agency is usually required.	and human development. Included is a discussion of the major social science paradigms
Prerequisite(s): FRAN*6090 Restriction(s): Available only to students in the Couple and Family Therapy field of	including positivism, critical theory, social constructionism and post-modernity. This
study	course is designed for doctoral students. (Offered in alternate years.)
FRAN*6100 Clinical Issues in Couple and Family Therapy* U [0.50]	FRAN*6310 Family Relationships Across the Life Span U [0.50]
This course is taken four times in the two year program of study. Each offering features	Considers theory and research on family and social relationships across the life span.
selected clinical issues; examination of each issue will include the socio-cultural context,	Examples may include: parent-child, sibling, grandparent, couples, etc. (Offered in
theoretical location, and conceptual and practical implications for couple and family	alternate years.)
therapy.	FRAN*6320 Human Sexuality Across the Life Span U [0.50]
<i>Restriction(s):</i> Available only to students in the Couple and Family Therapy field of	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 are sexual assault international research and
FRAN*6120 Theories and Methods of Family Therapy I W [0.50]	sex education. (Offered in alternate years.)
and family therapy beginning with family systems therapy, through intergenerational	FRAN*6330 Research Seminar U [0.25]
models, to current constructionist approaches. Intervention methods consistent with these	Research literature in Family Relations and Human Development. Registration for this
models, to current constructionist approaches. Intervention methods consistent with these conceptual frameworks are examined. (Offered in alternate years.)	Research literature in Family Relations and Human Development. Registration for this course occurs in semester 5 for MSc students and semester 7 for PhD students. Thesis
 models, to current constructionist approaches. Intervention methods consistent with these conceptual frameworks are examined. (Offered in alternate years.) FRAN*6130 Theories and Methods of Family Therapy II F [0.50] 	Research literature in Family Relations and Human Development. Registration for this course occurs in semester 5 for MSc students and semester 7 for PhD students. Thesis students attend weekly seminars in each of the Fall and Winter semesters of their program of study.
models, to current constructionist approaches. Intervention methods consistent with these conceptual frameworks are examined. (Offered in alternate years.) FRAN*6130 Theories and Methods of Family Therapy II F [0.50] This course explores clinical theory and methods associated with structural, strategic and the structural structural strategic and the structural strategic and the structural structural strategic and the structural	Research literature in Family Relations and Human Development. Registration for this course occurs in semester 5 for MSc students and semester 7 for PhD students. Thesis students attend weekly seminars in each of the Fall and Winter semesters of their program of study.
models, to current constructionist approaches. Intervention methods consistent with these conceptual frameworks are examined. (Offered in alternate years.) FRAN*6130 Theories and Methods of Family Therapy II F [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 avamine power and conder duemings in therapy (Offered in a structural).	Research literature in Family Relations and Human Development. Registration for this course occurs in semester 5 for MSc students and semester 7 for PhD students. Thesis students attend weekly seminars in each of the Fall and Winter semesters of their program of study. <i>Restriction(s):</i> Available to FRAN graduate students only.
 models, to current constructionist approaches. Intervention methods consistent with these conceptual frameworks are examined. (Offered in alternate years.) FRAN*6130 Theories and Methods of Family Therapy II F [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. (Offered in alternate years.) 	Research literature in Family Relations and Human Development. Registration for this course occurs in semester 5 for MSc students and semester 7 for PhD students. Thesis students attend weekly seminars in each of the Fall and Winter semesters of their program of study. <i>Restriction(s):</i> Available to FRAN graduate students only. FRAN*6340 Interdisciplinary Perspectives in Family Relations and Human Development W [0.50]
models, to current constructionist approaches. Intervention methods consistent with these conceptual frameworks are examined. (Offered in alternate years.) FRAN*6130 Theories and Methods of Family Therapy II F [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. (Offered in alternate years.) FRAN*6140 Professional Issues U [0.50]	Research literature in Family Relations and Human Development. Registration for this course occurs in semester 5 for MSc students and semester 7 for PhD students. Thesis students attend weekly seminars in each of the Fall and Winter semesters of their program of study. <i>Restriction(s):</i> Available to FRAN graduate students only. FRAN*6340 Interdisciplinary Perspectives in Family Relations and Human Development W [0.50] This course acquaints students with the diverse disciplinary perspectives used in the study
models, to current constructionist approaches. Intervention methods consistent with these conceptual frameworks are examined. (Offered in alternate years.) FRAN*6130 Theories and Methods of Family Therapy II F [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. (Offered in alternate years.) FRAN*6140 Professional Issues U [0.50] An exploration of ethics in couple and family therapy: legal issues in the practice of	Research literature in Family Relations and Human Development. Registration for this course occurs in semester 5 for MSc students and semester 7 for PhD students. Thesis students attend weekly seminars in each of the Fall and Winter semesters of their program of study. <i>Restriction(s):</i> Available to FRAN graduate students only. FRAN*6340 Interdisciplinary Perspectives in Family Relations and Human Development W [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
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study.

Restriction(s): Available only to students in the Couple and Family Therapy field of study

May 13, 2014

FRAN*6370 Social Development During Childhood and Adolescence U [0.50]	FRAN*6750 Final Project in Applied Human Nutrition S,F,W [0.50]
A detailed study of factors important to social development and competence from infancy through adolescence. (Offered in alternate years.)	This supervised project includes a written report and oral presentation of an applied research project or a proposal for a research project, consisting of a literature view,
FRAN*6410 Developmental Assessment and Intervention in Childhood and Adolescence U [0.50]	purpose, methodology, and analysis plan. Students register in and work on the project for 3 consecutive semesters.
An examination of psychological difficulties encountered in childhood and adolescence.	Restriction(s): For MAN students only.
Special attention will be given to theoretical models used to explain childhood difficulties,	Food, Agricultural and Resource Economics
issues specific to working with children and adolescence. (Offered in alternate years.)	FARE*6100 The Methodologies of Economics W [0.50]
FRAN*6440 Applied Factor Analysis & Structural Equation Modelling U [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
This course introduces students to exploratory factor analysis, confirmatory factor analysis, and structural equation modeling. Topics include: model selection and validation, multiple group models, manufactor to analysis, and structural equation modeling.	investigated. FARE*6140 Major Paper in Food, Agricultural and Resource Economics U [1.00]
is data-driven and students will learn through hands-on analytic experiences accompanied	The major paper is an option only available to MSc students registered in the course-based
by in-class lectures and readings. (Offered in alternate years)	option master program. An original research project related to the specialization of choice
Prerequisite(s): FRAN*6000, FRAN*6010	in food, agricultural and resource economics will be undertaken. The project will include
Restriction(s): Instructor consent required for non-FRAN students	preparation of a written paper and an oral presentation of the findings to the faculty.
FRAN*6510 Nutrition in the Community W [0.50]	<i>Restriction(s):</i> Restricted to students in the course-based MSc program in FARE
Concepts and knowledge of nutrition as applied in community and public health nutrition.	FARE*6380 Applied Microeconomics for Agricultural Economists F [0.50]
Examination of current programs in applied nutrition.	The objective of this course is to foster a deeper understanding of standard microeconomic concepts and their application to a wide veriety of tonics in food, agricultural, and resource
<i>Restriction(s):</i> Instructor consent required for non-FRAN students.	economics. Emphasis is placed on what tool(s) to use in a wide variety of circumstances
FRAN*6550 Research Seminar U [0.25]	to address real life problems. Topics will include decisions by firms and consumers,
Research literature in applied nutrition. Registration for this course occurs in semester 5 for MSc students and semester 7 for PhD students. Students attend workly semicors in	market equilibrium, and production decisions.
each of the Fall and Winter semesters of their program of study.	<i>Prerequisite(s):</i> ECON*2770 or equivalent, ECON*2310 or equivalent, ECON*3740 or equivalent
FRAN*6560 Special Topics in Applied Human Nutrition U [0.50]	FARE*6400 Advanced Topics in Agricultural Economics S [0.50]
Contemporary research and special topics in applied human nutrition. Course content is unique to each offering. Instructor consent required for non FRAN graduate students.	The application of economic theory and various contemporary tools of economic analysis in solving production problems in the agricultural sector of the economy.
FRAN*6610 Advances in Clinical Nutrition/Assessment I F [0.50]	FARE*6600 Food Security and the Economics of Agri Food Systems in Developing
An advanced overview of nutritional assessment and clinical nutrition with emphasis on	Countries F [0.50]
issues relevant to community based and non-acute care settings. Nutrition assessment	The aim of this course is to understand the nature of food security in developing countries
nutrition will be integration of theory and practice.	and relations with the economic performance of the agri food system. Towards this aim,
<i>Restriction(s)</i> : Instructor consent required for non-FRAN students	its importance as a source of livelihood and as a driver of overall processes of economic
FRAN*6620 Nutritional Epidemiology W [0.50]	development.
An investigation of selected non-communicable diseases. The emphasis is on	Prerequisite(s): ECON*1050 or equivalent, ECON*1100 or equivalent
epidemiologic methods and identification of nutritional risk factors. (Offered in alternate	FARE*6720 Readings in Agricultural Economics F,S,W [0.50]
years.)	A reading course on selected topics of special interest. May be offered to individual
FRAN*6710 Practicum in Applied Human Nutrition I F [1.50]	students or to groups of students in any semester.
This course provides a practicum of 3 days per week with a dietetic-related agency or	FARE*6800 Seminar in Agricultural Economics U [0.00]
organization to develop and perform dietetic competencies (internship experience). In weekly seminars, students discuss and reflect on theory and dietetic practice issues	Students in the MSc program must give two presentations at the annual MSc research
Restriction(s): For MAN students only	vear on their thesis research results.
FRAN*6720 Practicum in Applied Human Nutrition II W [1.50]	FARF*6910 Applied Policy Applysis I W [0 50]
This course provides a practicum of 3 days per week with a dietetic-related agency or	An overview of domestic and international agrifood policies and an introduction to the
organization to develop and perform dietetic competencies (internship experience). In	concepts and methods used to evaluate domestic trade policies.
weekly seminars, students discuss and reflect on theory and dietetic practice issues	Prerequisite(s): FARE*6380
Prerequisite(s): FRAN*6710 Restriction(s): For MAN students only.	FARE*6920 Applied Policy Analysis II U [0.50]
FRAN*6730 Practicum in Applied Human Nutrition III S [1.50]	A presentation and evaluation of advanced quantitative agrifood policy models and selected special topics related to domestic and trade policy evaluation
This course provides a practicum of 3 days per week with a dietetic-related agency or	Prerequisite(s): AGEC*6910 or FARE*6910 or equivalent
organization to develop and perform dietetic competencies (internship experience). In weekly seminars, students discuss and reflect on theory and dietetic practice issues.	Co-requisite(s): ECON*3710
Prerequisite(s): FRAN*6720	FARE*6930 Food Firms, Consumers and Market I F [0.50]
Restriction(s): For MAN students only.	This course examines the application of microeconomic theory to food markets. Topics
FRAN*6740 Foodservice Management in Healthcare W [0.50]	model and decision making under risk, optimal capital replacement models and their
Students will critically assess and integrate foodservice management literature and theories	application to food system economics, consumer behaviour with respect to food products
to address the multifactorial issues in foodservice operations in healthcare. Case studies	and behaviour with respect to food products and behaviour of marketing intermediaries
evaluation of the literature.	(Offered in alternate years.)
<i>Restriction(s):</i> Instructor consent required for non-FRAN students.	<i>Prerequisite(s):</i> ECON*2310 or equivalent, ECON*3740 or equivalent
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FARE*6940 Food Firms, Consumers and Markets II U [0.50]

This course builds on Food Firms, Consumers and Markets I by extending the breadth and depth of student's understanding and scope of economic analysis. Advanced techniques in producer and consumer theory, as well as advance market analysis techniques are presented and utilized. Understanding of the research process and advanced methods is emphasized throughout.

Prerequisite(s): AGEC*6930 or FARE*6930

FARE*6950 Natural Resource Economics I W [0.50]

Natural Resources I introduces conventional theoretical modeling approaches to renewable resources, e.g. fisheries & forestry. Seminal theoretical literature is discussed. Emphasis is placed on setting up economic models, deriving and interpreting general results. Applied methods include dynamic optimization and regression analysis. Additional topics include Land Economics and the property rights approach.

Prerequisite(s): FARE*6380

FARE*6960 Natural Resource Economics II U [0.50]

Natural Resources II reviews & extends conventional theoretical modeling approaches to renewable resources, e.g. fisheries & forestry. Seminal literature is reviewed and contemp. theoretical work and empirical papers discussed. Emphasis on extending economic models addressing natural resource issues - uncertainty, externalities & policy instruments, and derive reduced-form versions of forestry & fishery for empirical estim. & analysis. Primary method of math analysis involves dyn. opt. techniques. Detailed math derivations & proofs expected. Also- extinction, climate change, carb sequest.

Prerequisite(s): AGEC*6950 or FARE*6950

FARE*6970 Applied Quantitative Methods for Agricultural Economists F [0.50]

This course exposes students to the empirical tools agricultural economists use when conducting research. Emphasis is placed on what tool(s) to use in a variety of circumstances. Topics covered will include advanced econometric techniques, optimization and simulation modelling. Students will also be exposed to the different quantitative software packages used in empirical research.

Prerequisite(s): ECON*3740 or equivalent and ECON*2770 or equivalent

FARE*6980 Agricultural Trade Relations W [0.50]

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

Prerequisite(s): One of AGEC*6910 or FARE*6910

Food Safety and Quality Assurance

FSQA*6000 Food Safety and Quality Assurance Seminar S,F [0.50]

Provides experiential training in forms of communication that are likely to be required in professional or academic careers in food science and technology.

Restriction(s): This course is open only to students in the MSc FSAQ program.

FSQA*6100 Food Law and Policy F [0.50]

The fundamentals of food policy development and Canadian and international food law are learned and practiced through online presentations, independent study and online interactions with other students and industry professionals.

Restriction(s): Offered by distance education only.

FSQA*6150 Food Quality Assurance Management W [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.

Restriction(s): Offered by distance education only.

FSQA*6200 Food Safety Systems Management W [0.50]

Food safety systems are studied in four modules. (1) A brief review of plant hygiene and HACCP principles. Students with insufficient background will do supplemental study in these areas; (2) HACCP implementation and verification; (3) HACCP-based food safety programs in Canada; and (4) International Food Safety Management Systems.

Restriction(s): Offered by distance education only.

FSQA*6500 Food Safety and Quality Assurance Research Project S,F,W [1.00]

An original research project related to food safety and quality assurance which includes the preparation of a written report suitable for publication and an oral presentation of the findings to the graduate faculty.

FSQA*6600 Principles of Food Safety and Quality Assurance S,F [0.50]

An integrated approach to factors affecting food safety and quality including microbial and chemical contamination is provided. Major food-borne disease outbreaks are studied as examples. Modern methods of quality management to minimize contamination of processed foods is discussed.

Restriction(s): Offered by distance education only.

Food Science

FOOD*6190 Advances in Food Science U [0.50]

Topics of current research interest and importance are examined. A project supervised by a faculty member is undertaken, the topic of which is chosen after considering the interests of the student.

FOOD*6300 Food Science Communication U [0.50]

This course provides experiential training in forms of communication that are likely to be required in professional or academic careers in food science and technology.

Restriction(s): This course is only open to students in the MSc Food or PhD Food programs.

FOOD*6710 Special Topics in Food Chemistry U [0.25]

This is a modular course in which several faculty members lecture and/or lead discussions in current topics in food chemistry. Students will complete an independent review in the area of food chemistry, participate in discussions, complete case studies, and present talks related to food chemistry.

FOOD*6720 Special Topics in Food Microbiology U [0.25]

This is a modular course in which several faculty members lecture and/or lead discussions in current topics in food microbiology. Students will complete an independent review in the area of food microbiology, participate in discussions, complete case studies, and present talks related to food microbiology.

FOOD*6730 Special Topics in Food Physics U [0.25]

This is a modular course in which several faculty members lecture and/or lead discussions in current topics in food physics. Students will complete an independent review in the area of food physics, participate in discussions, complete case studies, and present talks related to physics in foods.

FOOD*6740 Special Topics in Food Processing U [0.25]

This is a modular course in which several faculty members lecture and/or lead discussions in current topics in food processing. Students will complete an independent review in the area of food processing, participate in discussions, complete case studies, and present talks related to conventional and emerging methodologies for the processing of foods.

FOOD*6750 Special Topics in Food for Health U [0.25]

This is a modular course in which several faculty members lecture and/or lead discussions in current topics in food for health. Students will complete an independent review in the area of food and health, participate in discussions, complete case studies, and present talks related to the impact of food for health.

FOOD*6760 Special Topics in Food Quality U [0.25]

This is a modular course in which several faculty members lecture and/or lead discussions in current topics in food quality. Students will complete an independent review in the area of food quality, participate in discussions, complete case studies, and present talks related to quality of foods.

French

FREN*6000 Research Methods Seminar F [0.50]

This course will introduce students to the field and research methods of various disciplines and of interdisciplinary studies, and it will familiarize them with field-relevant research skills and methodologies.

FREN*6020 Topics in French Literature U [0.50]

This course will focus on European French literature in relation to thematic approaches including: gender and feminism, transgression, (post)colonialisms, identity and alterity.

FREN*6021 Topics in Quebec and French-Canadian Literatures W [0.50]

This course will focus on how literature functions as a socio-political institution in Quebec and in French Canada. It will also deal with elements that relate more broadly to identity, reception theory and semiotics.

FREN*6022 Topics in Caribbean and African Literatures F [0.50]

This course focuses on the works of major Francophone African and Caribbean fictional and theoretical works with particular attention being given to links between notions of cultural hierarchies, identity, métissage and creolization.

FREN*6030 Topics in Translation U [0.50]

This course deals with various aspects of literary translation, including theories of translation, the role of reading in translation, the active translation of a text from English into French, and the reflection upon the influence of each of these categories on the others.

224	Appendix A - Courses, Geography
FREN*6031 Topics in Intermediality U [0.50]	GEOG*6450 Development Geography U [0.50]
An investigation of the intersection of artistic expression taking place in literature, theatre, film, television and new media and the various effects produced by the interaction of two	Group identities at various scales in relation to concepts of territory and territoriality, and their changing impact on the world's political map. (alternate years)
or more media.	GEOG*6550 Environmental Modelling W [0.50]
FKEN*6041 Topics in French and French-Canadian Sociolinguistics W [0.50] This course will allow students to explore, within the framework of sociolinguistics and applied linguistics, the relationship between language and society, with particular reference to French and the French-speaking world.	This course aims to provide students with an understanding of the processes and techniques involved in environmental modeling practice and will focus on the power and limitations of existing models.
FREN*6042 Topics in FSL Pedagogy U [0.50]	GEOG*6610 Global Hydrology F [0.50]
This compulsory course covers theories, methods, and real-life applications of the teaching/learning of a second language, specifically French.	subsurface water and runoff. Physical processes, measurement, analytical techniques and modelling strategies will be considered in the context of global change.
FREN*6050 Reading Course S [0.50]	History
An independent study course, the nature and content of which is agreed upon between the student and the professor offering the course. Subject to the approval of the graduate	HIST*6000 Historiography I F [0.50]
coordinator.	This course will introduce students to some of the essential components of the historical
FREN*6051 Major Research Paper U [0.50]	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
This independent, required course allows students to pursue research in an area of particular interest to them in the field of French Studies. A compulsory major paper 40	extend from ancient times to the eve of World War I, emphasis will be placed on 19th-century historiography.
pages in length will be required.	HIST*6020 Historiography II W [0.50]
FREN*6053 Practicum in French Studies S 10.501	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 theorem.
This course will allow students to engage in volunteer service in a francophone	proposal.
community. Students will be asked to forge links between knowledge acquired in the	HIST*6040 Special Reading Course U [0.50]
community partners will be provided.	Students selecting this course should speak to individual instructors to arrive at appropriate topics
Prerequisite(s): FREN*6000 and FREN*6042	HIST*6140 Topics in British History Since 1688 U [0.50]
Geography	Although topics vary with the expertise of individual instructors, this course encompasses
GEOG*6060 Special Topics in Geography S,F,W [0.50]	the British Isles.
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.	HIST*6141 British History Research U [0.50]
Restriction(s): Instructor's signature required	Continuation of HIS1*6140 in which students prepare an indepth research paper based on primary sources.
GEOG*6090 Geographical Research Methods I F [0.50]	HIST*6150 Scottish Archival Research U [0.50]
A review of philosophies and research methods in geography. The development and presentation of a context paper for the thesis or research project.	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
GEOG*6091 Geographical Research Methods II W [0.50]	students to basic skills in the digitization of sources and teach competence in conservation, record creation and archival research
A review of philosophies and research methods in geography. The development and presentation of a research proposal for the thesis or research project.	<i>Restriction(s):</i> Student numbers are limited by the number of placements available in the University Archives.
Prerequisite(s): GEOG*6090	HIST*6190 Topics in Scottish History I U [0.50]
A review of 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).	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.
GEOG*6180 Research Project in Geography S.F.W [1.00]	HIST*6191 Scottish History I Research U [0.50]
The preparation and presentation of a report on the research project approved in GEOG*6090.	Continuation of HIST*6190 in which students prepare an indepth research paper based on primary sources.
Restriction(s): Instructor's signature required	HIST*6200 Topics in Scottish History II U [0.50]
GEOG*6281 Environmental Management and Governance F [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
Analysis, evaluation and management of environmental resources. Emphasis is on biophysical and socio-economic concepts and methods which offer a more comprehensive	involving manuscripts in the University Archives.
and integrative basis for environmental decisions.	HIST*6201 Scottish History II Research U [0.50]
GEOG*6330 Biotic Processes and Biophysical Systems U [0.50]	on primary sources.
of plant and animal communities and of approaches to biophysical systems analysis,	HIST*6230 Canada: Culture and Society U [0.50]
focusing on environmental system interaction at the landscape scale.	A course that examines the current historiography of selected aspects of Canadian history.
GEOG*6340 Human-Environment Relations W [0.50]	HIST*6231 Canada: Culture and Society Research U [0 50]
management of systems involving the interaction of environmental processes and human spatial activity.	Continuation of HIST*6230 in which students prepare an indepth research paper based on primary sources.
GEOG*6400 Urbanization and Development U [0.50]	HIST*6280 Canada: Community and Identity 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. (alternate years)	A course that examines the current historiography of selected aspects of Canadian history. Topics will vary with the expertise of individual instructors.

HIST*6281 Canada: Community and Identity Research U [0.50]	HIST*6501 Global History Research U [0.50]
Continuation of HIST*6280 in which students prepare an indepth research paper based on primary sources.	Continuation of HIST*6500 in which students prepare an indepth research paper based on primary sources.
HIST*6290 Topics in North American History U [0.50]	HIST*6520 Topics in Latin 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.	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*6291 North American Research U [0.50]	HIST*6521 Latin American Research U [0.50]
Continuation of HIST*6290 in which students prepare an indepth research paper based on primary sources.	Continuation of HIST*6520 in which students prepare an indepth research paper based on primary sources.
HIST*6300 Topics in Modern Europe I U [0.50]	HIST*6540 Topics in South Asian History 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.	Topics in South Asian History will examine the history and historiography of imperialism and nationalism in India from 1757 to 1947.
HIST*6301 Modern Europe I Research U [0.50]	HIST*6541 South Asian History Research U [0.50]
Continuation of HIST*6300 in which students prepare an indepth research paper based on primary sources.	continuation of HIS1*6540 in which students prepare an indepth research paper based on primary sources.
HIST*6310 Topics in Modern Europe II U [0.50]	HIS 1 * 7000 Protessional Development Seminar U [0.00]
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	All doctoral students attend the professional development seminar in their first year of the program. The seminar is designed to prepare students for success as a PhD student for their future careers.
or the faculty and the interest of the students.	HIST*7010 Qualifying Examination U [0.50]
HIST*6311 Modern Europe II Research U [0.50] Continuation of HIST*6310 in which students prepare an indepth research paper based on primary sources.	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*6350 History of the Family U [0.50]	HIST*7030 Language Requirement U [0.00]
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	A written demonstration of the student's knowledge of written French (or other appropriate second language).
authority (both formal and informal).	HIST*7040 Major Field U [0.50]
HIST*6351 Family History Research U [0.50] Continuation of HIST*6350 in which students prepare an indepth research paper based	The examination written following completion of the major field seminar and before the oral qualifying examination.
	HIST*7070 Thesis Proposal U [0.00]
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.	A written (up to 2,000 words, including citations) and oral demonstration of the proposed dissertation. The proposal will include a statement of the overall thesis of the dissertation, a description/discussion of the major research question(s), a review of the principal primary/archival sources being used, a chapter or topic outline, and a clear explanation of the originality of the thesis. Graded SAT/UNS.
HIST*6361 Sexuality History Research U [0.50]	Restriction(s): For PhD students only.
Continuation of HIST*6360 in which students prepare an indepth research paper based on primary sources.	HIST*7080 Colloquium U [0.00] The colloquium is a public presentation of original research, normally a chapter, significant
HIST*6370 Topics in Cultural History U [0.50]	portion, or summary of the student's thesis. Graded SAI/UNS.
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	Restriction(s): For PhD students only.
war, empire, gender, class, 'race', ethnicity, the environment, and consumption.	HIS1*/100 Canadian History Major Seminar U [1.00]
HIST*6371 Cultural History Research U [0.50]	HIST*7120 Scottish History Major Seminar U [1.00]
Continuation of HIST*6370 in which students prepare an indepth research paper based on primary sources.	HIST*7140 Early Modern European History Major Seminar U [1.00]
HIST*6380 Topics in Early Modern European History U [0.50]	HIGT 7130 Wodern European History Major Seminar U [1.00]
This seminar course examines current issues in early modern European history as selected	HIST*7170 Race, Slavery, and Imperialism Major Seminar U [1.00]
by instructor(s). Participants review current research and historiography, discuss the principal debates, and develop their own perspectives through encounter with primary	HIST*7190 War and Society Major Seminar U [1.00]
source materials.	HIST*7250 Cold War Era History Major Seminar U [1.00]
HIST*6381 Early European Research U [0.50]	Offered annually
Continuation of HIST*6380 in which students prepare an indepth research paper based on primary sources.	Restriction(s): Instructor's Signature Required HIST*7260 Medieval History Major Seminar U [1.00]
HIST*6400 Major Paper U [1.00]	Offered annually
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.	Restriction(s): Instructor's Signature Required
HIST*6450 Quantitative Evidence and Historical Methods U [0.50]	Offered Annually
An overview of the use for historical research of quantitative evidence and methodologies.	<i>Restriction(s):</i> Instructor's Signature Required
HIST*6500 Topics in Global History U [0.50]	C
This is a topical course that evplores the history of processes that take place on a	

HIST*7590 War and Society Minor Seminar U [1.00]	HTM*6150 Research Methods for Managers F [0.50]
HIST*7600 Canadian History Minor Seminar U [1.00]	Students learn to formulate a research problem, undertake a literature review, and to
HIST*7610 British History Minor Seminar U [1.00]	analysis of relevant data. The course also promotes the use of the World Wide Web as
HIST*7620 Scottish History Minor Seminar U [1.00]	an information resource. Restriction(s): CME Executive Programs students only
HIST*7630 Community Studies Minor Seminar II [1 00]	HTM*6170 Hospitality and Tourism Economics and Policy U [0.50]
	The course introduces participants to economic and government policy issues that impact
HIST*/640 Early Modern European History Minor Seminar U [1.00]	the hospitality and tourism industry. The course provides a strategic framework for understanding the macroeconomic and policy environment that is shaped by multilateral
HIST*7650 Modern European History Minor Seminar U [1.00]	institutions, government and the hospitality and tourism industry.
HIST*7660 Gender, Women and Family Minor Seminar U [1.00]	Restriction(s): CME Executive Programs students only
HIST*7670 Race, Slavery, and Imperialism Minor Seminar U [1.00]	An advanced course for those specializing in management, marketing or organizational
HIST*7680 United States History Minor Seminar U [1.00]	behaviour. Deals with current and future topics, trends and problems in the industry,
HIST*7690 International History Minor Seminar U [1.00]	behaviour.
HIST*7700 Science, Medicine and Technology Minor Seminar U [1.00]	Restriction(s): CME Executive Programs students only
HIST*7710 Other Minor Seminar U [1.00]	HTM*6300 Hospitality and Tourism Marketing F [0.50]
HIST*7750 Cold War Era History Minor Seminar U [1.00]	Analysis and application of marketing foundations through integration of marketing variables with real-world situations and in-depth analysis of strategic marketing issues.
Offered annually	Restriction(s): CME Executive Programs students only
Restriction(s): Instructor's Signature Required	HTM*6320 Special Topics in Hospitality Marketing F,W,S [0.50]
HIST*7760 Medieval History Minor Seminar U [1.00]	An advanced course for those specializing in marketing. Deals with marketing theories,
Offered annually	behaviour, distribution, services, and service-delivery concepts.
Restriction(s): Instructor's Signature Required	<i>Restriction(s):</i> CME Executive Programs students only
HIST*7770 World History Minor Seminar U [1.00]	HTM*6330 Special Topics in Hospitality Marketing F,W,S [0.50]
Offered Annually	An advanced course for those specializing in marketing. Deals with marketing theories,
Restriction(s): Instructor's Signature Required	models, and specific subsets of marketing such as pricing, consumer and industrial-buyer
HIST*7990 Doctoral Thesis U [2.00]	Restriction(s): CME Executive Programs students only
Students are required to write and successfully defend a thesis of such cogency and originality as will represent a significant contribution to knowledge. The thesis will	HTM*6510 Hospitality and Tourism Revenue Management II [0.50]
normally be between 50,000 and 90,000 words in length. University of Guelph regulations	This course discusses revenue maximization strategies and factics that improve the
and procedures govern this process.	profitability of businesses that work in fixed capacity environments, face time-varied
Hospitality and Tourism Management	demand, their product is homogeneous and their cost structure reflects a high proportion of fixed and a low proportion of variable cost items.
HTM*6050 Management Communications F [0.50]	Prerequisite(s): HTM*6300
Examination of the theory, function and practice of managerial communications with	Restriction(s): CME Executive Programs students only
<i>Rastriction(s):</i> CME Executive Programs students only	HTM*6530 Safety, Security and Risk Assessment in HTM U [0.50]
HTM*6110 Foundations of Leadership F [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
This course will enhance students' interpersonal skills, as well as their knowledge and	analysis and management, crisis management, liability management, and industry specific
understanding of the theory and research underlying effective team management and	law provide the foundation for this course.
collaboration on an organization. Experiential approaches are used to enhance managerial skills	Restriction(s): CME Executive Programs students only
<i>Restriction(s):</i> CME Executive Programs students only	HTM*6550 Managing Service Quality S [0.50]
HTM*6120 Special Topics in Hospitality Organizational Behaviour F,W,S [0.50]	A nonstic and interdisciplinary approach is used to explore the principles of service management. The course will enhance participants' understanding of what actually
Advanced course for those specializing in organizational behaviour. Deals with in-depth	constitutes quality, the nature of service, and strategies for improving it.
analysis of industry organizational behaviour, management of current and future problems,	Restriction(s): CME Executive Programs students only
reorganizations, corporate cultures, multi-cultural organizations, and etnics.	HTM*6590 Organizational Theory and Design U [0.50]
HTM*6130 Special Topics in Hospitality Organizational Behaviour FWS [0.50]	Core concepts in organizational theory and their interrelationships as well as concepts such as group decision making and integroup and integroup dynamics are explored
Advanced course for those specializing in organizational behaviour. Deals with in-depth	Restriction(s): CME Executive Programs students only
analysis of industry organizational behaviour, management of current and future problems,	HTM*6600 International Tourism and Tourism Marketing F [0.50]
reorganizations, corporate cultures, multi-cultural organizations, and ethics.	Analyzes the social, political and economic impacts of tourism on the world scene, as
Kestrichon(s): CME Executive Programs students only HTM#6140 Foundations of Human Decement Management (MLIO 201)	well as the global integration of tourism in today's society.
This course examines the essential human resource management w [0.50]	Restriction(s): CME Executive Programs students only
staffing, employee development, compensation, health and safety, labour relations, and	HTM*6620 Special Topics in Tourism F,W,S [0.50]
legal compliance, in a variety of organizational settings.	Advanced course for those specializing in tourism. Deals with theories of tourism generators, multi-markets, tourism multipliers, current and future trends, regulatory.
Restriction(s): CME Executive Programs students only	environments and distributions systems

Appendix A - Courses, Human Health and Nutritional Sciences	227
HTM*6630 Special Topics in Tourism F,W,S [0.50]	HHNS*6410 Applied Functional Foods and Nutraceuticals W [1.00]
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. <i>Restriction(s):</i> CME Executive Programs students only	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 HHNS*6400
HTM*6700 Strategic Management U [0.50]	HHNS*6440 Nutrition, Gene Expression and Cell Signalling W [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.	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. (offered annually)
Restriction(s): CME Executive Programs students only	HHNS*6700 Nutrition, Exercise and Metabolism F [0.50]
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	A discussion of recent concepts in the relationships among nutrition, exercise and metabolism. Information from the molecular to the whole-body 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.
and food and agribusiness organizations.	HHNS*6710 Advanced Topics in Nutrition and Exercise W [0.50]
Restriction(s): CME Executive Programs students only	Advanced topics will be presented to establish an in-depth understanding of current
HTM*6900 Major Paper F,W,S [0.50]	investigations in nutrition and exercise. Based on the integrated understanding of nutrition
A detailed critical review of an area of study specific to the specialization of students in	and exercise developed in HBNS 6 /00, the focus of this course will be to develop the student's ability to independently analyze original research investigations.
the MBA by course work and major paper option.	HHNS*6910 Basic Research Techniques and Processes S F W [0 50]
Restriction(s): CME Executive Programs students only	Working with a faculty advisor, students will gain experience in basic aspects of scientific
Human Health and Nutritional Sciences	research. This will be accomplished through experience of one or more components of
HHNS*6000 Students Promoting Awareness of Research Knowledge S,F,W [0.25]	the scientific method in a laboratory setting. Objective outcomes will be evaluated and will include documentation of the experience in a written report.
This course will explore research communication through practical experience. The course will be part of the SPARK program in which students write, edit and coordinate	<i>Restriction(s):</i> Restricted to HHNS MSc. course work and project students. Instructor's
a variety of news publications that highlight University of Guelph research activities for	signature required
a wide range of audiences. Restriction(s): Limited to HHNS MSc course work and project students only	HHNS*6920 Applied Research lechniques and Processes S,r,w [0.50]
Instructor's signature required.	discipline-specific aspects of research. This will be accomplished through experience in
HHNS*6010 Seminar in Human Health and Nutritional Sciences S [0.50]	a pre-arranged practicum in an applied setting. Objective outcomes will be evaluated and will include documentation of the experience in a written report
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	<i>Restriction(s):</i> Restricted to HHNS MSc. course work and project students. Instructor's
process-oriented concepts and issues such as effective scientific communication and	signature required
dissemination of results.	HHNS*6930 Research Project S,F,W [0.50]
HHNS*6040 Research Fronts in Nutritional and Nutraceutical Sciences F [0.50]	or Applied Research Techniques and Processes, students will carry out a specific research
Building on an information base in nutrition, biochemistry and physiology, the course	project to its completion. Results will be documented in a written report and communicated
comprises selected research topics pertaining to the importance of nutrition as a	Praraquisita(s): HHNS*6010 or HHNS*6020
determinant of health throughout the life span. Distinction will be drawn between the	<i>Restriction(s):</i> Restricted to HHNS MSc. course work and project students. Instructor's
THE above basis of number essentiality and the health protectait effects of number determined.	signature required
This course examines how the energy provision pathways in human skeletal muscle and	Integrative Biology
associated organs meet the energy demands of the muscle cell during a variety of	IBIO*6000 Advances in Ecology and Behaviour U [0.50]
metabolically demanding situations.	This is a modular course in which several faculty lecture and/or lead discussion groups
HHNS*6200 Research Methods in Biomechanics F [1.00]	in tutorials about advances in their broad areas, or related areas, of ecology and behaviour.
This course covers the basic elements of biomechanics experimental data collection including instrumentation analog to digital conversion signal processing and analysis	mating systems, population dynamics, niche theory and food-web dynamics. The course
Particular emphasis is placed on the areas of kinematics, electromyography and tissue	includes lectures and seminars in which the students participate. Offered annually.
mechanics.	IBIO*6010 Advances in Physiology U [0.50]
HHNS*6210 Exploring Research Techniques in Biomechanics F [0.50]	A modular course format in which several faculty members lecture and/or lead discussion
This course will review basic elements of biomechanics experimental data collection	groups in tutorials on advances in their areas, or related areas, of physiology. Topics may
including instrumentation, analog-to-digital conversion, signal processing and analysis	endocrinology, and exercise and muscle physiology. The course includes lectures and
responsible for conducting bi-weekly seminars which will analyze and critique original	seminars in which the students participate. Offered annually.
research investigations in the area of biomechanics instrumentation/processing techniques.	IBIO*6020 Advances in Evolutionary Biology U [0.50]
HHNS*6320 Advances in Human Health and Nutritional Sciences Research S,F,W	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
This course provides the student with an opportunity to study a topic of choice and	epigenetics, phylogenetics, developmental basis of evolutionary change, and molecular
involves literature research on a chosen topic. The course may stand alone (MSc thesis	evolution. The course includes lectures and seminars in which the students participate.
and PhD students) or provide the background information for an experimental approach	Offered annually.
to the topic (MSc course work and project students).	IBIO*6040 Special Topics in Ecology U [0.50]
HHNS*6400 Functional Foods and Nutraceuticals F [0.50]	Students will explore aspects of ecology not otherwise covered in existing graduate
This course considers the relation of nutraceuticals, functional foods, designer foods,	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
development and commercialization of nutraceuticals	presentations may be required.
development and commercianzation of nutraceuticals.	

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 Integrative Biology I U [0.50]

This course provides graduate students, either individually or in groups, with the opportunity to pursue topics in specialized fields of integrative biology 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 integrative biology 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*6630 Scientific Communication U [0.50]

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

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

IDEV*6800 Theories and Debates in Development F [0.50]

This course examines recent approaches in development theory explaining international inequality, poverty and long-term change. It also investigates selected current debates in international development – such as food security, trade, good governance, sustainability or gender – from various discipline-based and interdisciplinary perspectives, and analyzes selected regional experiences of development.

Restriction(s): Restricted to students in doctoral IDEV programs or instructor's consent.

IDEV*6850 Development Research and Practice W [0.50]

In this course students establish the linkages between their doctoral research topic and the wider field of development studies and practice. The course will examine development policies and projects, ethical issues related to (cross-cultural) development research, and relationships between research and development practice.

Restriction(s): Restricted to students in doctoral IDEV programs or instructor's consent.

Landscape Architecture

LARC*6010 Landscape Architecture Studio I F [0.50]

Studio and field instruction introduces the student to landscape architecture through acquisition of basic professional skills and knowledge. Topics include design theory, landscape inventory and analysis, application of the design process to projects at the site scale, graphic and oral communication.

LARC*6020 Landscape Architecture Studio II F [0.50]

Studio and field instruction introduces the student to basic knowledge and skills of site engineering as it relates to landscape architecture. Topics include surveying, principles of site grading and drainage, introduction to materials and methods of construction, and graphic communication.

LARC*6030 Landscape Architecture Studio III W [0.50] Studio and field instruction continues the student's development of professional knowledge and skills at the site scale. Topics include site planning principles, social factors in design, introduction to principles of planting design and architectural structures, facilitation and computer applications in design.

LARC*6040 Landscape Architecture Studio IV W [0.50]

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

LARC*6120 Community Design W [0.50]

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

LARC*6340 Landscape History Seminar F [0.25]

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

LARC*6360 Professional Practice Seminar F [0.25]

A lecture/seminar course focussed on the legal, business, ethical and professional practices of Landscape Architecture professionals. Skills emphasize the development of oral and writing skills.

LARC*6380 Research Seminar W [0.25]

A seminar course focussed on the process and communication of research, influenced by the current research of the participants. Participants organize a conference to present their research results.

LARC*6430 Landscape Resource Analysis F [0.50]

Integrated field and classroom instruction introduces the student to inventory and analysis of biological, physical, social and cultural elements of the landscape. Projects will incorporate principles of landscape ecology and landscape planning. Field study will require some travel at student's expense.

LARC*6440 Environmental Design F [0.50]

This course integrates field and classroom study to apply landscape ecology to current landscape problems, including analysis of regional landscapes, restoration of degraded landscapes, and application of aesthetic and ecological principles across scales in site to regional settings. Case studies component will require some travel at students' expense.

LARC*6470 Integrative Environmental Planning W [0.50]

Landscape planning emphasizing the integration and interrelationships between biophysical and cultural resources, with application at a regional landscape planning scale. This course typically incorporates community-outreach projects.

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

Students are introduced to critical inquiry as a method of evaluating information, design, and planning. The focus of the course is on the quantification and analysis of research data. Modelling and simulation are introduced and discussed in the context of planning, design, and research.

LARC*6610 Research Methods F [0.50]

An introduction to a broad array of research methods as they apply to landscape planning and design, with a focus on the connections between research and design. Emphasis is on developing foundations for the creation of appropriate research questions.

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.

Latin American and Caribbean Studies

LACS*6000 Research Methods Seminar U [0.50]

This course will introduce students to the field and research methods of various disciplines and of interdisciplinary studies, and it will familiarize them with field-relevant research skills and methodologies.

LACS*6010 Latin American Identity & Culture I F [0.50]

This is the first of the two required LACS culture core courses. They will address theoretical issues relevant to Latin American identities and cultures, and will use these as heuristic devices in the study of major and marginalized cultural events, narratives, and visual and musical expressions. In LACS*6010 students will analyze the concept of "hybridity" and study how hybrid culture has been incorporating past with the present, and how it is and has been incorporating local and African forms and themes with European and US derived high culture.

Appendix A - Courses, Leadership Studies	229
LACS*6020 Latin American Identity & Culture II W [0.50]	LEAD*6400 Research Methods for Decision-Making S [0.50]
This course is a continuation of LACS*6010. Students going on an exchange may replace this course with a similar course taken at the exchange university. This course will study minority cultures and the relationship of the periphery and the centre. Feminist, queer, Latina/o and indigenous marginalized cultures will be studied in the context of Internationalism and Globalization.	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. <i>Restriction(s):</i> CME Executive Programs students only
LACS*6030 Globalization & Insecurity in the Americas F [0.50]	LEAD*6500 Ethics in Leadership W,S [0.50]
An analytical,critical and inerdisciplinary introductory overview of Latin America and the Caribbean in the larger context of the Americas, from the point of view of the security and insecurity of its people. It will concentrate on the interplay of environmental, economic, social, political, and cultural factors upon such security in an era of globalization.	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. <i>Restriction(s):</i> CME Executive Programs students only
LACS*6040 Novel & Nation in Spanish America U [0.50]	LEAD*6720 Politics of Organizations W [0.50]
This course will study the constitution of Spanish American nation in the novel since 1900 from a variety of theoretical perspectives. Particular attention will be paid to the novel's appropriation of foreign artistic and cultural influences to articulate Spanish American history.	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.
LACS*6050 Globalization & Latin American Representation in Art W [0.50]	Restriction(s): CME Executive Programs students only
Inis course will examine the continuous flow of large, temporary high-profile identity-based "blockbuster" exhibitions based on Latin American and Caribbean art in Canada and the United States. These exhibitions play a key role as cultural agents, and raise questions of the concept of converging visual cultures.	LEAD*6740 Coaching and Developing Others W [0.50] This course will provide student with an opportunity to design developmental plans for direct reports, assess their coaching skills, and develop their coaching skills to support the development of others.
LACS*6100 Research Project U [1.00]	Restriction(s): CME Executive Programs students only
This research project will result in a major paper of about 15,000 words. The student chooses a topic and writes a paper on the topic with the guidance of a faculty member. The topic must be approved by the Graduate Committee.	LEAD*6800 Personal Skill Self-Assessment S [0.50] Using the "Basis of Competence" model, this course examines personal skills in four
LACS*6200 Topics in Latin American and Caribbean Studies U [0.50]	areas: Managing Self, Communicating, Managing People and Tasks, and Mobilizing
An independent study course, the nature and content of which is agreed upon between the individual student and the person offering the course.	another in a dynamic workplace will be explored.
<i>Restriction(s):</i> Instructor and Graduate Co-ordinator signatures required. Course cannot be taken in first compactor	LEAD*6900 Major Research Project W-S [1.00]
Leadership Studies	This course involves a directed research project leading to a referenced, professional report on a leadership problem or issue.
LEAD*6000 Foundations of Leadership S,F [0.50]	Restriction(s): CME Executive Programs students only
The course will enhance participants' interpersonal competency, as well as their knowledge	Literature and Theatre Studies
and understanding of the theory and research underlying the impact of team management and collaboration on the organization	LTS*7770 Language Requirement U [0.00]
Restriction(s): CME Executive Programs students only	A written demonstration of a student's reading knowledge of one language other than
LEAD*6100 Theories of Leadership S,F [0.50]	English, as approved by the Graduate Studies Committee.
This course traces the development of the concept of leadership. Through the interplay	LTS*7900 Directed Studies U [0.50]
of theory and practical application, participants will gain a deeper appreciation for the requirements, responsibilities, and consequences of effective leadership.	Management
Restriction(s): CME Executive Programs Students Only	MGMT*6800 Philosophy of Social Science Research 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	This course introduces students to the underlying philosophical assumptions that support empirical research methods within social science disciplines. The aim of this course is to examine the philosophy of knowledge generation and claims, particularly in the context of management phenomena.
Restriction(s): CME Executive Programs students only	MGMT*6820 Theory of Management F [0.50]
LEAD*6220 Strategic Leadership and Management W [0.50]	This course examines the evolution of management thought and the overarching theories
As a research intensive course in the MA Leadership, this course examines the conceptual and practical dimensions of strategic leadership and management in a variety of organizational, external and individual contexts using a selection of readings, discussions, case analyses and a final paper.	that have been successfully applied to multiple functional areas of the organization. Examples of theories that apply to such disparate areas as operations, marketing, and organizational behaviour include agency theory, transaction cost analysis, and contingency theory.
LEAD*6300 Role of the Leader in Decision-Making F,W [0.50]	Marketing and Consumer Studies
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.	MCS*6000 Consumption Behaviour Theory I 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.
Restriction(s): CME Executive Programs students only	MCS*6010 Consumption Behaviour Theory II W [0.50]
LEAD*6350 The Role of the Leader as Reflective Practioner F [0.50] This course will enhance the leader's ability to navigate the complexity of organizational	Consumption behaviour is an interdisciplinary field of study which applies theories from multiple disciplines to the activities and processes people engage in when choosing, using

ourse will enhance the leader's ability to navigate the complexity of organizational life and contribute to building a more sustainable society by developing skills in reflective practice. Reflective practice is divided into four areas that stretch over eight modules: Rethinking, Relating, Responding and Reinventing.

Restriction(s): CME Executive Programs students only

Prerequisite(s): MCS*6000 or consent of instructor

and application of the theories underlying consumer behaviour.

and disposing of goods and services. The purpose of this course is to provide a basic

review of the theoretical foundations of aspects of consumption and consumer behaviour

and to demonstrate their applicability to marketing management. The course is designed to allow participants to bring their own background and interests to bear on the review

230	Appendix A - Courses, Mathematic
MCS*6050 Research Methods in Marketing and Consumer Studies F [0.50]	MATH*6012 Dynamical Systems II U [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.	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-Smallhomoclinic theorem; strange attractors and deterministic chaos.
MCS*6060 Multivariate Research Methods W [0.50]	MATH*6020 Scientific Computing U [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. <i>Prerequisite(s):</i> MCS*6050 or consent of instructor	This course covers the fundamentals of algoithms and computer programming. This may include computer arithmetic, complexity, error analysis, linear and nonlinear equations least squares, interpolation, numerical differentiation and integration, optimization random number generators, Monte Carlo simulation; case studies will be undertaken using modern software.
MCS*6070 Introduction to Structural Equation Modeling F [0.50]	MATH*6021 Optimization I U [0.50]
This course introduces students to the theory, concepts and application of structural equation modeling. Topics covered include path analysis, confirmatory factor analysis	A study of the basic concepts in: linear programming, convex programming, non-convex programming, geometric programming and related numerical methods.
and measurement models, latent variable modeling, multi-group modeling, and measurement invariance testing. Emphasis is placed on applying the principles of SEM to the creation and testing of theoretically driven models using both categorical and continuous data.	MATH*6022 Optimization II U [0.50] A study of the basic concepts in: calculus of variations, optimal control theory, dynami programming and related numerical methods.
MCS*6080 Qualitative Research Methods W [0.50]	MATH*6031 Functional Analysis U [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. <i>Prerequisite(s):</i> MCS*6050 or consent of instructor	Review of metric, normed, and inner product spaces; Banach contraction principle; brie introduction to measure and integration; elementary Fourier analysis; adjoint and compace operators; nonlinear operators and the Frechet derivative; Baire category theorem; principle of uniform boundedness; open mapping theorem; principle of uniform boundedness closed graph theorem.
MCS*6090 Special Topics in Consumer Research and Analysis U [0.50]	MATH*6041 Partial Differential Equations I U [0.50]
MCS*6100 Marketing Theory F [0.50]	Classification of partial differential equations. The Hyperbolic type, the Cauchy problem range of influence, well, and ill posed problems successing approximation, the Dimensional
A theoretical understanding of marketing, including philosophy of science and marketing, a history of marketing thought, market orientation, marketing strategy theory, modeling, social marketing, and ethical issues in marketing.	function. The elliptic type: fundamental solutions, Dirichlet and Neumann problems. The parabolic type: boundary conditions, Green's functions and separation of variable Introduction to certain non-linear equations and transformations methods.
<i>Restriction(s):</i> Signature required for non-MCS students.	MATH*6042 Partial Differential Equations II U [0.50]
MCS*6120 Marketing Management U [0.50]	A continuation of some of the topics of Partial Differential Equations I. Also, system
student understand how marketing theory can directly affect marketing practice and firm	of partial differential equations, equations of mixed type and non-linear equations.
performance. As this is an MSc course and NOT an MBA course, there is an expectation that the level of critical thinking and knowledge growth falls within the realm of the science of marketing and/or the empirical nature of marketing research and is not simply about marketing practice. <i>Prerequisite(s):</i> MCS*6100	MATH*6051 Mathematical Modelling U [0.50] The process of phenomena and systems model development, techniques of model analysis model verification, and interpretation of results are presented. The examples of continuou or discrete, deterministic or probabilistic models may include differential equations difference equations, cellular automata, agent based models, network models, stochasti
MCS*6260 Special Topics in Food Marketing U [0.50]	processes.
MCS*6500 Global Business Today U [0.50]	MATH*6071 Biomathematics U [0.50]
This course will survey the key issues related to doing business internationally including the cultural context for global business, cross border trade and investment, ethics, the	to illustrate the different mathematical approaches employed when considering different levels of biological function.
global environment.	MATH*6091 Topics in Analysis U [0.50]
<i>Restriction(s):</i> Non MBA/MA Leadership students only by permission of Executive	Selected topics from topology, real analysis, complex analysis, and functional analysis
Programs Office.	MATH*6181 Topics in Applied Mathematics I U [0.50]
MCS 10/10 Special Topics in Marketing U [0.50]	This course provides graduate students, either individually or in groups, with the opportunity to pursue topics in applied mathematics under the guidance of gradual
MCS*6720 Special Topics in Housing and Real Estate U [0.50]	faculty. Course topics will normally be advertised by faculty in the semester prior to the offering. Courses may be offered in any of lecture, reading/seminar, or individual projection of the semester prior to the semester prior to the ofference of the semester prior to the semester pr
Math amoting	formats.
	MATH*6182 Topics in Applied Mathematics II U [0.50]
MATH*6010 Analysis U [0.50] Half the course covers metric spaces, normed linear spaces, and inner product spaces, including Banach's and Schauder's fixed point theorems, Lp spaces, Hilbert spaces and the projection theorem. The remaining content may include topics like operator theory, inverse problems, measure theory and spectral analysis.	opportunity to pursue topics in applied mathematics under the guidance of graduat faculty. Course topics will normally be advertised by faculty in the semester prior to the offering. Courses may be offered in any of lecture, reading/seminar, or individual project formats.
MATH*6011 Dynamical Systems I U [0.50]	MATH*6400 Numerical Analysis 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	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.
Applications drawn from the biological, physical, and social sciences.	MATH*6410 Numerical Analysis II U [0.50]
	One or more topics selected from those discussed in Numerical Analysis I, but in greated 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 and Cellular Biology

MCB*6100 MSc Research Topics in Molecular and Cellular Biology U [0.50]

The development and refinement of the skills of scientific communication, emphasizing writing skills, in the context of developing a thesis proposal. This course is mandatory for all students in the MCB MSc graduate program and is normally completed within the first two (2) semesters of the program, and must be taken with the accompanying course MCB*6200.

MCB*6200 MSc Scientific Communication in Molecular and Cell Biology U [0.50]

The development and refinement of the skills of scientific communication emphasizing oral presentation. Students will present a public seminar on a contemporary subject in the molecular biosciences culminating in a description of the proposed research. This course is mandatory for all students in the MCB MSc program and must be taken with the accompanying course MCB*6100.

MCB*6310 Advanced Topics in Developmental and Cellular Biology U [0.50]

A study of selected topics in contemporary developmental and cellular biology. Students will review recent advances in these disciplines at the molecular and cellular level, in biological systems ranging from simple eukaryotes to plants and vertebrates.

MCB*6320 Advanced Topics in Microbiology U [0.50]

A study of selected topics in contemporary microbiology. Students will review recent advances in microbial cell structure, physiology, interactions, gene expression and virulence.

MCB*6330 Molecular Biology of Viruses U [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.

MCB*6340 Advanced Topics in Molecular Genetics U [0.50]

A study of selected topics in contemporary molecular biology and molecular genetics. Students will review recent progress in gene expression and regulation in model organisms, and the application of molecular biology tools to the study of cellular and organismal physiology.

MCB*6350 Advanced Topics in Plant Biology U [0.50]

A study of selected contemporary topics in biochemistry and molecular biology. 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.

MCB*6360 Advanced Topics in Biochemistry and Molecular Biology U [0.50]

A study of selected contemporary topics in biochemistry and molecular biology. 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.

MCB*6370 Protein Structural Biology and Bioinformatics U [0.50]

This course explores structural biology from three perspectives: 1) the fundamental concepts in structural biology; 2) the methods used to determine structures (including x-ray crystallography, NMR, electron microscopy, and computational modeling); 3) the bioinformatic concepts and tools used to compare, contrast and assign biochemical function to protein structures and sequences. The course emphasizes building a conceptual and practical skill set that will be applicable to any structure related problem.

MCB*6380 Structure and Function of Biological Membranes U [0.50]

This course covers multidisciplinary investigations of the basic structure and function of membranes in relation to cell biology. Topics will include structural biology of membrane proteins, experimental approaches for studying membranes, membrane transport systems, import-export systems and/or membrane trafficking.

MCB*7100 PhD Research Topics in Molecular and Cellular Biology U [0.50]

The development and refinement of the skills of scientific communication, emphasizing writing skills, in the context of developing a thesis proposal. This course is mandatory for all students in the MCB PhD program and is normally completed within the first two (2) semesters of the program, and must be taken with the accompanying course MCB*7200.

MCB*7200 PhD Scientific Communication in Molecular and Cell Biology U [0.50]

The development and refinement of the skills of scientific communication emphasizing oral presentation. Students will present a public seminar on a contemporary subject in the molecular biosciences culminating in a description of the proposed research. This course is mandatory for all students in the MCB PhD program and must be taken with the accompanying course MCB*7100.

Neuroscience

NEUR*6000 Principles of Neuroscience U [0.50]

This course is designed to ensure that graduate students with diverse neuroscience backgrounds registered in the Collaborative Program in Neuroscience are exposed to the fundamentals in all areas of neuroscience.

NEUR*6100 Seminar in Neuroscience U [0.00]

This course will expose graduate students to some of the major theories, issues and methodologies driving research in neuroscience. Students will learn to critically evaluate presentations by researchers in this field as well as to communicate the results of their own research.

Pathobiology

PABI*6000 Bacterial Pathogenesis F [0.50]

An overview of key concepts in bacterial pathogenesis with emphasis on veterinary and zoonotic pathogens.

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

Introduction to laboratory procedures and interpretation of data arising from hematology, cytology, clinical chemistry, urinalysis and hemostatis analysis of clinical material (Intended for students training in clinical pathology.)

Restriction(s): Instructor's signature required

PABI*6040 Applied Clinical Pathology II U [0.50]

A continuation of PABI*6030 with greater depth in the interpretation of data and increased understanding of ancillary diagnostic methods applied in clinical case material. (Intended for students in training in clinical pathology).

Restriction(s): Instructor's signature required

PABI*6041 Applied Clinical Pathology III U [0.50]

A continuation of PABI*6040 with independent and comprehensive interpretation of diagnostic test results, and analysis of laboratory quality assurance quality control procedures. (Intended for students training in clinical pathology)

Restriction(s): Instructor's signature required

PABI*6050 Applied Avian Pathology I F [0.50]

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

Restriction(s): Instructor's signature required

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 conditions.

Restriction(s): Instructor's signature required

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 summer conditions.

Restriction(s): Instructor's signature required

PABI*6080 Diagnostic Pathology I - Domestic Animals S,F,W [0.50]

An introductory course of diagnostic pathology with emphasis on the common and uncommon diseases of the whole body and respiratory, urinary and digestive (including liver and pancreas) systems. (Intended for students in training in anatomic pathology.)

Restriction(s): Instructor's signature required

PABI*6090 Diagnostic Pathology II - Domestic Animals S,F,W [0.50]

An intermediate course that builds on the skills acquired in PABI*6080 and further enhances diagnostic veterinary pathology skills to include diseases of the nervous, endocrine and musculoskeletal systems. (Intended for students training in anatomic pathology.)

Restriction(s): Instructor's signature required

PABI*6091 Diagnostic Pathology III - Domestic Animals S,F,W [0.50]

An advanced course that builds on the skills acquired in PABI*6090 and further enhances diagnostic veterinary pathology skills to include diseases of all organ systems. (Intended for students training in anatomic pathology.)

Restriction(s): Instructor's signature required

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 W [0.50]

Molecular, cellular and tissue processes involved in the pathogenesis of adaptive, degenerative, inflammatory, infectious, proliferative and neoplastic diseases.

PABI*6105 Integrative Pathology U [0.50]	PABI*6630 Applied Comparative Pathology I S,F,W [0.50]
Basic and interpretive tissue and biochemical concepts of disease in the liver, pancreas,	Introductory course in the diagnostic pathology of mammals, birds, reptiles, amphibians
kidney, endocrine and hemolymphatic systems. (Even-numbered years)	and fish. Cases may be restricted by animal taxa or context (e.g., free-ranging Canadiar wildlife, zoological collections, aquacultura). The three Applied Comparative Pathology
Restriction(s): Instructor's signature required	courses build in expected level of accomplishment.
PABI*6110 Pathology I W [0.50]	<i>Restriction(s):</i> Instructor's signature required
Disease processes of the respiratory, integumentary, reproductive and skeletal systems. (Even-numbered years)	PABI*6640 Applied Comparative Pathology II S,F,W [0.50]
Restriction(s): Instructor's signature required	Intermediate course in the diagnostic pathology of mammals, birds, reptiles, amphibians
PABI*6130 Pathology II W [0.50]	and fish. Cases may be restricted by animal taxa or context (e.g., free-ranging Canadiar wildlife, real-ginal collections, exposulture). The three Amiled Composition Pathology
Disease processes of the alimentary, central nervous, cardiovascular and muscular systems	courses build in expected level of accomplishment.
and special senses. (Odd-numbered years)	Restriction(s): Instructor's signature required
Restriction(s): Instructor's signature required	PABI*6650 Applied Comparative Pathology III S,F,W [0.50]
PABI*6180 Clinical Bacteriology U [0.50]	Advanced course in the diagnostic pathology of mammals, birds, reptiles, amphibians
Current techniques and approaches in diagnostic bacteriology.	and fish. Cases may be restricted by animal taxa or context (e.g., free-ranging Canadiar
PABI*6190 Topics in Immunology W [0.50]	wildlife, zoological collections, aquaculture). The three Applied Comparative Pathology courses build in expected level of accomplishment.
Aspects of immune and non-specific host resistance, diagnostic immunology and	<i>Restriction(s):</i> Instructor's signature required
Immune-mediated disease.	PABI*6560 Antimicrobial Therapy U [0.50]
PABI*6221 Comparative Veterinary Pathology I U [0.50]	This course will cover antimicrobial therapy in veterinary medicine, encompassing
Pathological changes associated with diseases of amphibia, reptiles, wild and captive non-domestic birds, and wild mammals including fur-bearers. (Even numbered years)	microbiological, pharmacological and clinical aspects of prudent and effective antimicrobial use.
Restriction(s): Instuctor's signature required	PABI*6700 Laboratory Animal Science U [0.50]
PABI*6222 Comparative Veterinary Pathology II U [0.50]	Basic information on various aspects of laboratory animal science, including IACUC
laboratory animals. (Even numbered years)	function, regulatory oversight, ethics, historical review of animal research, anima modelsand alternatives, experimental design and considerations, biology, managemen
<i>Restriction(s):</i> Instructor's signature required	and uses of common species in research.
PABI*6300 Clinical Pathology I U [0.50]	Restriction(s): Instructor's signature required
Principles and applications of veterinary hematology and cytology, with emphasis on the	PABI*6710 Applied Laboratory Animal Science I U [0.50]
hematopoietic systems.	This course will emphasize practical aspects of laboratory animal science including
Restriction(s): Instructor's signature required	research protocol review, writing and reviewing standard operating procedures, anima monitoring, pathology procedures, and case management
PABI*6320 Clinical Pathology II W [0.50]	Restriction(s): Instructor's signature required
Principles and applications of veterinary hematology and cytology, with emphasis on the hematopoietic system	PABI*6720 Applied Laboratory Animal Science II U [0.50]
Restriction(s): Instructor's signature required	Continuation of I with emphasis on biohazard and personnel safety, monitoring fo
PABI*6330 Viral Diseases F [0.50]	disease, quality control and diagnostic procedures.
A study of important viral diseases of animals, with emphasis on etiology, host responses,	Restriction(s): Instructor's signature required
diagnosis and control. (Odd numbered years)	PABI*6730 Applied Laboratory Animal Science III U [0.50]
PABI*6350 Molecular Epidemiology of Bacterial Diseases W [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 necrops
This is a basic introduction to molecular epidemiology of bacterial diseases. It provides	procedures.
an understanding of molecular epidemiology methodologies and of their use for improving our understanding of infectious diseases epidemiology and control	<i>Restriction(s):</i> Instructor's signature required
Prerequisite(s): STAT*2040 Statistics I	PABI*6740 Avian Diseases U [0.50]
<i>Restriction(s):</i> Lab component: limited number of participants and WHIMIS certificate	Detailed study of recent concepts of preventive medicine, diagnosis and therapeutics as
compulsory.	applied to clinical recognition and control of avian diseases.
PABI*6440 Graduate Seminar in Pathobiology S,F,W [0.50]	Restriction(s): Instructor's signature required
Following discussions of approaches to scientific research and communication, students will develop and submit a thorough written critical review of the literature on an agreed	PAB1*6960 Special Topics in Pathobiology F,W,S [0.50]
upon topic, and a detailed research proposal in the same topic area. This material will	paper(s), laboratory studies, and/or written and oral examination, with or without semina
also be presented in the form of a public seminar.	preparation.
PABI*6500 Infectious Diseases and Public Health F [0.50]	Restriction(s): Instructor's signature required
Prevention and control of infectious diseases is an important aspect of public health. This course will involve detailed discussion of selected infectious diseases of public health	Philosophy
concern, excluding zoonotic diseases. Relevant aspects of microbiology, epidemiology, clinical presentation diagnosis and treatment will be covered with additional emphasis	PHIL*6000 Value Theory U [0.50]
on prevention and control.	A critical examination of some selected contemporary works in value theory or aesthetics
<i>Restriction(s):</i> Restricted to students in Public Health programs.	PHIL*6060 Logic U [0.50]
PABI*6550 Epidemiology of Zoonoses W [0.50]	A course designed to bring the individual student to the level of competence in logical techniques and theory required for graduate studies.
Characterization and distribution of diseases common to people and animals.	DHII \$6110 Delegonby of Deligion U [0 50]
Prerequisite(s): MCB*6330	A critical evamination of some calacted major works or control problems in the philosophy
PABI*6560 Principles and Practice of Antimicrobial Therapy U [0.50]	of religion.
This course will cover antimicrobial therapy in veterinary medicine, encompassing microbial pharmacological and clinical aspects of prudent and effective antimicrobial	PHIL*6120 Philosophy of Mind U [0.50]
use. (Offered in alternate years)	A study of contemporary theories of mind and philosophies of psychology.
<i>Restriction(s):</i> Instructor's signature required, DVM degree or equivalent required	

232

PHIL*6140 Contemporary European Philosophy I U [0.50]	PHIL*6960 PhD Graduate Seminar U [0.50]
A study of the historical and contemporary origins of existentialism, phenomenology	A seminar course in which students work on developing a range of academic skills for
and post-modernism, concentrating on one or several of the classic texts.	doing professional philosophy. This course is pass/fail and is mandatory for all second year PhD students. Please refer to the Philosophy Department website for a comprehensive
PHIL*6150 Contemporary European Philosophy II U [0.50]	description of this course.
A study of the historical and contemporary origins of existentialism, phenomenology	PHIL*6990 Guided Research Project U [1.00]
DITIL \$(200 Bushless of Contention of Difference Difference bull (0.50)	A guided research project undertaken by students doing an MA by course work, under
A study of a particular set of problems in contemporary philosophy U [0.50]	the supervision of a faculty member.
	Physics
PHIL*6210 Metaphysics U [0.50]	PHYS*6010 PSI Quantum Field Theory I U [0.50]
A critical examination of some selected major works of central problems in metaphysics.	Canonical quantization of fields, perturbation theory, derivation of Feynman diagrams.
PHIL*6220 Epistemology U [0.50]	applications in particle and condensed matter theory, renormalization in phi^4.
A critical examination of some selected major works of central problems in epistemology.	PHYS*6020 PSI Statistical Physics U [0.50]
PHIL*6230 Ethics U [0.50]	A brief review of ensembles and quantum gases, Ising model, landau theory of phase
A critical examination of some selected contemporary works or problems in ethical theory.	transititions, order parameters, topology, classical solutions.
PHIL*6240 Biomedical Ethics II [0 50]	PHYS*6030 PSI Quantum Field Theory II U [0.50]
A critical examination of some selected contemporary works or of problems in biomedical	Feynman Path Integral, abelian and nonabelian guage theories and their quantization
ethics.	Wilsonian renormalization.
PHIL*6310 Plato U [0.50]	PHYS*6040 PSI Relativity U [0.50]
A study of some of the major works of Plato.	Special relativity, foundations of general relativity, Riemannain geometry. Einstein's
PHIL*6311 Aristotle U [0.50]	equations, FRW and Schwarzschild geometries and their properties.
A study of some of the major works of Aristotle.	PHYS*6050 PSI Quantum Theory U [0.50]
PHIL*6320 Medieval Philosophy U [0.50]	Schrodinger equation: free particle, harmonic oscillator, simple time-dependent problems
A close examination of particular problems and texts of the medieval period	Heisenberg picture and connection with classical physics. Entanglement and non-locality
PHIL*6340 Modern Philosophy U [0.50]	DIVC*(0(0 DCI Information and Data Analogic U [0 50]
An examination of major texts, from Descartes to Mill.	Probability antrony Bayasian information and information theory Maximum likelihood
	methods, common probability distributions, applications to real data including Monte
A critical examination of the works of John Locke.	Carlo methods.
 PHIL*6530 Kant U [0.50]	PHYS*6070 PSI Dynamical Systems U [0.50]
A critical examination of the works of Immanuel Kant.	Maps, flows, stability, fixed points, attractors, chaos, bifurcations, ergodicity, approach
PHIL*6600 Social and Political Philosophy U [0.50]	to chaos. Hamiltonian systems, Liouville, measure, Poincare theorem, integrable systems with examples.
A critical examination of some selected contemporary works or central problems in the	PHVS*6080 PSI Computation II [0 50]
field of social philosophy.	Common algorithms for ode and pde solving, with numerical analysis. Common tasks
PHIL*6700 Survey of Ancient Philosophy U [0.50]	in linear algebra. Focus on how to write a good code, test it, and obtain a reliable result
A survey of ancient philosophy.	Parallel programing.
PHIL*6710 Survey of Early Modern Philosophy U [0.50]	PHYS*6210 PSI Cosmology U [0.25]
A survey of modern philosophy from Hobbes to Hume.	FRW metic, Hubble expansion, dark energy, dark matter, CMB, Thermodynamic history
PHIL*6720 History of the Philosophy of Science U [0.50]	comparison to observations, cosmic microwave background anisopropies, inlation and
A survey of the history of the philosophy of science from the Presocratics to the Positivists.	observational tests.
PHIL*6730 Contemporary Philosophy of Science U [0.50]	PHYS*6220 PSI Standard Model U [0.25]
An examination of the contemporary discipline of the philosophy of science.	Application of Yan-Mills theory to particle physics, QCD and its tests in the perturbative
PHIL*6740 Philosophy of Biology U [0.50]	regime, theory of weak interactions, precisions tests of electroweak theory, CKM matrix and flavour physics, open questions.
A general introduction to the history and philosophy of biology.	PHVS*6230 PSI String Theory II [0 25]
PHIL*6760 Science and Ethics U [0.50]	Superstring spectrum in 10d Minkowski, as well as simple toroidal and orbifold
A consideration of the problems which arise in the conjunction of science and ethics.	compactifications. T-duality, D-branes, tree amplitudes. Construct some simple unified
PHIL*6810 Survey of Late Modern Philosophy U [0.50]	models of particle physics. Motivate the 10- 11-dimensional supergravities. Simple
A survey of modern philosophy from Kant to the late 19th century.	supergravity solutions and use these to explore some aspects of adS/CF1 duality.
PHIL*6900 Reading Course U [0.50]	PHYS*6240 PSI Mathematical Physics Topics U [0.25]
PHIL*6930 Selected Topics I U [0.50]	monopoles and instantons, Kahler manifolds, Dirac equations, zero modes and index
Topics in this course will vary from offering to offering.	theorems.
PHIL *6940 Selected Tonics II U [0 50]	PHYS*6350 PSI Quantum Information Review U [0.25]
Topics in this course will vary from offering to offering	Review of selected topics in Quantum Information.
PHIL*6950 MA Seminar II [0 50]	PHYS*6360 PSI Gravitational Physics Review U [0.25]
A seminar course in which students work on developing a range of academic skills for	Review of selected topics in Gravitational Physics.
doing professional philosophy. This course is pass/fail and is mandatory for all incoming	PHYS*6370 PSI Condensed Matter Theory U [0.25]
MA students. Please refer to the Philosophy Department website for a comprehensive	Review of selected topics in Condensed Matter Theory.
TOPSCIDDODE OF THIS COURSE	

PHTYPE/08 PNI Quantum Gravity U[0.25] PHTYPE/100 Atunic Psysies (19.81) PHTYPE/08 PNI Quantum Theory U[0.26] Department, nutrition, Wigner Flacker, Nutrition Vigner Question, Nutrition, Wigner Flacker, Nutrition, Nutrio, Nutrio, Nutrition, Nutrito, Nutrition, Nutrition, Nutrio, Nutr		
Review of solved lopis in Quantum Theory 11 (0.25) Englishes on atomic structure and spectroscopy. Review of neglistic quantum controls on the generation of the spectroscopy. Review of neglistic quantum theorem (0.25) PTMSV601071 FEW profiles in Quantum Theory 11 (0.25) Englishes in Quantum theorem (0.10) PTMSV601071 FEW profiles in Quantum Theory 11 (0.25) PTMSV6100171 FEW profile of molecular protocols on profile composition of generating and protocols on generating and pr	PHYS*6380 PSI Quantum Gravity U [0.25]	PHYS*7100 Atomic Physics U [0.50]
PRDSY-600 PIN Foundations of Quantum Theory (10,23) Wight in Annual Constant Constant, B y System, Charles System Constant, B y System, Charles System,	Review of selected topics in Quantum Grativity.	Emphasis on atomic structure and spectroscopy. Review of angular momentum, rotations,
Network of six strend dops in Fruide Rays insertion mund, at least one of which is to be taken from comain illuminume. PHYS*610 PHI Septentiania in Quantum Information. PHYS*120 PHISE Septentiania in Quantum Information. PHYS*610 PHI Septentianiania Charakation (I (25)] PHYS*120 PHISE Septentianiania Charakation (I (25)] Review of website dipps in Conducted Matter Theory. (I (25)] PHYS*120 PHISE Septentianianianianianianianianianianianianiani	PHYS*6390 PSI Foundations of Quantum Theory U [0.25]	theory, radiative-transitions and inner-shell processes. Further topics selected with class
PHTYS-101 PSI Exploration in Quantum Information. PHTYS-7120 Special Tapics in Torsectical Physics (U.6.30) PHTYS-640 PSI Exploration in Granitational Physics. PHTYS-7120 Special Tapics in Torsectical Physics (U.6.30) PHTYS-640 PSI Exploration in Guantam Gravity (I.0.25) Applant momentum and the induction in tradicules, esperimentum electrony in sectors descent approximation (Territy (I.0.25)) Review of selected topics in Containant Gravity (I.0.25) PHTYS-7140 Notices memory descent approximation (Territy (I.0.25)) Review of selected topics in Containant Gravity (I.0.25) PHTYS-7140 Notices memory descent approximation (Territy (II.0.25)) Review of selected topics in Containant Gravity (II.0.25) PHTYS-7140 Notices of the containant approximation (Territy (III.0.25)) Review of selected topics in Containant Gravity (II.0.25) PHTYS-7140 Notices Topics (III.0.60) Review of selected topics in Containant Gravity (III.0.25) PHTYS-7140 Notices Trajectory (III.0.60) Review of selected topics in Containant Strainant Containant Strainant Containant	Review of selected topics in Foundations of Quantum Theory.	interest in mind, at least one of which is to be taken from current literature.
Review of selected topics in Quantum Information. PRIVSY-62407 Explorations in Grandmach Matter Theory U (0.25) Review of selected topics in Condensed Matter Theory U (0.25) Review of selected topics in Condensed Matter Theory U (0.25) Review of selected topics in Condensed Matter Theory U (0.25) Review of selected topics in Condensed Matter Theory U (0.25) Review of selected topics in Condensed Matter Theory U (0.25) Review of selected topics in Condensed Matter Theory U (0.25) Review of selected topics in Condensed Matter Theory U (0.25) Review of selected topics in Foundations of Quantum Theory U (0.25) Review of selected topics in Foundations of Quantum Theory U (0.25) Review of selected topics in Foundations of Quantum Theory U (0.25) Review of selected topics in Condensed Quantum Theory U (0.25) Review of selected topics in Condensed Quantum Theory U (0.25) Review of selected topics in Condensed Quantum Theory U (0.25) Review of selected topics in Condensed Quantum Theory U (0.25) Review of selected topics in Condensed Quantum Theory U (0.25) Review of selected topics in Condensed Quantum Theory U (0.25) Review of selected topics in Condensed Quantum Theory U (0.25) Review of selected topics in Condensed Quantum Theory U (0.25) Review of selected topics in Condensed Quantum Theory U (0.25) Review of selected topics in Condensed Quantum Theory U (0.25) Review of selected topics in Condensed Quantum Theory U (0.25) Review of selected topics in Condensed Quantum Theory U (0.25) Review of selected topics in Condensed Quantum Theory U (0.25) Review of selected topics in Condensed Quantum Theory U (0.25) Review of selected topics in Condensed Quantum Theory U (0.25) Review of selected topics in Condensed Quantum Theory U (0.25) Review of selected topics in Condensed Quantum Theory U (0.26) Review of selected topics in Condensed Quantum Theory U (0.26) Review of selected topics in Condensed Quantum Theory U (0.26) Review of selected topics in Condensed Quantum Theory U (0.26) Review of selected topics in Condens	PHYS*6410 PSI Explorations in Quantum Information U [0.25]	PHYS*7120 Special Topics in Theoretical Physics U [0.50]
PIINSY-640 PSI Exploration in Cravitational Physics (U.6.3] Implication in contension of condensed Matter Theory (U.6.2] Review of selected togics in Condensed Matter Theory (U.6.2] Implication in condense of Matter Theory (U.6.2] Review of selected togics in Condensed Matter Theory (U.6.2] Implication in condense of Matter Theory (U.6.2) Review of selected togics in Condensed Matter Theory (U.6.2) Implication in condense of Quantam Gravity (U.6.2) Review of selected togics in Particle Physics (U.6.2) Implication in condense of Quantam Theory, (U.6.2) Review of selected togics in Particle Physics (U.6.2) Implication in Condense of Quantam Theory, (U.6.2) Review of selected togics in Particle Physics (U.6.2) Implication in Condense of Quantam Theory, (U.6.2) Review of selected togics in Complex Systems (U.6.2) Implication and simulated scientific process, subject totic where the conduction of nuclear selected togics in Complex Systems, matter Systems, matter Systems, matter Theory, (U.6.2) Review of selected togics in Complex Systems (U.6.2) Implication and Systems, matter Theory, (U.6.2) Review of selected togics in Complex Systems, U.6.23 Implication and Systems, Theory, (U.6.2) Review of selected togics in Complex Systems, U.6.25 Implication selected togics in Complex Systems, U.6.20 Review of selected togics in Complex Systems, U.6.25 Implicatin Complex Systems, U.6.20	Review of selected topics in Quantum Information.	PHYS*7130 Molecular Physics U [0.50]
Review of selected logics in Crusticons of Matter Theory. [10,25] Review of selected logics in Conductors of Quantum Theory [10,25] Review of selected logics in Conductors of Quantum Theory [10,25] Review of selected logics in Conductors of Quantum Theory [10,25] Review of selected logics in Conductors of Quantum Theory [10,25] Review of selected logics in Conductors of Quantum Theory [10,25] Review of selected logics in Conductors of Quantum Theory [10,25] Review of selected logics in Conductors of Quantum Theory [10,25] Review of selected logics in Conductors of Quantum Theory [10,25] Review of selected logics in Conductors of Quantum Theory [10,25] Review of selected logics in String Theory [10,25] Review of selected logics in String Theory [10,25] Review of selected logics in String Theory [10,25] Review of selected logics in Conductors of Quantum Theory [10,25] Review of selected logics in String Theory [10,25] Review of selected logics in Conductors of Quantum Theory [10,25] Review of selected logics in Conductors (10,25] Review of selected logics in String Theory [10,25] Review of selected logics in Conductors (10,25] Review of selected logics in Conductors (10,25] Re	PHYS*6420 PSI Explorations in Gravitational Physics U [0.25]	Angular momentum and the rotation of molecules; introduction to group theory with
PIINYS-6400 PSI E Subjection in Condensed Matter Theory. U[0,25] However of selected optics in Contensed Matter Theory. However optications in Contenses of Quantum Theory. Hits Selected Optics in Contenses (Here Contension)	Review of selected topics in Gravitational Physics.	application to molecular vibrations; principles of molecular spectroscopy; spectra of
Review of selected uppes in Consensed Muler Theory. perconscepts changes, nontion statisting contraction functions, collision induced aborytion, collision induced	PHYS*6430 PSI Exploration in Condensed Matter Theory U [0.25]	isolated molecules; intermolecular interactions and their effects on molecular spectra;
PHIYS*6440 PSI Explorations in Quantum Gravy U [0.25] Horepsi of Quantum Gravy. PHIYS*6450 PSI Explorations in Foundations of Quantum Theory U [0.25] HUS*7140 Nunlinear Optics U [0.50] Review of selected optics in Foundations of Quantum Theory. PHIYS*7460 PSI Explorations in Foundations of Quantum Theory. PHIYS*640 PSI Explorations in Foundations of Quantum Theory. PHIYS*7400 PSI Explorations in Particle Physics. PHIYS*640 PSI Explorations in Complex Systems. PHIYS*7400 PSI Explorations in Complex Systems. PHIYS*640 PSI Explorations in Complex Systems. PHIYS*7400 PSI Explorations in Complex Systems. PHIYS*640 PSI Explorations in Complex Systems. PHIYS*7400 PSI Explorations in Complex 1 [0.25] Review of selected optics in Complex Systems. PHIYS*7400 PSI Explorations in Complex 1 [0.25] PHIYS*640 PSI Explorations in Complex 1 [0.25] PHIYS*7400 PSI Explorations in Complex 1 [0.25] PHIYS*640 PSI Explorations in Complex 1 [0.25] PHIYS*7400 PSI Explorations in Complex 1 [0.25] PHIYS*640 PSI Explorations in Complex 1 [0.25] PHIYS*7400 PSI Explorations in Complex 1 [0.25] PHIYS*7400 PSI Explorations in Complex 1 [0.25] PHIYS*7400 PSI Explorations in Complex 1 [0.25] PHIYS*7400 PSI Explorations in Complex 1 [0.25] PHIYS*7400 PSI Explorations in Complex 2 [0.25] PHIYS*7400 PSI Explorations in Complex 2 [0.25]	Review of selected topics in Condensed Matter Theory.	spectroscopic techniques, neutron scattering, correlation functions, collision induced
Review of selected topics in Quantum Theory. PEC.3 PHYSY6409 PST Explorations is Aronadians of Quantum Theory. QLastical and Quantum Mechanical descriptions of nonliner susceptibility, nonliner society of sole of sole factor by soles. PHYSY6409 PST Explorations in String Theory. QLastical and Quantum Mechanical descriptions of nonliner susceptibility, nonliner society of sole descriptions in String Theory. Review of selected topics in String Theory. QLastical and Quantum Mechanical descriptions of nonliner susceptibility, nonliner society of nuclei, dipha. Net., gamma deva; (no-body systems, nuclear Physics U [0.50] Review of sole def topics in Complex Systems. PHYS*1150 Nuclear Physics U [0.50] Review of sole def topics in Complex Systems. PHYS*110 Nuclear Physics U [0.50] Review of sole def topics in Complex Systems. PHYS*110 Nuclear Physics U [0.50] Review of sole def topics in Complex Systems. PHYS*110 Nuclear Physics U [0.50] Review of sole def topics in Complex Systems. PHYS*110 Nuclear Physics U [0.50] PHYS*120 Duartum Mechanics I U [0.50] PHYS*120 Nuclear Physics U [0.50] Review of sole def topics in Commongy. PHYS*120 Nuclear Physics U [0.50] PHYS*202 Quartum Ketchnics, elementary quantum theory of a relative and mode for splatical and Quartum and topic relative structure relative structure quarture and mode and explatical and topics in Solutononic and mode topic structure and Nuclear Physics U [0.52]	PHYS*6440 PSI Exploration in Quantum Gravity U [0.25]	absorption, extension of group theory to molecular crystals, normal co-ordinate analysis,
PHIYS*6430 PSI Explorations in Foundations of Quantum Theory U[0.25] PHIYS*7140 Nanimat Uptes U[0.80] Review of selected topics in Particle Physics U[0.25] PHIYS*7150 Natchard Physics U[0.26] Review of selected topics in String Theory PHIYS*7160 Nather Physics U[0.26] Review of selected topics in String Theory PHIYS*7150 Natchard Physics U[0.26] Review of selected topics in String Theory PHIYS*7160 Natchard Physics U[0.26] Review of selected topics in String Theory PHIYS*7170 Natchard Physics U[0.50] Review of selected topics in Complex Systems U[0.25] PHIYS*7170 Natchard and Ultip Energy Physics U[0.50] Review of selected topics in Complex Systems. PHIYS*7170 Natchard and Ultip Energy Physics U[0.50] Review of selected topics in Complex Systems. PHIYS*710 Natchard and Ultip Energy Physics U[0.50] Review of selected topics in Complex Systems. PHIYS*710 Natchard and Ultip Energy Physics U[0.50] Review of oftendismic mother association and somalization of more diavistic quantum mechanics including symmetries and interaction of the complexity and the classification, formation, interactions, signature required PHIYS*7200 Quantum Mechanical U[0.50] PHIYS*7200 Selectal Topics in Subtomic and Natchar Physics U[0.50] Review of alkidiski quantum mechanics including and anonic on the classification of formation of theoreting anoretinat physics V[0.50] PHIY	Review of selected topics in Quantum Gravity.	
Review or selected topics in Francisc Physics (U.5.2) Review of selected topics in Puricle Physics. (U.5.2) Review of selected topics in String Theory (U.6.2) Review of selected topics in String Theory (U.6.2) Review of selected topics in Combogy U(0.25) Review of formation of morelativitie quantum mechanics including symmetries and of radiation. Introduction to mechanics including symmetries and reparation for the relativities vave equations. PHYS*7100 Agreed Tupics II U(0.50) PHYS*7100 Select Tupics II U(0.50) PHYS*7100 Select Tupics II U(0.50) PHYS*7100 Select Tupics II U(0.50) PHYS*7100 Select Tupics II U(0.50) PHYS*7200 Quantum Mechanics II U (0.50) PHYS*7200 Quantum Selected relativities wave equations of transcring reparation of meracing holds (Review repaired PHYS*7200 Quantum Selected Physics II U (0.50) PHYS*7200 Select Tupics II U (0.50)	PHYS*6450 PSI Explorations in Foundations of Quantum Theory U [0.25]	PHYS*7140 Nonlinear Optics U [0.50]
PIIYS*940 PSI Explorations in Particle Physics U [0.25] generation, Plasse conjugation and student processes. PIYS*6400 PSI Explorations in String Theory. PIYS*710 Nuclear Physics U [0.50] PIYS*6400 PSI Explorations in Complex Systems. PIYS*6400 PSI Explorations in Complex Systems. PIYS*6400 PSI Explorations in Complex Systems. PIIYS*6400 PSI Explorations in Complex Systems. PIYS*6400 PSI Explorations in Complex Systems. PIIYS*710 Interactive signature required PIYS*6400 PSI Explorations in Complex Systems. PIIYS*710 Interactive signature required PIYS*6400 PSI Explorations in Complex Systems. PIIYS*710 Interactive signature required PIYS*7010 Quantum Mechanics I * U [0.50] Strong electromagnetic and vasia interactions. Isospin strangeness, concervation laws and brain desization. (mutuue tractions and decay: interactions. Int	Review of selected topics in Foundations of Quantum Theory.	Classical and Quantum Mechanical descriptions of nonlinear susceptibility, nonlinear wave proposition nonlinear effects such as Peckel's and Kerr effects harmonic
Review of selected topics in Particle Physics. FITS 97160 PSI Explorations in String Theory. PITS 976470 PSI Explorations in Cosmology U [0.25] State properties of nuclei; alpin, beta gamma decay; two-body systems; nuclear frees; nuclear frees	PHYS*6460 PSI Explorations in Particle Physics U [0.25]	generation, phase conjugation and stimulated scattering processes.
PHYS*640P PSI Explorations in String Theory U[0.25] static properties of much: lapha between devices in a spectral models for spherical and deformed nuclei: shell, PHYS*640P SI Explorations in Complex Systems. PHYS*640P SI Explorations in Complex Systems. Review of selected topics in Complex Systems. PHYS*640P SI Explorations in Complex Systems. PHYS*640P SI Explorations in Complex Systems. PHYS*640P SI Explorations in Complex Systems. PHYS*7100 Special Topics in Subtantic and Nuclear Physics U [0.50] Review of selected topics in Complex Systems. PHYS*7100 Special Topics in Subtantic and Nuclear Physics U [0.50] Review of solected topics in Complex Systems. PHYS*7100 Special Topics in Subtantic and Nuclear Physics U [0.50] PHYS*7010 Quantum Mechanics 1 U [0.50] PHYS*7100 Special Topics in Subtantie and Nuclear Physics U [0.52] PHYS*7010 Concerned and exactering theory. Elementary quantum field theory. and psymmetries and advects. PHYS*7100 Special Topics in Subtantie and Nuclear Physics U [0.52] PHYS*7010 Special Topics in Subtantie and Nuclear Physics U [0.50] PHYS*7100 Special Topics in Subtantie and Nuclear Physics U [0.50] PHYS*7010 Special Topics in Subtantie and Nuclear Physics U [0.50] PHYS*7200 Special Topics in Subtantie and Nuclear Physics U [0.50] PHYS*7010 Special Topics in Subtantie and Nuclear Physics U [0.50] PHYS*7200 Special Topics in Subtantie and Nuclear Physics U [0.50] PHYS*700 Special Topics in Subtantie and Nucle	Review of selected topics in Particle Physics.	PHYS*7150 Nuclear Physics U [0.50]
Review or selected topics in Siring Theory. muclear reactions; single-particle models for spherical and deformed nuclei; shell, edictive, interacting boon models. PHYS*040 PSI Explorations in Complex Systems. PHYS*100 Explorations in Cosmology U[0.25] Review or selected topics in Complex Systems. PHYS*100 Explorations in Cosmology U[0.25] Review of selected topics in Complex Systems. PHYS*100 Explorations in Cosmology. PHYS*100 FILE splorations in Cosmology. PHYS*110 Interactions in Subatomic and Nuclear Physics U[0.50] Review of formalism of nonrelativistic quantum mechanics including symmetries and symmetry freinfiels. Leptons, hadrons, quarks and their classification in surgery topical relativistic quantum mechanics. elementary quantum field theory, and for aphraical relativistic quantum mechanics. elementary quantum field theory, and ferrite systems. PHYS*7300 Quantum Field Theory U [0.50] PHYS*730 Solid State Physics I U [0.50] PHYS*7300 Special Topics in Theoretical Condensed Matter Physics U [0.50] PHYS*730 Solid State Physics I U [0.50] PHYS*7300 Special Topics in Theoretical Condensed Mater Physics U [0.50] PHYS*730 Special Topics in Theoretical Condensed Mater Physics U [0.50] PHYS*7300 Special Topics in Theoretical Condensed Mater Physics U [0.50] PHYS*730 Special Topics in Theoretical Condensed Mater Physics U [0.50] PHYS*7300 Special Topics in Theoretical Condensed Mater Physics V [0.50] PHYS*730 Special Topics in Theoretical Condensed Mater Physics V [0.5	PHYS*6470 PSI Explorations in String Theory U [0.25]	Static properties of nuclei; alpha, beta, gamma decay; two-body systems; nuclear forces;
PHYS*440 PSI Explorations in Camplex Systems. PHYS*1710 Discrete Systems. PHYS*1710 Quartum Mechanics 1* U (0.50) Excitication(s): Instructor's signature required PHYS*1710 Quartum Mechanics 1* U (0.50) PHYS*1710 Internetiation and Nuclear Physics U (0.50) Review of selected topics in Cosmology. PHYS*1710 Internetiation and Nuclear Physics U (0.50) PHYS*1710 Quartum Mechanics 1* U (0.50) PHYS*1710 Internetiation and Nuclear Physics U (0.50) Review of relativistic quantum mechanics including symmetries and invariance. Approximation methods and scattering theory. Elementary quantum field theory, and theory of relativistic quantum mechanics and classical field theory. PHYS*1710 Special Topics in Subatomic and Nuclear Physics U (0.25) PHYS*1710 Or equivalent PHYS*1710 or equivalent PHYS*1710 or equivalent PHYS*1710 Complex in the Complex of physics and classical field theory. Quantization of free mermalization in the synthesis and classical field theory. Quantization of free mermalization in the synthesis and classical field theory. Quantization of free mermalization in the field quantis. Canonical quantizating quantum inetchains and classical field theory. Quantization of field quantis. Canonical quantization of physics I U (0.50) PHYS*1730 Special Topics in Subtatom Physics U (0.50) PHYS*1730 Special Topics in Subtatom Physics U (0.50) PHYS*1740 Special Topics in Condensed Matter Physics U (0.50) PHYS*1740 Special Topics in Condensed Matter Physics U (0.50) PHYS*1740 Spe	Review of selected topics in String Theory.	nuclear reactions; single-particle models for spherical and deformed nuclei; shell,
Review of selected topics in Complex Systems. PHTS*7100 Special Topics in System required PHYS*97010 Quantum Mechanics I * U [0.50] PHTS*7100 Intermediate and High Energy Physics U [0.50] Review of selected topics in Cosmology. PHTS*7100 Quantum Mechanics I * U [0.50] PHYS*97010 Quantum Mechanics I * U [0.50] Strong. electromagnetic and weak interactions. Isospin. strangeness, conservation laws, interactions and decay. PHYS*9702 Quantum Mechanics I U [0.50] PHTS*7100 Special Topics in Subnomic and Nuclear Physics U [0.52] PHYS*97303 Quantum mechanics, elementary quantum field theory, and magnitud gravitation to many-particle systems. PHTS*7130 Solid State Physics I U [0.50] PHYS*97304 Quantum mechanics and classical field theory. Quantization of free particle interpaction of the formalism on finterneting quantum field theory to particle systems. PHTS*7130 Solid State Physics I U [0.50] Review of relativistic quantum mechanics and classical field theory. Quantization of the particle interpaction of the formalism on interacting quantum field theory to particle systems. PHTS*7130 Solid State Physics I U [0.50] PHYS*7040 Statistical Physics I U [0.50] PHYS*710 or equivalent. PHYS*7130 Solid State Physics U [0.50] PHYS*7040 Statistical Physics I U [0.50] PHYS*7130 Special Topics in Theoretical Condensed Matter Physics U [0.50] PHYS*7130 Special Topics in Surface Physics U [0.50] PHYS*7130 Special Topics in Surface Physics U [0.50]	PHYS*6480 PSI Explorations in Complex Systems U [0.25]	
PITVS*6400 PSI Explorations in Cosmology. Residence of selected topics in Cosmology. Review of selected topics in Cosmology. PITVS*7100 Quantum Mcchanics 11 U [0.50] Strong, electromagnetic and High Energy Physics U [0.59] Strong, electromagnetic and High Energy Physics U [0.59] Strong, electromagnetic and High Energy Physics U [0.50] Strong, electromagnetic and High Energy Physics U [0.51] PITVS*7020 Quantum Mcchanics II U [0.50] Strong, electromagnetic and High Energy Physics U [0.52] Review of relativistic quantum mechanics, elementary quantum field theory, and digrams, Application to many-particle systems. PHVS*7100 Special Topics in Subatomic and Nuclear Physics U [0.50] Provequisite(s): PHYS*7010 or equivalent PHVS*7100 Special Topics in Subatomic and Materia Special Topics in Condensed Matter Physics U [0.50] PHVS*7020 Quantum mechanics, electron of the density matrix functuations for the machines, and or the density matrix functuation of the formalian of interacting quantum field theory, and field theory, and the particle interpretation of field quants. Canonical quantization. PHVS*7300 Special Topics in Condensed Matter Physics U [0.50] PHVS*7040 Special Topics in Sourface Physics U [0.50] PHVS*7308 Special Topics in Sourface Physics U [0.50] PHVS*7308 Special Topics in Surface Physics U [0.50] PHVS*7308 Special Topics in Surface Physics U [0.50] PHVS*7400 Special Topics in Specinal physics. Furt enspiration of the density matrix functuations,	Review of selected topics in Complex Systems.	PHYS*/160 Special Topics in Subatomic and Nuclear Physics U [0.50]
Review of selected topics in Cosmology. PHYS*710 Intermediate and High Energy Physics U [0.50] PHYS*7010 Quantum Mechanics I * U [0.50] Stong, electronagencii: and weak interactions. Isosiny: transgeness: conservation laws and symmetry principles. Leptons, hadrons, quarks and their classification, formation, interactions and decay. PHYS*7100 Quantum Mechanics II U [0.50] PHYS*7180 Special Topics in Subatomic and Nuclear Physics U [0.25] PHYS*7100 Quantum Mechanics, elementary quantum field theory, and field theory of relativistic quantum mechanics, elementary quantum field theory, and field theory U [0.50] PHYS*7100 Gid State Physics U [0.50] PHYS*7100 Quantum Field Theory U [0.50] PHYS*710 Social State Physics U [0.50] PHYS*720 Social State Physics U [0.50] PHYS*7100 or equivalent PHYS*720 Social Topics in State Physics U [0.50] PHYS*720 Social Topics in State Physics U [0.50] PHYS*7200 Sutsitical Physics U [0.50] PHYS*720 Special Topics in State Physics U [0.50] PHYS*720 Special Topics in State Physics U [0.50] PHYS*7200 Sutsitical Physics U [0.50] PHYS*720 Special Topics in State Physics U [0.50] PHYS*720 Special Topics in State Physics U [0.50] PHYS*7200 Sutsitical Physics U [0.50] PHYS*720 Special Topics in State Physics U [0.50] PHYS*720 Special Topics in State Physics U [0.50] PHYS*7200 Sutsitical Physics II U [0.50] PHYS*720 Special Topics in State Physics U [0.50] PHYS*720 Special Topics in Stat	PHYS*6490 PSI Explorations in Cosmology U [0.25]	Restriction(s): Instructor's signature required
PHYS*7010 Quantum Mechanics 1* U [0.50] Strong, electromagnetic and weak interactions, loopin, strangeness, conservation laws and symmetry principles. Leptons, ladoros, quarks and their classification, formation, intraction, formation, function, func	Review of selected topics in Cosmology.	PHYS*7170 Intermediate and High Energy Physics U [0.50]
Review of formalism of norrelativistic quantum mechanics including symmetries and invariance. Approximation methods and sattering theory. Elementary quantum herein of radiation. Introduction to one-particle relativistic wave equations. Interactions and decay. PHYS*7020 Quantum Mechanics II U [0.0] Review of institution to many-particle systems. Prerequisite(s): Instructor's signature required Physics P1010 or equivalent PHYS*7010 Solid State Physics II U [0.50] Review of relativistic quantum mechanics and classical field theory. Quantization of interacting fields (Feynman rules). Application of the formalism of interacting quantum fields to lowest-order quantum intectorolynamic processes. Radiative corrections and renormalization. PHYS*703 Decial Topics in Theoretical Condensed Matter Physics U [0.50] PHYS*97405 Natistical Physics IF U [0.50] PHYS*7330 Special Topics in Experimental Physics V [0.50] PHYS*9730 Special Topics in Experimental Physics V [0.50] PHYS*730 Special Topics in Experimental Physics V [0.50] PHYS*9750 Statistical Physics IF U [0.50] PHYS*730 Special Topics in Experimental Physics V [0.52] PHYS*9750 Statistical Physics IF U [0.50] PHYS*730 Special Topics in Experimental Physics V [0.50] PHYS*9750 Statistical Physics IF U [0.50] PHYS*730 Special Topics in Experimental Physics V [0.50] PHYS*9750 Statistical Physics IF U [0.50] PHYS*730 Special Topics in Experimental Physics V [0.50] PHYS*9750 Statistical Physics II U [0.50] PHYS*730 S	PHYS*7010 Quantum Mechanics I * U [0.50]	Strong, electromagnetic and weak interactions. Isospin, strangeness, conservation laws and symmetry principles. Leptons, hadrons, quarks and their classification, formation
invariance. Approximation methods and scattering theory. Elementary quantum theory of radiation. Intructor's signature required PHYS*7180 Special Topics in Subatomic and Nuclear Physics U [0.25] PRYS*7180 Special Topics in Subatomic and Nuclear Physics U [0.50] Review of relativistic quantum mechanics, elementary quantum field theory, and perform and gargers of relativistic quantum mechanics and classical field theory. Quantization of free quantum fields (the particle interpretation of field quants). Canonical quantization of interacting fields (the particle interpretation of field quants). Canonical quantization of reormalization. PHYS*7230 Solid State Physics II U [0.50] PHYS*7030 Quantum Field Theory U [0.50] Transport or poperties: optical properties: magnetism; superconductivity; disordered matter decitodynamic processes. Radiative corrections and renormalization. PHYS*7300 Special Topics in Theoretical Condensed Matter Physics U [0.50] PHYS*7040 statistical Physics I* U [0.50] PHYS*7308 Special Topics in Surface Physics U [0.50] PHYS*7050 Statistical Physics I* U [0.50] PHYS*7308 Special Topics in Condensed Matter and Materials Physics U [0.52] PHYS*7050 Statistical Physics I* U [0.50] PHYS*7400 perices applications selected from a variety of topics and spectral properties; applications selected from a variety of topics are nuclear differention, light scattering, acoustics, molecular beams, NMR, surface analysis, etc. PHYS*7500 Electromagnetic Theory V [0.50] PHYS*7502 Molecular Biophysics U [0.50] PHYS*7500 Electromagnetic Theory server and properties; applications alper	Review of formalism of nonrelativistic quantum mechanics including symmetries and	interactions and decay.
PHYS*700 Quantum Mechanics and expansion Restriction(s): Instructor's signature required PHYS*020 Quantum Mechanics, elementary quantum field theory, and figures of solids. PHYS*7010 Solid State Physics I U [0.50] PHYS*702 Quantum Field Theory U [0.50] PHYS*703 Quantum mechanics, and classical field theory, quantization of the formalism of interacting quantum fields to lowest-order quantum field quantum. Field quantum field quants). Canonical quantization of the formalism of interacting quantum fields to lowest-order quantum electrodynamic processes. Radiative corrections and renormalization. Prerequisite(s): PHYS*7010 or equivalent. PHYS*7030 Solid State Physics I* U [0.50] PHYS*7030 Statistical Physics I* U [0.50] PHYS*7040 statistical Physics I* U [0.50] PHYS*7050 Statistical Physics I* U [0.50] PHYS*7050 Statistical Physics I* U [0.50] PHYS*7050 Statistical Physics I* U [0.50] PHYS*7050 Statistical Physics I* U [0.50] PHYS*7050 Statistical Physics I* U [0.50] PHYS*7050 Statistical Physics I U [0.50] PHYS*7050 Statistical Physics I U [0.50] PHYS*7050 Statistical Physics I U [0.50] PHYS*7050 Statistical Physics I U [0.50] PHYS*7050 Statistical Physics I U [0.50] PHYS*7050 Statistical Physics I U [0.50] PHYS*7050 Statistical Physics I U [0.50] PHYS*7050 Statistical Physics I U [0.50] PHYS*7050 Statistical Physics I U [0.50] PHYS*7050 Statistical P	invariance. Approximation methods and scattering theory. Elementary quantum theory of radiation. Introduction to one-particle relativistic wave equations	PHYS*7180 Special Topics in Subatomic and Nuclear Physics U [0.25]
PHTS*7030 Goal distate Physics I U (0.50) PHTS*7030 Solid State Physics I U (0.50) PHTS*7030 Concerts of relativistic quantum mechanics, elementary quantum field theory, and Perequisite(s): PHTS*7010 or equivalent PHTS*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 guaduitization. PHTS*7030 Quantum Field Interpretation of field quants). Canonical quantization of interacting guaduitization. Prerequisite(s): PHTS*7030 Solid State Physics II U (0.50) PHTS*7030 Solid Statistical Physics I V (0.50) PHTS*7030 Solid State Physics I U (0.50) PHTS*7030 Solid State Physics I U (0.50) PHTS*7040 Statistical Physics II U (0.50) PHTS*7040 Statistical Physics II U (0.50) PHTS*7050 Secial Topics in Experimental Physics V (0.50) PHTS*7050 Statistical Physics II U (0.50) PHTS	PUVC*7020 Quentum Machanics II II [0.50]	<i>Restriction(s):</i> Instructor's signature required
 Ferryman diagrams. Application to many-particle systems. Prerequisite(s): PHYS*7010 or equivalent Physe7030 Quantum Field Theory U [0.50] PHYS*7030 Quantum Field Theory U [0.50] PHYS*7010 or equivalent Physe7300 Special Topics in Theoretical Condensed Matter Physics U [0.50] PHYS*7300 Special Topics in Theoretical Condensed Matter Physics U [0.50] PHYS*7300 Special Topics in Surface Physics U [0.50] PHYS*7300 Special Topics in Condensed Matter Physics U [0.50] PHYS*7300 Special Topics in Condensed Matter and Materials Physics U [0.50] PHYS*7300 Special Topics in Condensed Matter and Materials Physics U [0.50] PHYS*7300 Special Topics in Condensed Matter and Materials Physics U [0.50] PHYS*7300 Special Topics in Condensed Matter and Materials Physics U [0.50] PHYS*7300 Special Topics in Condensed Matter and Materials Physics U [0.50] PHYS*7300 Special Topics in Condensed Matter and Materials Physics U [0.50] PHYS*7300 Special Topics in Condensed Matter and Materials Physics U [0.50] PHYS*7300 Special Topics in Condensed Matter and Materials Physics u [0.50] PHYS*7300 Special Topics in Condensed Matter and Materials Physics u [0.50] PHYS*7400 Optical Electronic component fabrication top: applications of comp relics: application to grave phromema, Kubo's theory of the corelation function: membrane theories, adiffustion and superimental Physics. Sci Cellular State Physics U [0.50] PHYS*7500 Statistical Physics I U (0.50] PHYS*7500 Applications of Group Theory U [0.50] PHYS*7500 Applications of Group Theory U [0.50] PHYS*7500 Material protection: company physics U [0.50] PHYS*7500 Material physics I (0.50) PHYS*7500 Material physics I (0.50) PHYS*7500 Material Physics I (0.50)	Concepts of relativistic quantum mechanics, elementary quantum field theory and	PHYS*7310 Solid State Physics I U [0.50]
Prerequisite(s): PHYS*7010 or equivalent properties of solids. PHYS*7030 Quantum Field Theory U [0.50] PHYS*72030 Guantum Field Theory U [0.50] Transport properties; magnetism; superconductivity: disordered systems. Review of relativistic quantum fields (the particle interpretation of field quants). Canonical quantization of field quants). Canonical quantization of the formalism of interacting quantum fields (the particle interpretation of the formalism of interacting quantum fields (the particle interpretation of the formalism of interacting quantum fields (the particle interpretation of the formalism of interacting quantum fields (the particle interpretation of the formalism of interacting quantum fields (the particle interpretation of the formalism of interacting quantum fields to lowsci order quantum the detordynamics; marcorotanonical, canonical quantus; fluctuations, insci. traverspite thermodynamics; transport the detory; applications to gases, liquids, solids. PHYS*7050 Statistical Physics II U [0.50] PHYS*7450 Special Topics in Experimental Physics * U [0.50] PHYS*7060 Electromagnetic Theory of the dielectric constant, etc. PHYS*7470 Optical Electronics U [0.50] PHYS*7040 equivalent. PHYS*7510 Cellular Biophysics U [0.50] PHYS*7040 equivalent. PHYS*7040 or equivalent. PHYS*7040 properties; applications decord from a variey of inte correlation function; membrane theories, diffusion and any perting constant, etc. PHYS*7470 Optical Electronics U [0.50] PHYS*7040 Electromagnetic Theory * U [0.50] Optoelectronic comonontal fabrication,	Feynman diagrams. Application to many-particle systems.	Phonons, electron states, electron-electron interaction, electron-ion interaction, static
PHYS*7030 Quantum Field Theory U [0.50] Review of relativistic quantum mechanics and classical field theory. Quantization of field quants. Canonical quantum fields (the particle interpretation of field quants). Canonical quantum fields (the particle interpretation of field quants). Canonical quantum fields (Feynman rules). Applications of the formalism of interacting quantum fields (Feynman rules). Applications of the formalism of interacting quantum fields (Feynman rules). Applications of the formalism of interacting quantum fields (Feynman rules). Applications of the formalism of interacting quantum fields (Feynman rules). Applications of the density matrix: fuctuations, noise, interversible thermodynamics; microcanonical, canonical and grand canonical ensembles; quantum statistical mechanics, theory of the density matrix: fluctuations, for insport and spectral properties: application to gases, liquids, solids. PHYS*7050 Statistical Physics II U [0.50] PHYS*7050 Getectromagnetic Theory * U[0.50] PHYS*7060 Electromagnetic Theory * U[0.50] PHYS*7060 Electromagnetic field (1, line broadening. Dispersion; field theory, senderoly reductions to molecular vibrations, the solid state, quantum mechanics and intermolecular forces, with application of lorerign molecular.	Prerequisite(s): PHYS*7010 or equivalent	properties of solids.
Review of relativistic quantum mechanics and classical field theory. Quantization of field quants). Application of the formalism of interacting quantum fields (Feynman rules). Application of the formalism of interacting quantum fields (Feynman rules). Application of the formalism of interacting quantum fields (Feynman rules). Application of the formalism of interacting quantum fields (Feynman rules). Application of the formalism of interacting quantum fields (Feynman rules). Application of the formalism of interacting quantum fields (Feynman rules). Application of the formalism of interacting quantum fields (Feynman rules). Applications of the operation of the formalism of interacting quantum fields (Feynman rules). Applications of the operation of the formalism of interacting quantum statistical physics I to I (0.50) PHYS*7308 Special Topics in Surface Physics U (0.50) PHYS*7050 Statistical Physics II U [0.50] PHYS*7050 Statistical Physics II U [0.50] PHYS*7050 Statistical Physics II U [0.50] PHXS*7060 Exetormagnetic Theory * U [0.50] PHYS*7060 Cheen setup henomena. Kubo's heory of time correlation functions for transport and spectral properties; applications selected from a variety of topics revisite, special radius theory, irrediating, molecular liquids, liquid, Prives*7060 Exetormagnetic Theory * U [0.50] PHYS*7100 Otical Electronics U [0.50] Solutions to Maxwell's equations, radiation theory, normal modes; multipole expansion: laws for the electromagnetic field; ine broadening. Dispersion: Ricer Physics U [0.50] PHYS*7500 Electronics U [0.50] PHYS*7000 Cheen's Function Method U [0.50] PHYS*7500 Molecular Biophysics U [0.50] PHYS*7500 Molecular Biophysics U [0.50] PHYS*7000 Green's Function M	PHYS*7030 Quantum Field Theory U [0.50]	PHYS*7320 Solid State Physics II U [0.50]
quantum fields (the particle interpretation of held quants). Canonical quanturation of interacting fields (Feynman rules). Applications of the cromalism of interacting quantum fields (Feynman rules). Applications of the cromalism of interacting quantum fields (Feynman rules). Applications of the cromalism of inter extremes in the creation of the form fields (Feynman rules). Applications of the cromal modes; multipole expansion; Kirchhof's diffraction theory; radiation theory, normal modes; multipole expansion; Kirchhof's diffraction theory; rulation theory, normal modes; multipole expansion; Kirchhof's diffraction theory; rulations, the solid state, quantum mechanics Kirchhof's diffraction some concept, representation theory, character theory. Applications of Group Theory U [0.50] PHYS*750 Applications of Group Theory U [0.50] PHYS*7080 Applications of Group Theory U [0.50] PHYS*750 Celular Biophysics U [0.50] PHYS*7080 Applications diffraction theory, character theory. Applications, second finite temperature. Green's functions, krew of essential quantum field theory. Zero and finite temperature. Green's functions, PHYS*7080 Green's Function Method U [0.50] PHYS*750 Special Topics in Experimental Physics V [0.50] PHYS*7080 Green's Function Method U [0.50] PHYS*750 Cellular Biophysics U [0.50] PHYS*7080 Green's Function Method U [0.50] PHYS*750 Special Topics in Biophysics U [0.50] PHYS*7080 Green's Function Method U [0.50] PHYS*750 Special Topics in Biophysics U [0.50] PHYS*760 Green's Function Method U [0.50] PHYS*750 Special Topics in Biophysics U [0.50] PHYS*760 Green's Function Method U [0.50] PHYS*750 Special Topics in Bioph	Review of relativistic quantum mechanics and classical field theory. Quantization of free	Transport properties; optical properties; magnetism; superconductivity; disordered
Interesting to loss of optimization meters planation of meters planation of meters planation of meters planation. PHY\$*730 Special Topics in Theoretical Condensed Matter Physics U [0.50] PHYS*7040 Statistical Physics I* U [0.50] 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, inverseible thermodynamics; microcanonical, canonical and grand canonical ensembles; quantum statistical mechanics, theory of time correlation functions, for transport and spectral properties; applications ogaes, liquids, solids. PHYS*7050 Statistical Physics II U [0.50] A modular course in which each module deals with an established technique of expression for transport and spectral properties; applications selected from a variety of topics in functions; for transport and spectral properties; applications selected from a variety of topics (crystals, surface phenomena, theory of the idelectric constant, etc. PHYS*7060 Electromagnetic Theory * U [0.50] PHYS*7040 Optical Electronics U [0.50] PHYS*7040 Cellular Biophysics U [0.50] PHYS*7510 Cellular Biophysics U [0.50] Rirdsh's diffraction theory, radiating point charge; optical theorem, Special relativity; transport, bioelectric phenomena, intracellular motion, thermodynamics; selected topics in current interest and seminar. PHYS*7080 Statistical Physics I (0.50] PHYS*7510 Cellular Biophysics U [0.50] Rirdsh's diffraction theory; radiation theory, normal modes; multipole expansion; Kramers-Kronig relations. Magnetohydrodynamics and plasmas	quantum fields (the particle interpretation of field quants). Canonical quantization of interacting fields (Feynman rules) Application of the formalism of interacting quantum	systems.
renormalization. PHYS*730 Special Topics in Surface Physics U [0.50] PHYS*7304 Statistical Physics I* U [0.50] PHYS*7304 Statistical Physics I* U [0.50] PHYS*7305 Special Topics in Experimental Physics * U [0.50] PHYS*7350 Special Topics in Experimental Physics * U [0.50] PHYS*7050 Statistical Physics II U [0.50] PHYS*7050 Statistical Physics II U [0.50] PHYS*7050 Statistical Physics II U [0.50] PHYS*7050 Statistical Physics II U [0.50] PHYS*7050 Statistical Physics II U [0.50] PHYS*7050 Statistical Physics II U [0.50] PHYS*7050 Statistical Physics II U [0.50] PHYS*7060 Electronics U [0.50] PHYS*7060 Electromagnetic Theory * U [0.50] PHYS*7040 or equivalent. PHYS*7060 Electromagnetic Theory * U [0.50] PHYS*7060 Electronics U [0.50] Solutions to Maxwell's equations; radiation theory, normal modes; multipole expansion; Karahors diffraction heory: radiating point charge: optical theorem. Special relativity; FY7520 Molecular Biophysics U [0.50] PHYS*7080 Applications of Group Theory U (0.50) PHYS*7520 Molecular Biophysics U [0.50] PHYS*7090 Green's Function Method U [0.50] PHYS*7520 Molecular Biophysics U [0.50] PHYS*7090 Green's Function Method U [0.50] PHYS*7520 Molecular Biophysics U [0.50] PHYS*7080 Applications to molecular vibrations, the solid state, quantum mechanics and crystal field theory. PHYS*7520 Molecular Biophysics U [0.50]	fields to lowest-order quantum electrodynamic processes. Radiative corrections and	PHYS*7330 Special Topics in Theoretical Condensed Matter Physics U [0.50]
Prerequisite(s): PHYS*7010 or equivalent. PHYS*7040 Statistical Physics I* U [0.50] Statistical basis of thermodynamics; microcanonical, canonical ensembles; quantum statistical mechanics, theory of the density matrix; fluctuation phenomena. Kubo's theory of the density matrix; fluctuations, noise, irreversible thermodynamics; transport theory; application to gases, liquids, solids. PHYS*7050 Statistical Physics II U [0.50] Phys*7060 Electromagnetic Theory * U [0.50] Solutions to Maxwell's equations; radiation theory, normal modes; multipole expansion; Kramers-Kronig relations. Magnetohydrognamics and plasmas. PHYS*7080 Applications of Group Theory U [0.50] PHYS*7080 Applications to Maxwell's equations; 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.	renormalization.	PHYS*7370 Special Topics in Surface Physics U [0.50]
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. PHYS*7100 Dical Electronics U [0.50] PHYS*7060 Electromagnetic Theory * 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*7060 Electromagnetic Theory * U [0.50] PHYS*7510 Cellular Biophysics U [0.50] Solutions to Maxwell's equations; radiation theory, normal modes; multipole expansion; Kramers-Kronig relations, Magnetohydrodynamics and plasmas. PHYS*7510 Cellular Biophysics U [0.50] PHYS*7080 Applications of Group Theory 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*7080 Applications of Group Theory U [0.50] PHYS*7520 Molecular Biophysics U [0.50]	Prerequisite(s): PHYS*7010 or equivalent.	PHYS*7380 Special Topics in Condensed Matter and Materials Physics U [0.25]
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. FMTS*7450 Special Topics in Experimental Physics * C [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*7470 Optical Electronics U [0.50] PHYS*7470 Optical Electronics U [0.50] Crystals, surface phenomena, theory of the dielectric constant, etc. PHYS*7470 Optical Electronics U [0.50] PHYS*7060 Electromagnetic Theory * U [0.50] PHYS*7510 Cellular Biophysics U [0.50] Solutions to Maxwell's equations; radiation theory, normal modes; multipole expansion; Kirchhoff's diffraction hory; radiating point charge; optical theorem. Special relativity; transformation laws for the electromagnetic field; line broadening. Dispersion; Kiramers-Kronig relations. Magnetohydrodynamics and plasmas. PHYS*7500 Applications to molecular vibrations, the solid state, quantum mechanics and relations to molecular vibrations, the solid state, quantum mechanics and releves, with application to lamellar structure; information storage, DNA and RNA, recognition and rejection of foreign molecules. PHYS*7500 Green's Function Method U [0.50] PHYS*7540 Special Topics in Biophysics U [0.50] Review of essential quantum field	PHYS*7040 Statistical Physics I* U [0.50]	
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 heory; radiating point charge; optical theorem. Special relativity; transformation laws for the electromagnetic field; line broadening. Dispersion; Kirchhoff's diffraction toory; symmetry, the group concept, representation theory, character theory. Applications to molecular vibrations, the solid state, quantum mechanics and phases.PHYS*7090 Green's Function Method U [0.50]Review of essential quantum field theory. Zero and finite temperature. Green's functions.PHYS*704 Of creating aquatum field theory. Zero and finite temperature. Green's functions.PHYS*704 Of creating aquatum field theory. Zero and finite temperature. Green's functions.	Statistical basis of thermodynamics; microcanonical, canonical and grand canonical ensembles: quantum statistical mechanics, theory of the density matrix; fluctuations	A modular course in which each module deals with an established technique of
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.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*7040 or equivalent.PHYS*7040 or equivalent.PHYS*7060 Electromagnetic Theory * 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*7060 Electromagnetic Theory * U [0.50]PHYS*7510 Cellular Biophysics U [0.50]Solutions to Maxwell's equations; radiating point charge; optical theorem. Special relativity; transformation laws for the electromagnetic field; line broadening. Dispersion; Kramers-Kronig relations. Magnetohydrodynamics and plasmas.PHYS*7510 Cellular Biophysics U [0.50]PHYS*7080 Applications of Group Theory U [0.50]PHYS*7520 Molecular Biophysics U [0.50]PHYS*7090 Green's Function Method U [0.50]PHYS*7540 Special Topics in Biophysics U [0.50]Review of essential quantum field theory. Zero and finite temperature. Green's functions. Applications.PHYS*7540 Special Topics in Biophysics U [0.50]PHYS*700 Green's Function Method U [0.50]PHYS*7540 Special Topics in Biophysics U [0.50]Review of essential quantum field theory. Zero	noise, irreversible thermodynamics; transport theory; application to gases, liquids, solids.	experimental physics. Four modules will be offered during the Winter and Spring
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. PHYS*7470 Optical Electronics U [0.50] PHYS*7060 Electromagnetic Theory * 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. Solutions to Maxwell's equations; radiation theory, normal modes; multipole expansion; Kramers-Kronig relations. Magnetohydrodynamics and plasmas. PHYS*7510 Cellular Biophysics U [0.50] PHYS*7080 Applications of Group Theory 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*7090 Green's Function Method U [0.50] PHYS*7540 Molecular Biophysics U [0.50] PHYS*7540 Special Topics in Biophysics U [0.50] PHYS*7540 Special Topics in Biophysics U [0.50] PHYS*7540 Green's Function Method U [0.50] PHYS*7540 Special Topics in Biophysics U [0.50] Review of essential quantum field theory. Zero and finite temperature. Green's functions. Applications. PHYS*7540 Special Topics in Biophysics U [0.50] Offered on demand Offered on demand	PHYS*7050 Statistical Physics II U [0.50]	semesters, but registration and credit will be in the spring semester. Typical topics are
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] Optoelectronics 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*7060 Electromagnetic Theory * U [0.50] PHYS*710 Cellular Biophysics 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; Kirchhoff's diffractions of Group Theory U [0.50] PHYS*710 Cellular Biophysics U [0.50] PHYS*7080 Applications of Group Theory U [0.50] PHYS*7520 Molecular Biophysics U [0.50] PHYS*7090 Green's Function Method U [0.50] PHYS*7540 Special Topics in Biophysics U [0.50] PHYS*7540 Special quantum field theory. Zero and finite temperature. Green's functions. PHYS*7540 Special Topics in Biophysics U [0.50] PHYS*7540 Special Topics in Biophysics U [0.50] PHYS*7540 Special Topics in Biophysics U [0.50]	Phase transitions. Fluctuation phenomena. Kubo's theory of time correlation functions	etc.
Introduction generalized involvements, theory of the dielectric constant, etc. Prerequisite(s): PHYS*7040 or equivalent. PHYS*7060 Electromagnetic Theory * U [0.50] Solutions to Maxwell's equations; 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] PHYS*7080 Applications to molecular vibrations, the solid state, quantum mechanics and rystal field theory. PHYS*7090 Green's Function Method U [0.50] Review of essential quantum field theory. Zero and finite temperature. Green's functions. PHYS*7080 Applications. PHYS*7090 Green's Function Method U [0.50] Review of essential quantum field theory.	for transport and spectral properties; applications selected from a variety of topics including linearized hydrodynamics of normal and superfluids molecular liquid liquid	PHVS*7470 Ontical Electronics II [0.50]
Prerequisite(s): PHYS*7040 or equivalent. PHYS*7060 Electromagnetic Theory * U [0.50] optical fiber properties, electro-optic and acousto-optic modulation, spontaneous and stimulated emission, semiconductor lasers and detectors, nose effects in fiber systems. 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*7510 Cellular Biophysics U [0.50] PHYS*7080 Applications of Group Theory U [0.50] PHYS*7520 Molecular Biophysics 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*7540 Special Topics in Biophysics U [0.50] PHYS*7090 Green's Function Method U [0.50] PHYS*7540 Special Topics in Biophysics U [0.50] Review of essential quantum field theory. Zero and finite temperature. Green's functions. Applications. PHYS*7540 Special Topics in Biophysics U [0.50] Offered on demand Offered on demand	crystals, surface phenomena, theory of the dielectric constant, etc.	Ontoelectronic component fabrication, light propogation in linear and nonlinear media.
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*7510 Cellular Biophysics U [0.50]PHYS*7080 Applications of Group Theory 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*7080 Applications of Group Theory U [0.50]PHYS*7520 Molecular Biophysics 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*7540 Special Topics in Biophysics U [0.50]PHYS*7090 Green's Function Method U [0.50]PHYS*7540 Special Topics in Biophysics U [0.50]Review of essential quantum field theory. Zero and finite temperature. Green's functions. Applications.PHYS*7540 Special Topics in Biophysics U [0.50]Offered on demand	Prerequisite(s): PHYS*7040 or equivalent.	optical fiber properties, electro-optic and acousto-optic modulation, spontaneous and
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*7510 Cellular Biophysics U [0.50]PHYS*7080 Applications of Group Theory 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*7080 Applications of Group Theory U [0.50]PHYS*7520 Molecular Biophysics 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*7540 Special Topics in Biophysics U [0.50]PHYS*7090 Green's Function Method U [0.50]PHYS*7540 Special Topics in Biophysics U [0.50]Review of essential quantum field theory. Zero and finite temperature. Green's functions. Applications.PHYS*7540 Special Topics in Biophysics U [0.50]Offered on demand	PHYS*7060 Electromagnetic Theory * U [0.50]	stimulated emission, semiconductor lasers and detectors, nose effects in fiber systems.
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.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*7080 Applications of Group Theory U [0.50]PHYS*7520 Molecular Biophysics 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*7520 Molecular Biophysics U [0.50]PHYS*7090 Green's Function Method U [0.50]PHYS*7540 Special Topics in Biophysics U [0.50]Review of essential quantum field theory. Zero and finite temperature. Green's functions. Applications.PHYS*7540 Special Topics in Biophysics U [0.50]Offered on demandDiffered on demand	Solutions to Maxwell's equations; radiation theory, normal modes; multipole expansion;	PHYS*7510 Cellular Biophysics U [0.50]
Hansformation faws for the effection agreet field, the 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 intermolecular forces, with application to lamellar structures, information storage, DNA and RNA, recognition and rejection of foreign molecules. PHYS*7090 Green's Function Method U [0.50] Review of essential quantum field theory. Zero and finite temperature. Green's functions. Applications.	Kirchhoff's diffraction theory; radiating point charge; optical theorem. Special relativity;	The physics of cellular structure and function; membrane theories, diffusion and active transport, bioelectric phenomena; intracellular motion, thermodynamics; selected tonics
PHYS*7080 Applications of Group Theory U [0.50] PHYS*7520 Molecular Biophysics 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. 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*7090 Green's Function Method U [0.50] PHYS*7540 Special Topics in Biophysics U [0.50] Review of essential quantum field theory. Zero and finite temperature. Green's functions. Applications. Offered on demand	Kramers-Kronig relations. Magnetohydrodynamics and plasmas.	of current interest and seminar.
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. 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*7090 Green's Function Method U [0.50] PHYS*7540 Special Topics in Biophysics U [0.50] Review of essential quantum field theory. Zero and finite temperature. Green's functions. Offered on demand	PHYS*7080 Applications of Group Theory U [0.50]	PHYS*7520 Molecular Biophysics U [0.50]
theory. Applications to molecular vibrations, the solid state, quantum mechanics and crystal field theory. and intermolecular forces, with application to lamellar structures, information storage, DNA and RNA, recognition and rejection of foreign molecules. PHYS*7090 Green's Function Method U [0.50] PHYS*7540 Special Topics in Biophysics U [0.50] Review of essential quantum field theory. Zero and finite temperature. Green's functions. Offered on demand	Introduction to group theory; symmetry, the group concept, representation theory, character	Physical methods of determining macromolecular structure: energetics, intramolecular
crystal held theory. DNA and RNA, recognition and rejection of foreign molecules. PHYS*7090 Green's Function Method U [0.50] PHYS*7540 Special Topics in Biophysics U [0.50] Review of essential quantum field theory. Zero and finite temperature. Green's functions. Offered on demand	theory. Applications to molecular vibrations, the solid state, quantum mechanics and	and intermolecular forces, with application to lamellar structures, information storage,
PHYS*7090 Green's Function Method U [0.50] PHYS*7540 Special Topics in Biophysics U [0.50] Review of essential quantum field theory. Zero and finite temperature. Green's functions. Offered on demand Applications. PHYS*7540 Special Topics in Biophysics U [0.50]	crystal field theory.	DNA and KNA, recognition and rejection of foreign molecules.
Applications. Othered on demand	PHYS*7090 Green's Function Method U [0.50]	PHYS*7540 Special Topics in Biophysics U [0.50]
	Review of essential quantum field theory. Zero and finite temperature. Green's functions. Applications.	

Offered on demand

PHYS*7670 Introduction to Quantum Information Processing F [0.50]	PLNT*6100 Advanced Plant Breeding I W [0.50]
Quantum superposition, interference, and entanglement. Postulates of Quantum Mechanics. Quantum computational complexity. Quantum Algorithms. Quantum communication and cryptography. Quantum error correction. Implementations.	The practical consideration of genetic theory and biological limitations to improving plant populations and developing cultivars will be discussed. Current and emerging breeding methodologies and sources of variation used to achieve plant breeding goals
PHYS*7680 Special Topics in Quantum Information Processing U [0.50]	will be examined through lectures, paper discussion, site visits and invited talks.
PHYS*7690 Special Topics in Quantum Information Processing U [0.25]	PLNT*6110 Fruit and Vegetable Technology F [0.50]
DIVS#7710 Special Lecture and Deading Course U [0.20]	The course is primarily intended to address science and technology aspects of fruits and vegetables, with specific reference to storage, packaging, quality, processing, products
rn 15*//10 Special Lecture and Reading Course U [0.50]	and ingredients, health regulatory properties and biotechnology issues etc. Methods of
PHYS*7730 Special Topics in Physics U [0.50]	presentations, term papers and participation in discussions. (Offered in even-numbered
PHYS*7750 Interinstitution Exchange U [0.50]	years)
of specialized studies at another institution. Formal evaluation is required.	PLNT*6160 Advanced Plant Breeding II W [0.50]
Restriction(s): GWPI director approval required	means, variances, covariances and resemblance among relatives. Lecture topics will be
PHYS*7760 Special Topics in Physics U [0.50]	expanded through discussion of classic and current papers. (Offered in odd numbered
PHYS*7770 Special Topics in Physics U [0.25]	DI NT*6170 Statistics in Plant Agriculture W [0.50]
PHYS*7810 Fundamentals of Astronhysics U [0.50]	The application of statistical techniques to research in plant agriculture SAS will be the
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.	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.
Distance indicators. Interstellar reddening. Related topics.	PLNT*6230 Colloquium in Plant Physiology and Biochemistry U [0.25]
PHYS*7840 Advanced General Relativity W [0.50] Review of elementary general relativity. Timelike and null geodesic congruences	An open discussion course designed to review and critically analyze contemporary issues in plant physiology and biochemistry.
Hypersurfaces and junction conditions. Lagrangian and Hamiltonian formulations of	PLNT*6240 Colloquium in Crop Production and Management U [0.25]
general relativity. Mass and angular momentum of a gravitating body. The laws of black-hole mechanics.	An open discussion course designed to review and critically analyze contemporary issues
PHYS*7850 Quantum Field Theory for Cosmology U [0.50]	in crop production and management.
Introduction to scalar field theory and its canonical quantization in flat and curved	PLNT*6250 Colloquium in Plant Genetics and Breeding U [0.25]
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.	An open discussion course designed to review and critically analyse contemporary issues in plant genetics and breeding.
Hawking radiation.	PLNT*6260 Advanced Plant Genetics I F [0.50]
Prerequisite(s): PHYS*7010	A lecture and discussion course examining the underlying principles of genetics and the recent advances in plant genetics. Topics will include: structure of the genome
PHYS*7860 General Relativity for Cosmology U [0.50] Introduction to the differential geometry of Lorentzian manifolds. The principles of	experiments to measure and experimentally describe phenotypes, population structures, and molecular basis of inheritance of a phenotype.
general relativity. Causal structure and cosmological singularities. Cosmological space-times with Killing vector fields. Friedmann-Lemaitre cosmologies, scalar vector	PLNT*6270 Agroecosystem Design and Function F [0.50]
and tensor perturbations in the linear and nonlinear regimes. De Sitter space-times and inflationary models.	This lecture-based course critically analyzes the agroecosystem in field crop, horticulture, turferass and greenhouse industries. Agroecosystem design is considered in relation to
PHYS*7870 Cosmology U [0.50]	key components such as crop rotation and management of soil, nutrient and water supply.
Friedmann-Robertson-Walker metric and dynamics; big bang thermodynamics; nucelosynthesis; recombination; perturbation theory and structure formation; anisotropies in the Commis Microwaya Background structure of assertion dynamics.	The significance of plant function, soil properties, and nutrient and water cycles to agroecosystem design are examined. Metrics of productivity and environmental sustainability serve to focus discussion on agroecosystem optimization.
fields; galaxy formation; inflation.	PLNT*6280 Invasive Plant Ecology in Natural and Agricultural Systems W [0.50]
PHYS*7880 Special Topics in Astronomy U [0.50]	This course will focus on the ecological principles that are important in understanding
Offered on demand	the potential for a plant species to become invasive. Students will be able to use this knowledge to facilitate management of these species under field conditions. (Offered in
PHYS*7890 Special Topics in Astrophysics U [0.25]	odd years)
Offered on demand	Prerequisite(s): CROP*4240 or BOT*2100 or BOT*3120
PHYS*7970 MSc Project U [1.00]	PLNT*6290 Advanced Plant Genetics II W [0.50]
Study of a selected topic in physics presented in the form of a written report. For students whose MSc program consists entirely of courses	A lecture and discussion course examining classical and molecular genetic investigations for understanding the genetic basis and regulation of physiological processes in plants.
PHYS*7900 Special Topics in Gravitation and Cosmology U [0.50]	(Onered in even-numbered years) PI NT*6320 Metabolic Processes in Crop Plants E [0 50]
PHYS*7910 Special Topics in Gravitation and Cosmology U [0.25]	A comprehensive examination of the metabolic mechanisms and versatility whereby
Plant Agriculture	autotrophic organisms sustain themselves. Emphasis will be placed on our current understanding of the regulation and integration of metabolic processes in plants and their
PLNT*6010 Physiology of Crop Yield W [0.50]	physiological and agricultural significance including available research methodologies.
This course covers factors affecting biomass production and yield, with primary focus	Restriction(s): no auditing without permission of Instuctor
(temperature, water deficit, nutrient deficiency) are considered in detail, as are technical	PLNT*6330 Metabolism of Natural Products in Plants W [0.50]
aspects of intrumentation used in crop physiology research. (Offered annually)	A comprehensive analysis of the metabolism and roles of natural products in plants.
Prerequisite(s): PBIO*3110 or permission of instructor	Emphasis will be placed on the distinction between secondary and primary processes,
PLNT*6080 Plant Disease Epidemiology and Management F [0.50]	turnover of natural products. Key research methodologies and the roles of natural products
Epidemiology and management of plant diseases caused by fungi, viruses, and bacteria. (Offered in alternate years.)	a. in abiotic and biotic stresses and their effects on human health will be discussed. (in even numbered years)

in even numbered years)

May 13, 2014

230	Appendix A - Courses, I onitear Secret
PLNT*6340 Plant Breeding F [0.50]	POLS*6390 Environmental Politics and Policy U [0.50]
This course examines principles of plant breeding in self- and cross-pollinted crops. Additional topics include crop domestication, mating systems, heritability, gain from selection, disease resistance, polyploidy, marker assisted selection and government regulations.	This course analyses environmental actors, movements, institutions, processes and policies across national, sub-national regional and/or global levels of governance utilizing a range of environmental perspectives and theories. Depending on the instructor(s), different case studies of critical and contemporary environmental policy issues will be explored.
Restriction(s): MBG*4160	POLS*6400 Comparative Social Policy U [0.50]
PLNT*6400 Seminar F,W [0.25] All graduate students present a departmental seminar on their research proposal no later than the second semester. Each student is expected to participate in the seminars of colleagues and faculty.	In this course, students will study social policy in comparative perspective. Theoretical models and various policy fields will be examined in order to understand welfare state development and retrenchment. Policy fields may include immigration, health, child care and income.
Restriction(s): Restricted to thesis-based students	POLS*6450 International Political Economy U [0.50]
PLNT*6450 Plant Agriculture International Field Tour U [0.25] A field course designed to increase student's knowledge of primary field and animal agricultural production systems. To explore the environmental and political issues related to international agriculture and to understand the role of agri-business in the rural economy.	The course relies on theoretical approaches in IPE to examine the relationships between politics and economics across national and regional levels. The evolution of the global political economy and its globalization and state and non-state actors' responses. Issue areas may include: money and power, technology, trade, development and the environment.
Restriction(s): CROP*4260 if PLNT*6450 is field tour to mid-west USA	POLS*6630 Approaches to Public Policy U [0.50]
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, phylogenias, and finding, metifs, and genes in biological	This course introduces students to the main theoretical approaches utilized in understanding public policy making and outcomes. Throughout the course, particular attention is paid to varying conceptions of institutions, ideas and interest and the role of these conceptions in various explanations of policy change and stasis.
 anguinents, constructing phytogenics, and mining 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*2000). 	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.
as MBG*2020).	POLS*6730 The Politics of Development and Underdevelopment U [0.50]
PLNT*6800 Special Topics in Plant Science U [0.50] A study of selected contemporary topics in plant science. Proposed course descriptions are considered by the Department of Plant Agriculture on an ad hoc basis, and the course will be offered according to demand.	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.
Political Science	POLS*6750 Development in Practice U [0.50]
POLS*6000 Comparative Approaches to Political Science U [0.50]	This course examines the politics of international development policy and practice.
In this course, the students examine the main theoretical frameworks and debates in political science and the ways in which these conceptual approaches guide empirical analysis and explain political behaviour. Examples include neo-institutionalism, political	Drawing upon theories of development and underdevelopment, it examines the role of transnational regimes, international institutions, national governments, and NGOs in the provision of international development assistance.
culture, Marxism, feminist and identity based approaches.	POLS*6800 Public Policy and Governance - Selected Topics F [0.50]
POLS*6050 Gender and Politics U [0.50] This course will survey theoretical approaches to gender, primarily feminist analysis. Through selected readings, students will be introduced to gender as an approach to examining current political problems such as social policy, security or development.	This course explores concepts, theories and methods of public policy analysis and governance practices and questions; the factors that influence a state's ability to design, coordinate, implement and learn from policy interventions; the intellectual forces and conceptual-theoretical frameworks that underpin the literature.
POLS*6210 Conceptions of Canada U [0.50]	POLS*6810 Core Seminar in Comparative Politics W [0.50]
This course will explore evolving conceptions of Canadian identity and nationalism through consideration of political culture, institutions and constitutional arrangements. Possible topics include: multiculturalism, aboriginal identity and community, Quebec nationalism, social citizenship, rights and representation, as well as Canada's global role	This PhD seminar course will familiarize students with themes and theorists in comparative politics. <i>Restriction(s):</i> Doctoral students only.
and significance.	POLS*6900 Pro-Seminar U [0.25]
POLS*6250 Comparative Governments in the Americas U [0.50]	This course is a 0.25 credit course introducing students to graduate studies in the
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.	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*6290 The American Political System U [0.50]	POLS*6940 Qualitative Research Design and Methods 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.	This course focuses on the elements of designing and writing a research question and proposal. It further examines a variety of research methods, such as the case study, comparative and survey methods. Data collection techniques also are examined.
POLS*6380 Democratization in Comparative Perspective U [0.50]	POLS*6950 Specialized Topics in Political Studies U [0.50]
This course offers a graduate seminar in the study of democratization. Focusing primarily on the countries of the Global South, it explores theories of democratic transition, social mobilization and the articulation of rights aimed at defending new forms of democratic recognition.	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]	POPM*6540 Concepts in Environmental Public Health W [0.50]
The major paper is an extensive research paper for those who do not elect to complete a	This course covers the main concepts of environmental public health including basic
thesis. It may be taken over two semesters. The length of the major paper is not to exceed 10,000 words.	elements of environmental toxicology, risk analysis, air and water quality, food safety, waste, occupational health and eco health.
Population Medicine	POPM*6550 Public Health Policy and Systems W [0.50]
POPM*6100 Seminar F [0.00]	This course covers concepts and principles of public health policy and systems including:
A practical course that utilizes tutorials, workshops, self and peer reviewed assessment	the healthcare system; evolution of public health policy; models of policy development
to help participants develop skills in public speaking and presentation of scientific data.	and analysis; stakeholder analysis; and, public health ethics.
seminar series.	POPM*6560 Public Health Practicum U [1.00]
POPM*6200 Epidemiology I F [0.50]	In this 1.0 credit course, students will synthesize theoretical concepts, learned via prior
This course covers concepts, principles and methods of basic and applied epidemiology,	for a 12-to 16-week period, focusing on a major project of significance to the host
including the following topics: sampling, measuring disease frequency, clinical	organization.
critical appraisal of surveys, observational studies, field trials and critical appraisal.	<i>Prerequisite(s):</i> POPM*6200, POPM*6510, POPM*6520, POPM*6530, POPM*6540, and POPM*6550
Restriction(s): MPH and Population medicine students. All others must obtain	Restriction(s): MPH students only. All others instructor's signature required.
instructor's signature.	POPM*6570 Communication II F [0.50]
POPM*6210 Epidemiology II W [0.50]	This course is a capstone course for the MPH program as students reflect on, interpret
Advanced study design and analytic methods for the analysis of data from observational studies and surveys	and present their practicum experience in a variety of formats. The course also focuses
DODM*6220 A nelytical Enidemiology S [0.50]	framing and the development of a public health communication campaign.
This course focuses on the advanced analysis of enidemiologic studies. Case control	Prerequisite(s): POPM*6560 or instructor's signature required
cohort and survival studies are analysed within the generalized linear-model framework.	POPM*6580 Public Health Administration F [0.50]
Links between study objectives, study design and data analysis will be emphasized	This course will teach students to develop, implement and evaluate public health programs.
sampling of individuals, are discussed.	Knowing an organization's mission and priorities, developing strategic plans and conducting a cost-henefit analysis is critical for an effective administrator. Furthermore
Prerequisite(s): POPM*6210 and POPM*6290	conducting a program evaluation, understanding the role of advocacy is vital.
POPM*6230 Applied Clinical Research F [0.50]	POPM*6610 Theriogenology of Cattle * U [0.50]
This course is designed to help clinical researchers design, fund, and analyze their clinical	A lecture/seminar course emphasizing the relationship of nutritional, genetic, endocrine,
research. Emphasis is placed upon planning a well-designed clinical trial and writing a well-organized grant proposal	anatomic, and environmental factors with the reproductive health of cattle. Application
POPM*6250 Project in Enidemiology S [1 00]	DODM*(620 Thereingered areas at 10 501
Collection and analysis of field data and the preparation of a written report suitable for	A lecture/seminar course covering the genetic endocrine anatomic and environmental
publication, and oral presentation of the findings to the graduate faculty. This course is	factors that affect reproductive performance and health of horses. Breeding management,
part of the MSc program by course work in epidemiology.	including recent technologies, and management of the infertile animal will be included.
POPM*6290 Statistics for the Health Sciences F [0.50]	POPM*6650 Theriogenology of Dogs and Cats * U [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	A seminar/lecture series that includes the theory and management of clinical reproduction for the dog and cat including use of developing technologies
<i>Prerequisite(s):</i> POPM*6210 (or equivalent graduate course from another university)	DOPM*6670 Theriogenology of Small Duminents * U [0 50]
POPM*6350 Safety of Foods of Animal Origins F [0.50]	A seminar/laboratory course emphasizing advanced reproductive management of cheep
The detection, epidemiology, human health risk, and control of hazards in food of animal	goats and farmed deer/elk, with the emphasis on a sheep production model. New
origin.	reproductive technologies will be included.
Restriction(s): Offered by distance education only.	POPM*6700 Swine Health Management * U [0.50]
POPM*6400 Dairy Health Management * S [0.50] This course stresses a population-based, herd-level approach to dairy herd health	Diseases of swine are studied with particular emphasis on preventive medicine and herd-health management.
management, in which optimizing the efficiency of the dairy enterprise is the overall	POPM*6950 Studies in Population Medicine U [0.50]
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	Assigned reading and/or special projects selected to provide in-depth study of topics
health programs. The course will emphasize the critical role of record keeping, data	appropriate to the specialized interests of individual students. Courses offered under this title have included Special Topics in Public Health: Ecology and Health: Systems
analysis and monitoring on program success.	Approaches; and Animal Welfare. Different offerings are assigned different section
POPM*6510 Community Health Promotion F [0.50]	numbers.
I ne objective of this course is to provide students with an understanding of public health, population health and health promotion. Topics will include perspectives on health and	Psychology
illness, injury prevention, determinants of health, population diversity and the role of	PSYC*6000 Developmental Psychopathology: Etiology and Assessment U [0.50]
evidence in public health decision-making.	The interaction of neurobiological, physiological, familial and social factors to an
POPM*6520 Introduction to Epidemiological and Statistical Methods F [0.50]	understanding of developmental psychopathology is the focus of this course. Emphasis is given to etiology and clinical assessment issues
This is a 0.5 credit introductory graduate course for MPH students and students interested in epidemiology. The course will provide an introduction to research design_grant proposal	PSVC*6010 Learning Disorders: Desearch and Clinical Deseties U [0 50]
writing, and critical appraisal, as well as survey (questionnaire) design and basic statistical	This course examines various cognitive social and educational components of learning
methods for epidemiological studies.	and language disorders and accompanying clinical methods of diagnosis and remediation.
Co-requisite(s): POPM*6200	
POPM*6530 Communication I W [0.50]	
I his course introduces the theory of public health communication and emphasizes the development of communication skills related to public health.	
Restriction(s): MPH students All others must obtain instructor's signature	

PSYC*6020 Clinical and Diagnostic Interviewing Skills S [0.50]	PSYC*6610 Advanced Child and Adolescent Psychotherapy U [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.	This course will consider newly emerging developments in child and adolescent psychotherapy, as well as issues of power relationships, cultural sensitivity and empirical support. In preparation, students should endeavor to complete two therapy cases prior to the commencement of the course.
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	Prerequisite(s): PSYC*6580 and PSYC*6472 (may be taken concurrently). Restriction(s): This course is open only to graduate students in the CP:ADE field.
Developmental Emphasis (CP:ADE) neid	PSYC*6630 Developmental Psychology U [0.50]
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.	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.
Current controversial issues are presented.	DSVC*6640 Foundations of Applied Social Develology U [0 50]
PSYC*6190 Research Project U [1.00]	This course exemines theory and research in social psychology, particularly in these
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 amplicial invastigation in their area of amplacia.	areas most relevant to applied concerns. Topics may include attribution, attitudes, social relationships, language and communication, and self and identity.
will design and conduct an empirical investigation in their area of emphasis.	PSYC*6670 Research Methods U [0.50]
PSYC*6270 Issues in 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 oscial backness on instrument of each change.	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
formation, as wen as the use of social policy as an instrument of social change.	and other cognitive tests. Students administer tests, score, interpret and write reports
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.	 under supervision. As a prerequisite for PSYC*6471, a passing grade and a satisfactory rating on the practical component must be achieved. <i>Restriction(s):</i> This course is open only to graduate students in the CP:ADE field. PSYC*6700 Personality and Social Assessment of Children and Adolescents U [0.50]
PSVC*6401 Reading Course I II [0.25]	This course considers projectives, questionnaires, observations and interviews for assessing
An independent in-depth study of current theoretical and empirical issues in the student's area of specialization.	children's personality and behaviour. Students administer tests, score, interpret and write reports under supervision. As a prerequisite for PSYC*6471, a passing grade and a satisfactory rating on the practical component must be achieved.
PSYC*6402 Reading Course II U [0.50]	<i>Restriction(s):</i> This course is open only to graduate students in the CP:ADE field.
An independent in-depth study of current theoretical and empirical issues in the student's area of specialization.	PSYC*6740 Research Seminar in Neuroscience and Applied Cognitive Science A U [0.50]
PSYC*6411 Special Problems in Psychology I U [0.25]	This course will expose graduate students to some of the major theories, issues and
A critical examination of current problems relating to conceptual and methodological developments in an area of psychology.	methodologies driving research in the broad field of Neuroscience and Applied Cognitive Science. Students will learn to critically evaluate presentations by researchers as well as to communicate the results of their own research, in both a written and oral format. All
PSYC*6412 Special Problems in Psychology II U [0.50]	first year master's students in NACS are required to enroll in this course in both the fall
A critical examination of current problems relating to conceptual and methodological developments in an area of psychology.	and winter semesters. PSYC*6750 Applications of Cognitive Science U [0.50]
PSYC*6471 Practicum I U [0.50]	This course surveys applications of cognitive science to the problem of optimizing human
Students will gain 2-3 days per week of supervised experience in a setting related to their field of specialization.	performance. Topics of discussion will include human-system interactions (including Human-Computer and Human-Vehicle), education, and cognitive rehabilitation.
PSYC*6472 Practicum II U [1.00]	PSYC*6760 Research Seminar in Neuroscience and Applied Cognitive Science B U
See PSYC*6471 . Students work four to five days a week in the selected setting.	[U.UU]
PSYC*6473 Practicum III U [0.25]	This course will expose graduate students to some of the major theories, issues and methodologies driving the research broad field of Neuroscience and Applied Cognitive
See PSYC*6471. This course is intended for students who wish to gain additional practicum experience after completing the requirements for PSYC*6471/PSYC*6472. Students work one day a week in the selected setting.	Science. Students will learn to critically evaluate presentations by researchers in this field as well as to communicate the results of their own research, in both a written and oral format. All second year master's and doctoral students in NACS are required to enroll in this course each full and winter semester of their graduate program until they graduate
PSYC*6521 Research Seminar I U [0.25]	DEVO*(700 E-m d-4-m - 4 C) - 11 - 11 - 11 - 11 - 11 - 11 - 11 -
An in-depth review of current theoretical and empirical developments in topic areas related to the student's area of specialization.	Cognitive Science is an inter-disciplinary field that encompasses cognitive psychology,
PSYC*6522 Research Seminar II U [0.50]	methodologies that define cognitive science will be discussed with specific examples
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.	from perception, learning, memory, language, decision-making, and problem solving. <i>Restriction(s):</i> Restricted to Psychology graduate students; all others by permission only
PSYC*6580 Models of Child and Adolescent Psychotherapy U [0.50]	PSYC*6790 Memory and Cognition 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]	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,
A highly applied course that focuses on the epidemiology of mental disorders, the design	classifications of memory, and applications to reading and eyewitness testimony.
and implementation of preventive interventions with children, youth, and adults in the community, as well as stress and coping theory and practice.	PSYC*6800 Neurobiology of Learning U [0.50] This course reviews the major theories issues, and methodologies guiding contemporary

This course reviews the major theories, issues, and methodologies guiding contemporary research in the neurobiology of learning.

Appendix A - Courses, Psychology	239
PSYC*6810 Neuropsychology U [0.50]	PSYC*7080 Consulting in Industrial/Organizational Psychology U [0.00]
This course focuses on current developments in neuropsychology. Particular emphasis is placed on the aphasias, apraxias, memory disorders, and disorders of movement.	The course introduces students to consulting in I/O Psychology through actual consulting projects with local organization. Topics include: marketing consulting services
PSYC*6830 Applied Social Psychology U [0.50]	from semester to semester based on work secured with local organizations (e.g. training,
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.	<pre>surveys, coaching). Prerequisite(s): Registration in the graduate IO psychology program and permission of the Instructor</pre>
PSYC*6840 Program Evaluation U [0.50]	PSYC*7130 Introduction to Industrial/Organizational Psychology 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. PSYC*6880 Ethical Issues in Psychology U [0,25]	This course introduces graduate students to a broad range of topics in Industrial/Organizational psychology. It emphasizes researcher-practitioner issues, consumer behaviour, professionalism, ethics, and theory building. As well, graduate
Relevant issues in the application of professional ethical standards to the practice of	students will learn about contemporary issues in I-O Psychology.
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	PSYC*7140 Industrial/Organizational Psychology Special Topic Doctoral Research Seminar U [0.50]
developmental/social psychology.	critically review past and current research, including theory development and empirical
PSYC*6890 Legislation and Professional Practice U [0.25]	findings. Participants work together to integrate past theory and findings, to note
This companion course to PSYC*6880, Ethics in Psychology, provides an introduction to the Provincial and Federal legislation governing the practice of psychology. Students	Prerequisite(s): PSYC*7130
will become familiar with legislation relevant to professional practice with children and adults in hospital aducational community, and other settings	PSYC*7160 Employee Development: Methods and Outcomes U [0.50]
<i>Co-requisite(s)</i> : PSYC*6880	This course explores development in an organization context. Employee learning and
PSYC*6900 Philosophy and History of Psychology as a Science U [0.50]	job analysis, career development, succession management, multi-source feedback, training,
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.	coaching/mentoring and employee counseling. PSYC*7170 Industrial/Organizational Psychology Doctoral Research Internship I U [0.50]
PSYC*7010 Recruitment and Selection: Methods and Outcomes U [0.50]	Participants work with an Industrial Organizational faculty member to conduct research
The course explores organizational issues in the recruitment and selection of new employees. Topics may include: individual differences, human rights, survey-based job analysis, recruitment methods and outcomes, selection methods and outcomes, hiring, decision making and employee placement/classification.	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*7020 Employee Performance U [0.50]	Co-requisite(s): PSYC*7140 Restriction(s): Instructor's signature required
This course focuses on issues that relate to employee performance. Individuals and organizations are interested in maximizing the contributions of employees at work. This course focuses on performance-based job analysis, criterion theory, performance management/appraisal, employee socialization, compensation, benefits, technology, and	PSYC*7180 Industrial/Organizational Psychology Doctoral Research Internship II U [0.50] Participants work with an Industrial Organizational faculty member to conduct research
labour relations.	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
PSYC*7030 Work Attitudes and Behaviour U [0.50]	and/or a quality publication manuscript.
include: organizational commitment, job satisfaction, emotions, other work attitudes and	Prerequisite(s): PSYC*7130, PSYC*7140, PSYC*7170 Restriction(s): Instructor's signature required
attitude change, organizational citizenship behaviours, withdrawal behaviours, employee	PSYC*7190 Work Motivation and Leadership U [0.50]
DEVC#7040 Seriel Drawnee in the Warden of U to 501	This course examines theories, research, and application of work motivation and leadership
This course examines social processes in the workplace C [0.50] This course examines social processes in the workplace. Topics may include: groups, teams, and intergroup processes; justice; diversity in the workplace; prejudice and discrimination; harassment and unethical behaviour; climate, culture change; and, organizational development.	within an organizational context. The course will include a description of classic and contemporary theories of work motivation and leadership, a critical evaluation of the research findings, and a discussion of the application of the research findings to the work environment.
PSYC*7050 Research Seminar in Industrial/Organizational Psychology U [0.00]	PSYC*7991 CP:ADE Clinical Practicum I U [0.25]
This course will expose graduate students to some of the major theories, issues, and methodologies driving research in the field of Industrial/Organizational psychology. Students will learn to critically evaluate presentations by researchers in this field, as well as to communicate the results of their own research, in both written and an oral format. All students are required to enroll in this course.	This CP:ADE practicum is typically undertaken at the Center for Psychological Services, one day a week over a semester, to enhance skills introduced in other clinical courses. Expectations for the course will be based on the student's current level of clinical skill. Students will work with diverse clients, and gain knowledge of ethics and jurisprudence in a clinical setting.
Restriction(s): Psychology students only.	<i>Restriction(s):</i> Restricted to students in the CP:ADE area of specialization
PSYC*7070 Psychological Measurement U [0.50]	PSYC*7992 CP:ADE Clinical Practicum II 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.	This CP:ADE practicum is undertaken in a school board, psychological services department for two days a week over one semester. Students will develop clinical assessment skills with a diversity of clients, work with interdisciplinary teams, and apply knowledge of ethics and jurisprudence to educational settings.
nesinenon(s). Instructor's signature required	<i>Prerequisite(s):</i> PSYC*6010, PSYC*6690, and PSYC*6700 <i>Restriction(s):</i> Restricted to students in the CP:ADE area of specialization

PSYC*7993 CP:ADE Clinical Practicum III U [1.00]	RPD*6260 Land Use Planning Law U [0.50]
This CP:ADE practicum is undertaken in a children's mental health setting two days a week over two semesters. Students will develop complex assessment and therapy skills with diverse clients, work with interdisciplinary team, and apply knowledge of ethics	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
and jurisprudence to mental health settings.	legislation.
<i>Restriction(s):</i> Restricted to students in the CP:ADE area of specialization, Instructor's	RPD*6280 Advanced Planning Practice W [0.50]
signature required.	to rural planning practice. A number of specific municipal (local and regional) rural
PSYC*8000 Clinical Internship U [0.00]	planning examples will be presented. Comparisons between different jurisdictions will
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	be reviewed. Students will be engaged in project-based learning. <i>Prerequisite(s):</i> RPD*6250
a full year (1800-2000 hour) internship in an accredited clinical setting (e.g., CPA or	RPD*6290 Special Topics in Rural Planning and Development U [0.50]
APA) approved by the Director of Clinical Training for CP:ADE.<i>Prerequisite(s):</i> Completion of all course work in the CP:ADE field, the PhD qualifying examination, and the PhD Thesis proposal at the time of application, one year in advance of beginning the clinical internship.	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 (IS) in agricultural development
Rural Planning and Development	micro-credit, physical/site planning and design, project management.
RPD*6030 International Rural Development Planning: Principles and Practices U	Restriction(s): Instructor's signature required
[0.50]	RPD*6291 Rural Development Administration 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 enational dimensioner compare policy, program project sectoral and integrated dimensioner.	This course explores the administration of rural development by considering the main organizational types delivering rural programs. The structure and behaviour of these organizations, their interactions, and their respective sectors will be considered. Students will also be introduced to administrative planning tools.
planning; and compares rural development planning in market, mixed and state-driven	RPD*6310 Environmental Impact Assessment U [0.50]
societies. RPD*6070 Project Development: Principles, Procedures, and Selected Methods 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.
This course introduces students to the principles, procedures and methods in developing	RPD*6320 Water Resource Management U [0.50]
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.	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*6080 Environment and Development: Biophysical Resources and Sustainable	RPD*6360 Major Research Paper U [1.00]
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*6360 Major Research Paper U [1.00] Students not pursuing the thesis route must satisfactorily complete a Major Research Paper. 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 using appropriate methodological and analytical procedures. Note: This is a one semester course and must be completed in the semester of registration. Instructor's signature required.
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 Rural Research Methods U [0.50]	RPD*6360 Major Research Paper U [1.00] Students not pursuing the thesis route must satisfactorily complete a Major Research Paper. 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 using appropriate methodological and analytical procedures. Note: This is a one semester course and must be completed in the semester of registration. Instructor's signature required. Restriction(s): For Major Paper option only
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 Rural Research Methods U [0.50] The course provides rural planning and development professionals with a number of theoretical frameworks and practical approaches to problem solving in rural Canadian	RPD*6360 Major Research Paper U [1.00] Students not pursuing the thesis route must satisfactorily complete a Major Research Paper. 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 using appropriate methodological and analytical procedures. Note: This is a one semester course and must be completed in the semester of registration. Instructor's signature required. Restriction(s): For Major Paper option only RPD*6370 Economic Development Planning and Management for Rural Communities U [0.50]
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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.

Rural Studies

RST*6000 Sustainable Rural Systems 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*6260 Research Design U [0.50]

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 non-experimental 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 critically assess recent empirical research relevant to each perspective.

SOC*6420 Global Agro-Food Systems, Communities and Rural Change U [0.50]

This course will reflect recent sociological interests in food studies and global agro-food systems, resources and the environment, community sustainability, rural-urban linkages, the transnationalization of labour regimes, and social movements in the rural context. The course will encourage students to take a comparative and historical approach, focusing on cross-national and inter-regional studies where possible, and to examine how class, gender, race and ethnicity play out in each particular substantive topic comprising the rural field.

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, Gender 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 globalization, economic restructuring, and shifts in public policy. Using case studies of particular work worlds, the course may include topics such as changing patterns of work and employment in comparative contexts, labour regimes, industrial and organizational change, organizations and protest, education for work, and the regulation of work. The course will focus on the dialectical relationship between the configurations of gender, class, race and ethnicity and the transformation of work.

SOC*6500 Social Movements in Latin America W [0.50]

Students will critically review the major theoretical perspectives on social movements and consider their relevance in understanding the timing, tactics, and impact of movements in Latin America. Movements to be examined may include labour, peasant, armed insurgent, indigenous, feminist, gay rights, and anti-globalization struggles.

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, including how to form a graduate advisory committee, assistantship responsibilities, presentation skills, exploration of careers in sociology, writing grant proposals, reports and articles, and teaching.

Restriction(s): Students in the MA program in Sociology only

SOC*6800 Advanced Topics in Sociology F [0.50]

This course will focus on the foundations of sociological theories and the broader philosophical context of inquiry in sociological research. Students will develop an advanced understanding of the research process through study, analysis and critical assessment of a range of theoretical and methodological approaches and issues.

Prerequisite(s): MA in Sociology

Restriction(s): Students in the PhD program in Sociology only

SOC*6810 Reading Course U [0.50]

A program of supervised independent reading, complemented with the writing of papers or participation in research. Reading courses are arranged by students in consultation with their advisor or advisory committee and must be approved by the chair of the department.

Restriction(s): Students in the PhD program in Sociology only

SOC*6820 Directed Readings U [0.50]

A program of directed readings related to the student's field of specialization. The nature and content of the course are agreed upon by the student and instructor in consultation with the student's advisor or advisory committee. The course must be approved by the chair of the department.

Restriction(s): Students in the PhD program in Sociology only

Statistics

STAT*6098 Graduate Diploma Project in Applied Statistics U [0.50]

A project leading to a technical report, which utilizes statistical principles and procedures in the solution of a substantive research problem. Completion of this course requires a formal presentation of the project to faculty and students.

Restriction(s): Students registered in the Graduate Diploma in Applied Statistics. Cannot be used to satisfy departmental MSc/PhD requirements.

STAT*6550 Computational Statistics U [0.50]

This course covers the implementation of a variety of computational statistics techniques. These include random number generation, Monte Carlo methods, non-parametric techniques, Markov chain Monte Carlo methods, and the EM algorithm. A significant component of this course is the implementation of techniques.

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.

242

STAT*6721 Stochastic Modelling U [0.50]

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

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

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

STAT*6761 Survival Analysis U [0.50]

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

STAT*6801 Statistical Learning U [0.50]

Topics include: nonparametric and semiparametric regression; kernel methods; regression splines; local polynomial models; generalized additive models; classification and regression trees; neural networks. This course deals with both the methodology and its application with appropriate software. Areas of application include biology, economics, engineering and medicine.

STAT*6802 Generalized Linear Models and Extensions U [0.50]

Topics include: generalized linear models; generalized linear mixed models; joint modelling of mean and dispersion; generalized estimating equations; modelling longitudinal categorical data; modelling clustered data. This course will focus both on theory and implementation using relevant statistical software.

STAT*6821 Multivariate Analysis U [0.50]

This is an advanced course in multivariate analysis and one of the primary emphases will be on the derivation of some of the fundamental classical results of multivariate analysis. In addition, topics that are more current to the field will also be discussed such as: multivariate adaptive regression splines; projection pursuit regression; and wavelets.

STAT*6841 Statistical Inference U [0.50]

Bayesian and likelihood methods, large sample theory, nuisance parameters, profile, conditional and marginal likelihoods, EM algorithms and other optimization methods, estimating functions, MonteCarlo methods for exploring posterior distributions and likelihoods, data augmentation, importance sampling and MCMC methods.

STAT*6850 Advanced Biometry U [0.50]

Topics on advanced techniques for analyzing data from biological systems. In particular, univariate discrete models, stochastic processes as it relates to population dynamics and growth models with time dependencies, generalized discrete models for spatial patterns in wildlife, the theoretical foundation and recent results in aquatic bioassays, and other topics relating to the student's research interest.

STAT*6860 Linear Statistical Models U [0.50]

Generalized inverses of matrices; distribution of quadratic and linear forms; regression or full rank model; models not of full rank; hypothesis testing and estimation for full and non-full rank cases; estimability and testability; reduction sums of squares; balanced and unbalanced data; mixed models; components of variance.

STAT*6870 Experimental Design U [0.50]

This is an advanced course in experimental design which emphasizes proofs of some of the fundamental results in the topic. The topics will include: design principles; design linear models; designs with several factors; confounding in symmetrical factorials; fractional factorials.

STAT*6880 Sampling Theory U [0.50]

Theory of equal and unequal probability sampling. Topics in: simple random, systematic, and stratified sampling; ratio and regression estimates; cluster sampling and subsampling; double sampling procedure and repetitive surveys; nonsampling errors.

STAT*6920 Topics in Statistics U [0.50]

STAT*6950 Statistical Methods for the Life Sciences F [0.50]

Analysis of variance, completely randomized, randomized complete block and latin square designs; planned and unplanned treatment comparisons; random and fixed effects; factorial treatment arrangements; simple and multiple linear regression; analysis of covariance with emphasis on the life sciences. STAT*6950 and STAT*6960 are intended for graduate students of other departments and may not normally be taken for credit by mathematics and statistics graduate students.

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*6950 and STAT*6960 are intended for graduate students of other departments and may not normally be taken for credit by mathematics and statistics graduate students.

STAT*6960 Design of Experiments and Data Analysis for the Life Sciences W [0.50]

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]

Studio 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

243

FINA*6640 MFA Seminar III F [0.50]	TOX*6590 Biochemical Toxicology F [0.50]
Continuation of FINA*6545	The molecular mechanisms of action of carcinogens and other toxic compounds. Enzymes
Prerequisite(s): FINA*6545	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
FINA*6641 MFA Seminar IV W [0.50]	one of TOX*4590 and TOX*6590) Department of Chemistry and Biochemistry
Continuation of FINA*6640	University Courses
FINA*6650 Individual Study in Art History U [0.50]	UNIV*6000 The Structure and Function of Muscle U [0.50]
Students will pursue special study under the guidance of a faculty member with appropriate expertise	An interdisciplinary course covering basic aspects of muscle from a range of viewpoints:
<i>Prerequisite(s):</i> Approval of the co-ordinator of the MFA program.	structure, metabolism, protein content, energetics, mechanics, biological adaptations,
FINA*6651 Individual Study in Contemporary Art U [0.50]	of specific disciplines and will provide a broad background to muscle biology as well as
Students will pursue special study under the guidance of a faculty member with appropriate	more detailed insights into specific aspects of each area covered.
expertise	UNIV*6010 Regulation in Muscle Metabolism U [0.50]
Filequisite(s). Approval of the Co-ordinator of the MFA program.	An interdisciplinary course emphasizing the regulation of muscle metabolism in vivo.
Students will pursue special study under the guidance of a faculty member with appropriate	demands under a variety of conditions in the whole animal. Topics include: sources of
expertise.	energy demand, integration of energy supply to meet energy demands, and regulation of
Prerequisite(s): Approval of the co-ordinator of the MFA program.	UNIV*6020 Cominger and Analyzis in Animal Dehaviour and Walfors F. W. [0.50]
Theatre Studies	This seminar-based course offers an interdisciplinary forum for the discussion of broad
THST*6150 Theatre Historiography F [0.50]	topics in animal welfare and human-animal relationships. Students analyze topics presented
This variable content course introduces students to the theory and practice of theatre	by visiting guest lecturers using perspectives from various disciplines such animal science, philosophy, history, psychology, ethics, and biology.
Program.	UNIV*6040 Selected Topics in Critical Studies in Improvisation S [0.50]
THST*6210 Devising W [0.50]	Intended for students who have an interest in musical improvisation, this interdisciplinary
This variable-content course addresses creative practice in the theatre as a site for the	course provides a forum to investigate the possibility of improvised artistic practices to
production of knowledge. It examines the theoretical and social issues of contemporary	regarding the role of the arts in society.
THST*6220 Theotre Theory E [0 50]	UNIV*6050 The Integration of Science and Business in Agrifood Systems F-W [1.00]
This variable content course introduces students to a range of theoretical approaches and	Designed specifically for students enrolled in OMAFRA/UoG HQP Scholarship program
to advanced issues and methods within the fields of drama, theatre, and performance	but open to all students. To provide market-readiness for students as they enter business,
studies. The course is required for all students in the Theatre Studies MA Program.	property, patent and licence protection as well as societal issues impacting agriculture.
THS1*6230 Performance and Difference W [0.50]	<i>Restriction(s):</i> Limited of 36 students. Priority to HQP Scholarship Program students.
international developments in the field of Theatre Studies and investigates sites of cultural	UNIV*6060 Mechanisms of Tissue and Cellular Mechanotransduction in Health
diversity and difference. It provides opportunities for culturally specific studies of dramatic	This course explores fundamental mechanisms and signalling pathways that dynamically
TUST*6250 Dedies and Space in Derformance W [0.50]	regulate cell and tissues responses to physical forces in health and disease. It is relevant
This variable-content course introduces students to the social, ethical, phenomenological	to a wide range of areas of study, from biomechanics and tissue engineering to gastro-intestinal health, food and nutrition.
and environmental dimensions of the interaction of bodies and space in theatre practice	<i>Restriction(s):</i> Instructor's signature required
and research. It provides a theorized context in which students may address questions of acting directing and design as research processes	UNIV*6500 International Study Option U [0.00]
THST*6280 Independent Reading Course U [1.00]	A period of study in another country as part of a graduate program at the University of
Independent Reading Course	Guelph. Details may be obtained from the Office of Graduate Studies.
THST*6500 Research Paper U [1.00]	UNIV*6600 Animal Care Short Course S,F,W [0.00]
THST*6801 Reading Course I U [0.50]	Regulation & Guidelines, Ethological Considerations in Animal Management, Ethics in
An independent study course, the nature and content of which is agreed upon between	Animal Experimentation, Research Issues, The Three Rs of Humane Animal Experimentation, Occupational Health and Safety when Working with Animals
the individual and the person offering the course. Subject to the approval of the student's	Euthanasia, Recognition and Alleviation of Pain and Distress in Animals. Graduate
THET*(202 Decking Course H U to 50)	students using or caring for live animals or assisting in teaching courses involving live
An independent study course the nature and content of which is agreed upon between	as part of the Animal User Training Program.
the individual and the person offering the course. Subject to the approval of the student's	UNIV*6710 Commercialization of Innovation F [0.50]
advisory committee and the graduate committee.	This course is designed to help participants better understand the process, the analytical
Toxicology	tools that can assist the process and how best to prepare technologies to survive commercialization. The course includes elements of entrepreneurship, relationship
TOX*6000 Advanced Principles of Toxicology S [0.50]	building, organizational change, as well as project and personnel management.
An intensive course in the principles of modern aspects of toxicology, taught in a lecture/case study format	UNIV*6800 University Teaching: Theory and Practice F [0.50]
TOX*6200 Advanced Tonics in Toxicology 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
Advanced topics in toxicology will include oral presentations by students. faculty	Satisfactory (SAT) or unsatisfactory (UNS) will be used to evaluate the student's
members, and guest lecturers. The emphasis will be on advanced concepts and techniques	performance in this course.
in toxicology research with particular relevance to mechanistic, molecular and interpretive toxicology.	

Credit may be obtained for only one of TOX*6200 or TOX*4200 Restriction(s):

UNIV*7100 Academic Integrity for Graduate Students S,F,W [0.00]

Academic integrity is a code of ethics for teachers, students, researchers, and writers. It is fundamental to the University of Guelph's educational mission and to ensuring the value of the scholarly work conducted here. This course provides definitions, examples, and exercises to help graduate students understand the importance of academic integrity and learn how to avoid academic misconduct in their own work. This course required of all graduate students has to be completed within 20 days of commencing their graduate program.