

ABE — AGRICULTURAL & BIORESOURCE ENGINEERING

Department of Agricultural & Bioresource Engineering, College of Graduate Studies and Research

ABE 807.3 — 2(3L-2P) Advanced Measurements

Topics include an analysis of the static and dynamic response of instruments, transducers used for measurement of temperature, pressure, strain, flow, radiation, displacement, velocity, acceleration, information transmission, signal conditioning and recording.

ABE 809.3 — 1/2(2L) Lubrication

Studies viscosity and flow; hydrostatic, hydrodynamic and boundary lubrication; friction and power losses in bearings; bearing materials and lubricants.

ABE 811.3 — 1(2.5L-1.5P) Modeling of Food Processes

Deals with mathematical/computer simulation of food processes associated with fluid flow, heat and mass transfer, internal heat generation due to biological activity and electromagnetic field treatment, and quality kinetics. Important optimization techniques will be introduced to design food processes with better energy efficiency/productivity and less quality degradation.

ABE 822.3 — 1/2(2L-1S) Soil Hydrology of Semi Arid Environments

The hydrological processes of infiltration, evapotranspiration, retention, drainage, and vadose zone flux within the Prairie semi-arid soil system will be studied. The course will cover concepts, field instrumentation and empirical and physically-based methods of analysis. Examples from field investigations will be used as basis for class discussion.

ABE 825.3 — 1/2(3L) Agricultural Ground Water Hydrology

A study of the fundamental theories and processes governing groundwater movement, groundwater occurrence and exploration, well construction, and aquifer evaluation. Students actively participate in this class by preparing and presenting a paper on a selected topic.

ABE 830.3 — 1/2(3L-3P) Design of Farm Irrigation Systems

Detailed study of the design of farm irrigation systems. Land classification and

preparation. Theory and empirical methods of estimating consumptive use, hydraulics and economics of sprinkler irrigation design, fundamentals of overland flow applied to the design of surface water distribution systems.

ABE 840.3 — 1/2(2L) Building Science

Advanced topics on: indoor air quality, workers comfort and health, and psychrometry; analysis of heat and moisture problems in buildings for cold climates, effect of moisture on the properties of agricultural products and building materials with special reference to heat transfer in the unsteady state; air infiltration in agricultural buildings; heating and ventilating loads, air distribution and heat recovery systems, and ventilation strategies; simulation and optimization of heating and ventilation systems under various weather conditions for agricultural buildings.

ABE 841.3 — 1/2(2L) Similitude

The application of dimensional analysis and similitude to the analyses of problems in Agricultural Engineering.

ABE 850.3 — 1/2(3L) Post Harvest Technology

Engineering principles as applied to processing, drying and storage of various agricultural materials. Topics include thermal environment, transport process, physical properties of biological materials and postharvest metabolic changes and quality. The emphasis will be on handling, storage, and drying of grains, forages, herbs and spices, and their products.

ABE 853.3 — 2(3L) Fiber Processing and Biocomposites

Will provide a comprehensive understanding on agricultural and man-made fibers, their engineering, process design, processing, characterization and application in the polymer industry to make fiber composites.

Prerequisite(s): Undergraduate degree in Engineering or Natural Sciences.

ABE 860.3 — 1/2(3L) Parameter Estimation in Engineering

Methods of data analysis and estimation of parameters appearing in mathematical models. Topics include parameters and model identification, sensitivity analysis, ordinary least squares, maximum likelihood, maximum a posteriori and sequential procedures. Numerical methods, optimization techniques and experimental design in engineering applications are also reviewed.

Prerequisite(s): Permission of the instructor.

ABE 861.3 — 1/2(3S-1.5P) Soil Machine Relations in Tillage and Traction

Mechanics of interactions between agricultural and forest soils and tillage and traction devices. Determination of relevant soil physical parameters. Analysis of stress and strains in soil due to machine applied loads. Effects on plant growth. Experimental and analytical methods for synthesizing characteristics of overall systems.

Prerequisite(s): A university-level course in calculus.

ABE 898.3 — 1/2(R) Special Topics

Special problem assignments involving investigation and/or design in each of the major study areas of agricultural engineering. Each student's work will be limited to his/her own area of specialization. A technical report in a form satisfactory to the supervisor is required.

ABE 990.0 Seminar

Reports and discussions on current topics of interest to Agricultural and Bioresource Engineers. All graduate students within the Department are required to register, attend, and participate throughout their program. At least one oral presentation and one poster presentation on their thesis topic is required for registered students during the period of their candidacy, whether one year or more. For students in programs lasting more than one year, either one oral presentation or one poster presentation is required each year.

ABE 992.3 Project

Students undertaking the Project Master's degree (M.Eng.) must register in this course. It consists of independent study and investigation of a real world problem, and submission of an acceptable report on the investigation.

ABE 994 Research

Students writing a Master's thesis must register for this course.

ABE 996 Research

Students writing a Ph.D. thesis must register for this course.

ACB — ANATOMY & CELL BIOLOGY

Department of Anatomy & Cell Biology,
College of Graduate Studies and Research

ACB 732.3 — 1/2(2L&2P) Human Histology

A survey of human tissue organization and systematic study of the normal arrangement of cells and tissues into organs and organ systems.

Prerequisite(s): ACB 200; or equivalent course in cell biology.

ACB 801.6 — 1&2(2L-6P-1S) Human Gross Anatomy

A practical study of the macroscopic structure of the human body by regional dissection and study of prepared specimens. Lectures are closely integrated with the laboratory sessions. Correlation of structure and function is emphasized and surface and radiological anatomy are included.

Prerequisite(s): ACB 202; or equivalent.

ACB 813.6 — 1&2(8P) Experimental Medicine

Provides advanced training in experimental methods to study the normal morphology and function of tissues and their reactions to pathogenic stimuli.

ACB 820.3 — 2(8L/P) Experimental Embryology

Deals with the causal analysis of embryological development as studied by morphological, surgical, physical and chemical methods. In the main, vertebrate embryos will be studied but some invertebrate material will also be used.

Prerequisite(s): ACB 331; or equivalent and permission of the instructor.

ACB 821.3 — 1/2(4S) Advanced Topics in Developmental Biology

A review of recent advances in the study of developmental biology. Special emphasis is placed on the contributions of different experimental animal systems to research in a variety of areas in the field.

Prerequisite(s): ACB 331; or equivalent and permission of the instructor.

ACB 824.3 — 1(3S/R) Current Topics in Cell Biology of Myelinating Glia

Students will read journal articles on the myelinating glia of the CNS and PNS to identify the cell biological questions being asked, the techniques being used to study

the cell biology of these cells, and the roles the cells play in normal and pathological functioning of the nervous system.
Prerequisite(s): ACB 200 and 210 or equivalent and permission of the instructor.

ACB 830.3 — 1/2(4S) Advanced Topics in Cell and Molecular Biology

Recent developments in cell and molecular biology research will be examined. Students will present and evaluate selected publications from current literature. Among the topics of interest are: Signal Transduction, Development and Differentiation, apoptosis, gene expression/transcription, cell and organelle structure, and DNA dynamics and chromosome structures.
Prerequisite(s): At least one senior level course in biochemistry, genetics or cell biology; or permission from the instructor.

ACB 840.3 — 2(2L-2S) Development of Nervous System

A comprehensive survey of the development of the vertebrate nervous system. Learning will be guided by examination of the experimental scientific literature. Topics include neurulation, cell migration, process outgrowth, trophism, differentiation, and extended consideration of the formation of synapses and refinement of patterns of connectivity.
Prerequisite(s): Permission of the instructor.

ACB 898.3 — 1/2(2S/R) Special Topics

Study in selected areas of morphological sciences may be undertaken with the consent of the Department Graduate Committee. Involves reading assignments, lectures, and tutorials. Students will be required to participate in discussion, give oral presentations, and prepare a series of essays.
Prerequisite(s): Permission of the department.

ACB 899.6 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

ACB 990 Scientific Communication

First year graduate students will receive practical training in written and oral scientific communication. Topics include

scientific writing technique and style, effective oral communication, electronic research tools and electronic presentation tools. All graduate students will attend a student-run seminar series, and make one presentation in that series each year they are enrolled in the program.
Prerequisite(s): Open only to graduate students in the Department of Anatomy and Cell Biology.

ACC 994 Research

Students enrolled in the M.Sc. program must register for this course.

ACC 996 Research

Students enrolled in the Ph.D. program must register for this course.

ACC — ACCOUNTING

Department of Accounting, College of Graduate Studies and Research

ACC 814.3 — 1(3S) Auditing Profession

Examines the economic, social, and professional determinants of an auditor's work environment. In addition, the auditor judgment process is examined through study of various theories and models from the psychology of information processing. Empirical applications of these models are considered in terms of auditor's judgments regarding issues such as analytical procedures and aggressive financial reporting.

ACC 823.3 — 1(3S) Management Accounting and Control Processes

Examines academic research in selected areas within the managerial accounting and control literature. Current research examining cost accounting systems (e.g., activity-based costing) and management control processes, including strategy, structure, performance measurement and evaluation, are discussed. Research papers discussed cover different methods (e.g., case studies, experiments, surveys).

ACC 824.3 — 1(3S) Accounting Information and Capital Markets

Explores both traditional and contemporary theories and research in financial accounting with a focus on empirical research. Paradigms that will be studied in depth include capital markets and costly contracting research.

ACC 825.3 — 1(3S) Evolution of Accounting Practices

The evolution of accounting thought and practices is examined with regard to both its internal and external dimensions. Sources of influence are traced and their relationship to present practices and to the future is sought.

ACC 827.3 — 1(4S) Research Methodology in Accounting

Introduces students to a wide range of research approaches appropriate to, and illustrative of, current accounting research. The course prepares students to effectively use these approaches in their own research and to critically evaluate research done by others.

ACC 898.3 — 1(R) Selected Readings in Accounting

Selected readings will be offered in specialized areas of scholarship within the department upon approval of the Graduate Accounting Committee.

ACC 899 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

ACC 990 Research Seminar

A forum in which faculty members, visiting professors and M.Sc. students will present research papers.

ACC 994 Research in Accounting

Students undertaking research should register in this course each year until completion of the program.

ACC 996 Research Seminar

A forum in which faculty members, visiting professors and M.Sc. students will present research papers.

AGEC — AGRICULTURAL ECONOMICS

Department of Agricultural Economics, College of Graduate Studies and Research

AGEC 820.3 — 2(3L) Agricultural Production Economics

A study of the application of economic theory to production economics and consumer demand systems. The course links static micro economic theory to the behavior of economic systems. This course includes a survey on the choice of functional form, the application of duality in demand theory and the use of Bayesian

econometrics to impose inequality restrictions in system estimation. The course also examines several aspects of technological change and dynamic problems involving risk and uncertainty.
Prerequisite(s): Permission of the instructor.

AGEC 830.3 — 2(3L) Dynamic Resource Modeling

The objective of this course is to familiarize students with the theory and procedures used to develop models that incorporate the temporal dynamics of physical and economic aspects of agricultural and other resource systems. The course will focus initially on the structure of static models and then build on this theory to develop dynamic models using optimal control theory in discrete and continuous time. The theory and procedures presented in this course will be motivated using agricultural resource examples based on a series of readings. This course will enable students to understand and interpret dynamic resource models.

AGEC 832.3 — 2(3L) Rural Development

The study of theories of rural development in advanced-market economies, a review of empirical studies of selected North American rural economies and a survey of national and subnational North American development policies.
Prerequisite(s): Graduate Econometrics.

AGEC 840.3 — 1(3L) Methods of Marketing Agricultural Products

A study of alternative marketing systems and price discovery methods from the point of view of the agricultural economist as a researcher. Covers the relevant literature with a focus on the theoretical and research issues of market regulation (rent seeking), commodity futures markets, auction markets, marketing boards, thin markets, vertical integration and coordination. A special section is included on international marketing and marketing in developing economies.
Prerequisite(s): Permission of the instructor.
Note: Students interested in a specialization in agricultural marketing should take both AGECE 840 and 842.

AGEC 842.3 — 2(3L) Agricultural Market Organizations

Develops a conceptual framework in which organizations, their behaviour, their interactions with other firms and their impact on an industry can be studied, compared and analyzed. The relevant

literature in organizational theory, industrial organization and contract theory is reviewed, especially as it focuses on theoretical and empirical work in the areas of co-operatives, agri-business firms and other forms of organizations. Examination of these types of firms is undertaken to better understand their behaviour and to develop concepts that can be put to use in analyzing other types of organizations.

Prerequisite(s): Permission of the instructor.
Note: Students interested in a specialization in agricultural marketing should take both AGEC 840 and 842.

AGEC 845.3 — 1(3L) Transportation Economics and Interregional Competition

Deals primarily with the transportation economics as applicable to the transportation problems of agricultural commodities. Topics include a study of basic concepts in transportation economics, decision making in space, and an evaluation of spatial equilibrium and interregional competition models.

Prerequisite(s): Permission of the instructor.

AGEC 851.3 — 1(3L) Agricultural Policy

Focuses on an economic analysis of agricultural policies in Canada. In addition, general economic policy will be discussed in terms of how it affects trade, investment, economic growth and efficiency. Agricultural policies in other countries will also be discussed.

Prerequisite(s): Permission of the instructor.

AGEC 855.3 — 1(3L) International Agricultural Trade Policy

The economic analysis of agricultural trade policy. Topics include introduction to international trade theory, an introduction to trade policy, methods of protection by importers and methods of protection by exporters.

Prerequisite(s): Graduate-level standing in agricultural economics or economics.

AGEC 860.3 — 1(3L) Econometrics for Agricultural Economists I

Deals with the alternative methods of estimating economic relationships. Topics include a review of single-variable statistical inference, the two-variable regression model, violations of the basic assumptions of ordinary least squares regression, the multiple-variable regression

model, and models that use qualitative variables.

Prerequisite(s): AGEC 461 or equivalent.

AGEC 861.3 — 2(3L) Econometrics For Agricultural Economists II

Follows up on concepts developed in AGEC 860. Topics include multi-variate hypothesis, extensions of multiple regression, distributed lag models, problems of estimation, and simultaneous equation methods. Econometric model building, including evaluation, forecasting, and econometric simulation will also be included.

Prerequisite(s): AGEC 860.

AGEC 862.3 — 2(3L) Advanced Econometrics

A study of advanced concepts in econometric theory and foundations. Topics include inference and distribution theory including asymptotic distributions, statistical analysis of disturbances and generalized least squares, aggregation, non-linear estimation, Bayesian methods, and control theory.

Prerequisite(s): AGEC 861 or equivalent.

AGEC 890.3 — 1(3L) Research Procedures in Agricultural Economics

Topics from the areas of the philosophical basis of research in agricultural economics, the methods of science as applied to economic problems, current issues and problematic aspects of both the methods and substance of research in agricultural economics and initiating, organizing, funding and utilizing the results from research are examined.

Prerequisite(s): Permission of the instructor.

AGEC 898.3 — 1/2(3L) Special Topics

Reading essays and discussion in an approved special field.

AGEC 899 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

AGEC 990 Seminar

Reports and discussion on current development and research. All graduate students in Agricultural Economics are required to register. Attendance and at least one presentation required of postgraduate students during the period of their candidacy.

AGEC 992.6 Project

Students undertaking the project Master's degree (M.Agr.) must complete the course as part of the requirements for the degree.

AGEC 994 Research

Students writing a Master's thesis must register for this course.

AGEC 996 Research

Students writing a Ph.D. thesis must register for this course.

AGMD — AGRICULTURAL MEDICINE

College of Graduate Studies and Research

AGMD 800.3 Public Health and Agricultural Rural Ecosystem PHARE

Provides the foundation knowledge for issues related to rural health, public health and agricultural rural ecosystems. This PHARE course provides an overview of the major health issues, general health, and health service delivery issues facing persons in rural and remote areas of Canada. It provides an overview of the environmental health challenges for rural and agricultural populations in the areas of risk management, injury control, workplace safety, food safety, and protection of the biosphere.

Note: AGMED 800 provides the foundation for the Public Health and Agricultural Rural Ecosystem Training Program (PHARE), a graduate training program funded by the Canadian Institutes of Health Research (CIHR). As well, AGMD 800 is beneficial as an elective to students enrolled in such disciplines as Veterinary Medicine, Agriculture, Nursing, Medicine, Dentistry, Economics, Community Health and Epidemiology, Engineering and Health Policy.

AGMD 990.0 Seminar

Reports and discussion of current research.

AGMD 996.0 Research

Students pursuing a graduate degree must register for this course.

AGRN — AGRONOMY

Department of Plant Sciences, College of Graduate Studies and Research

AGRN 82 Field Diagnostic School

The Field Diagnostic School provides students with practical experience in recognizing and diagnosing various soil and crop production problems. By examining a range of demonstration and research plots, students will be exposed to a wide variety of agronomic practices and problems including weed control and herbicide damage, nutrient deficiencies, fertilizer application and damage, seeding practices and pest management. A local tour of soils will be used to illustrate differences in parent material and soil development. A final project will be completed by correspondence.

Prerequisite(s): PLSC 41; SLSC 51, 52, and enrolled in the Diploma in Agriculture program.

Note: Conducted during a three-day period in July between Years 1 and 2. A special fee will apply.

ANSC — ANIMAL SCIENCE

Department of Animal & Poultry Science, College of Graduate Studies and Research

ANSC 800.3 — 2(3L) Advanced Protein and Amino Acid Nutrition

Current information on digestibility, absorption and metabolism of nitrogen, proteins, amino acids and nucleic acids, as they apply to animals and man. Includes discussion on protein synthesis, protein catabolism and related regulatory mechanisms. The application of these processes in defining the dietary requirement, interaction and toxicity of essential and non-essential amino acids, including assessment of protein quality.

Note: Offered in alternate years.

ANSC 810.3 — 1(3L) Nutrition of Grazing Ruminants

A concise overview of the sources, availability, functions, requirements, deficiencies, deleterious effects and interrelationships of nutrients affecting the productivity of free-ranging wild and domestic ruminant animals. Research techniques will be emphasized.

Note: Offered in alternate years.

ANSC 811.3 — 1(3L) Welfare of Agricultural Animals

An examination of various aspects of farm animal welfare including historical, philosophical and scientific perspectives. The positions of animal interest groups, scientific societies, and commodity groups will be discussed. Emphasis will be on agricultural animals, but material relevant to laboratory animals and wildlife may also be presented.

Prerequisite(s): Permission of Instructor.

ANSC 812.3 — (3L)

Molecular Genetic Analysis

Lectures and assignments in data analysis methods used in mammalian molecular genetic studies. Topics covered include diagnostic test development and accuracy, phylogenetic analysis, parentage testing, QTL mapping, linkage mapping and LOD score calculation, genomic imprinting, and disease association analysis.

Note: Offered in alternate years.

ANSC 813.3 — 2(3L)

Advanced Monogastric Nutrition

Lectures, seminars and discussion on special topics related to monogastric nutrition with emphasis on swine and poultry. Methods of evaluating the nutritional characteristics of feed ingredients and establishing nutrient requirements. Advanced feed formulation.

Prerequisite(s): Permission of the instructor.

Note: Offered in alternate years.

ANSC 814.3 — 1/2(3L-3P-1T)

Advanced Laboratory Techniques

Designed to provide the theoretical background and practical details of basic methodology for a wide range of analytical work in modern animal science laboratories, and to prepare students for independent laboratory analysis relevant to their research projects. The course will comprehensively cover the analytical principles and applications, and fundamental concepts of method development.

Prerequisite(s): Prerequisites required for enrolment of graduate students in specific programs in the department.

ANSC 815.3 — 2(3L)

Advanced Ruminant Nutrition and Metabolism

Covers the impact that nutrition has on ruminant metabolism in order to maintain optimal production throughout the animal's life. The main emphasis is on dairy and beef cattle. The role of nutrition in the metabolism of the fetus, the calf from birth to puberty, and of the pregnant and the

lactating cow is covered. Advances in feed and animal biotechnology that may improve the efficiency of production and have an impact on metabolism are discussed. Students will be assigned to a local dairy farm, cow-calf operation, or feedlot so that they can apply the knowledge gained in this course to a practical situation. Some tours will be given.

Prerequisite(s): Permission of the instructor.

Note: Offered in alternate years.

ANSC 817.3 — 2(3L)

Advanced Mineral Nutrition

A review of the biochemistry, physiology and application of mineral nutrition in ruminant and monogastric animals. Includes presentation of seminars and students will be acquainted with current analytical methodology.

Prerequisite(s): Permission of the instructor.

ANSC 820.3 — 1(3L)

Energetics and Micronutrient Nutrition

Current information on the metabolism of individual energy components, overall energy requirements and the metabolism of vitamins and minerals in animal and human nutrition.

Prerequisite(s): BIOC 200; or equivalent.

Note: Offered in alternate years.

ANSC 825.3 — 1(3L)

Nutritional Toxicology

Examines naturally occurring toxicants. Bacterial toxins and mycotoxins. Additives and residues. Contaminants. Drug nutrient interrelationships. Nutrient toxicity. Safety and regulatory aspects.

Prerequisite(s): Undergraduate biochemistry and nutrition courses and permission of the instructor.

Note: Offered in alternate years.

ANSC 870.3 — 1(3L-4P)

Applied Animal Biotechnology

Covers reproductive technologies; transgenic techniques; molecular genetics in animal selection; use of recombinant proteins for growth, lactation and reproduction; immunological modulation of animal production; improvement of feeds and rumen organisms; improvement of health. In addition, ethical and safety aspects will be considered. Emphasizes the application and impact of biotechnological techniques on animal production rather than the techniques themselves.

Prerequisite(s): Permission of the instructor; basic genetics and physiology courses are recommended.

Note: Students who have credit for ANSC 470 may not take this course for credit.

ANSC 898.3 — 1&2(3L)

Special Topics

Special offerings in topics relevant to Animal and Poultry Science. Examples would be Nutrition of Grazing Animals, Laboratory Techniques, Immunology, Animal Forensic Science and Use of Statistics in Animal Experimentation. Interested students should contact the Head of the Department.

ANSC 899

Special Topics

Offered occasionally by visiting faculty and in other special situations to cover, in depth, topics that are not thoroughly covered in regularly offered courses.

ANSC 990

Seminar

Reports and discussion of current research. Graduate students are required to attend and participate during their candidacy.

ANSC 992.6

Project

Students undertaking the project Master's degree (M.Agr.) must complete the course as part of the requirements for the degree.

ANSC 994

Research

Students writing a Master's thesis must register for this course.

ANSC 996

Research

Students writing a Ph.D. thesis must register for this course.

ANTH — ANTHROPOLOGY

Department of Religious Studies & Anthropology, College of Graduate Studies and Research

ANTH 803.3 — 1/2(3S)

Core Seminar in Ethnological Theory

Readings, seminars and discussion periods dealing with a wide range of theoretical developments in ethnology. The nature and dynamics of various conceptual frameworks and theoretical approaches will be critically examined, both historically and in the context of contemporary debates.

ANTH 820.3 — 1(3L)

Topics in Contemporary Ethnological Theory

A survey of the principal approaches employed by present-day social/cultural anthropologists as they seek to understand society and culture.

ANTH 821.3 — 1/2(3L)

Methods in Contemporary Ethnology

A survey of the methods and techniques employed in present-day social/cultural anthropological research. Problems of field work and data analysis will be considered.

ANTH 840.3 — 1/2(3L)

Seminar in Linguistic Anthropology

A survey of selected problems in linguistics and the ethnography of language. Problems of field work and data analysis will be emphasized.

ANTH 898.3

Special Topics

Offered occasionally by visiting faculty and in other special situations to cover, in depth, topics that are not thoroughly covered in regularly offered courses.

ANTH 899.6

Special Topics

Offered occasionally by visiting faculty and in other special situations to cover, in depth, topics that are not thoroughly covered in regularly offered courses.

ANTH 994

Research

Offered occasionally by visiting faculty and in other special situations to cover, in depth, topics that are not thoroughly covered in regularly offered courses.

ANTH 996

Research

Offered occasionally by visiting faculty and in other special situations to cover, in depth, topics that are not thoroughly covered in regularly offered courses.

APMC — APPLIED MICROBIOLOGY

Department of Applied Microbiology & Food Science, College of Graduate Studies and Research

APMC 801.3 — 1(1L-5P)

Laboratory in Fermentation Technology

Designed to familiarize limited numbers of students with fermentation research techniques used at the University of Saskatchewan. Commercially available microbes will be used to transform substrates to a variety of end products. Emphasizes operational aspects of laboratory scale fermenters, computer control and measurement of parameters

using modern equipment, enzymes and chemical assays.

Prerequisite(s): APMC 212, 434, and 437 or equivalents; BIOC 200 (or 203); laboratory experience in research and written permission of the Head of the Department.

**APMC 803.3 — 2(2L-1S)
Genetics of Industrial Microorganisms**

Detailed study of the genetics of industrially important microorganisms and their relationship to the relevant practices. Seminar presentations review research literature related to the lecture topics.

Prerequisite(s): APMC 437, BIOC 220 (or 203), and MICR 386 or equivalents; or an undergraduate degree in microbiology or biochemistry. Previous course work in genetics is desirable.

**APMC 806.3 — 2(3L)
Anaerobic Microbiology**

Studies the biology and cultivation of anaerobic microorganisms and of their application to agricultural and industrial processes.

Prerequisite(s): APMC 212 and MICR 386 or equivalent; or permission of the instructor.

**APMC 807.3 — 2(3L-1S)
Microbial Biotechnology in Industry and Agriculture**

Principles of biotechnology as they apply to useful products and processes involved in industry and agriculture, including food production and processing.

Prerequisite(s): APMC 212, 434 and 437, BIOC 220 (or 203), MICR 386 or equivalent; or permission of the instructor.

**APMC 808.3 — 1(3L-2P)
Brewing Microbiology**

A comprehensive review of the status and current problems in brewing microbiology, wild yeast and bacteria in brewing; use of selective and general media for their isolation and enumeration; yeast washing; brewery quality control; yeast propagation, storage, handling and fermentation; beer pasteurization.

Prerequisite(s): APMC 212 and 425 or equivalent; FDSC 412 or 812 is recommended.

**APMC 825.3 — 2(2L-1S)
Carcinogens and Mutagens**

Provides some understanding of carcinogens and mutagens, their

mechanism of action at organismic, cellular and molecular levels, and of their testing and assessment. Short seminar discussions of current developments will be included.

Prerequisite(s): A course in biochemistry [BIOC 220 (or 203)], knowledge of general cell biology (ACB 201), general microbiology (APMC 212 or MICR 214), and permission of the instructor.

**APMC 830.3 — 2(3L)
Microbial Ecology**

Introduction to the diversity of microorganisms and the dynamics of microbial interactions. Microbial biogeochemistry of specific aquatic and terrestrial ecosystems. Selective microbial enrichment and isolation. In situ quantitation of microbial activity.

Prerequisite(s): APMC 212 or MICR 214; CMPT 100 or AGRC 290.

**APMC 831.3 — 2(3L)
Laboratory in Microbial Ecology**

Designed to introduce modern experimental and computer modeling techniques for the study of microbial interactions. Laboratories will include the use of microbial enrichment cultures to isolate organisms of geochemical and industrial significance; in measurement of microbial proliferation and metabolic activity under in situ conditions; and in dynamics of microbial interactions and effects of environmental stress.

Prerequisite(s): APMC 430 or 830 (may be taken concurrently); and permission of the instructor.

**APMC 833.3 — 1/2(3L)
Microbial Insecticides**

Microorganisms as biological insect pest control agents is a rapidly advancing area of applied microbiology and agriculture. Examines the microbiology and molecular biology of such pest control agents.

Prerequisite(s): APMC 212 or MICR 214 or equivalent.

**APMC 836.3 — 1(3L)
Food Microbiology**

Applications of biotechnology to food microbiology. Emphasis on genetic engineering of starter cultures used to produce fermented foods, microbial processing of food wastes, and rapid methods for detection and enumeration of microorganisms.

Prerequisite(s): APMC 212 and 425 or equivalent, and BIOC 220 (or 203); or permission of the instructor.

**APMC 837.3 — 2(3L-3P)
Industrial Microbiology**

Principles of design and operation of fermentation equipment, aerobic and anaerobic fermentation processes leading to industrial chemicals, antibiotics, vitamins and amino acids with emphasis on biochemistry. Influence of biotechnology on the fermentation industry. Demonstrations, field trips and special projects are included.

Prerequisite(s): Permission of the instructor.

**APMC 838.3 — 2(1L-4P)
Laboratory in Microbial Insecticides**

Experimental methods in the production, molecular analysis and use of microbial insecticides. Commercially available and experimental microbial insecticides will be used to demonstrate principles of bioassay, culturing pathogens, characterization of insecticidal molecules, mycoinsecticide action, cuticle degrading enzyme production and commercial bacterial insecticide application technology.

Prerequisite(s): APMC 433 or 833 and permission of the instructor.

**APMC 850.3 — 1/2(3L-1S)
Microbiology of the Rumen**

A detailed study of the microflora and microfauna indigenous to the rumen and of the role of the rumen microbiota in nutrition of the host animal. Seminars will involve reading and discussion of recent literature in selected areas.

Prerequisite(s): Permission of the instructor.

**APMC 898.3 — 1&2(R/T/P)
Special Topics and Techniques**

Reading assignments, tutorials and laboratory projects in selected areas related to the student's major field of study. A series of term papers, reviews or laboratory reports will be required.

**APMC 990
Seminar**

Seminars are held weekly throughout the year. Current literature in the field of Applied Microbiology and Biotechnology is reviewed and discussed, and papers on current research topics are presented. Graduate students are required to attend and to participate.

**APMC 992.6
Project**

Students undertaking the project Master's program (M.Agr.) must register for this course.

**APMC 994
Research**

Students writing a Master's thesis must register for this course.

**APMC 996
Research**

Students writing a Ph.D. thesis must register for this course.

**ARCH —
ARCHAEOLOGY**

Department of Archaeology, College of Graduate Studies and Research

**ARCH 805.3 — 1/2(3S)
Core Seminar in Archaeological Method and Theory**

Seminars based on a series of readings dealing with the development of archaeological theory. Special emphasis will be given to anthropological archaeology and contemporary explanatory models.

**ARCH 850.3 — 1/2(3S)
Research Design**

Covers preparation of research designs, methods of problem development, data analysis and interpretation, and also the organization and writing of theses (including stylistic and technical aspects).

**ARCH 851.3 — 1/2(3S)
Seminar in Archaeological Method and Theory**

A survey, through discussion and analysis, of current methods and techniques of archaeological interpretation.

**ARCH 852.3 — 1/2(3S)
Seminar in Historical Archaeology**

Readings and discussions of the major theoretical developments and research orientations within contemporary Historical Archaeology.

Prerequisite(s): ARCH 352 or equivalent.

**ARCH 853.3 — 1/2(3S)
Graduate Seminar in Plains Archaeology**

Deals with the prehistory of the Northern Plains with an emphasis on current issues and problem-solving.

Prerequisite(s): ARCH 353; or equivalent.

ARCH 855.3 — 1&2(3S)

Problems in Archaeology

Research on a selected problem in archaeology or the prehistory of a selected geographic area with a problem orientation. The subject will be examined by the class as a group and in detail through conferences, readings and laboratory work. A comprehensive report will be prepared by the class.

ARCH 857.3 — 1/2(3S) Seminar in Pottery Analysis

Readings and discussions on the pottery produced by folk artisans in traditional settings. The mineral compositions of clays will be considered as well as the physical makeup of pottery, and its archaeological classification. There will be a practicum involving analysis and reporting on an actual pottery assemblages from the northern plains region.

Prerequisite(s): Permission of the instructor.

Note: This course will be offered every two years.

ARCH 858.3 — 1/2(3S&2L) Zooarchaeology

A reading course in method and theory relating to the identification and interpretation of faunal materials from archaeological sites. A practicum involving actual faunal assemblages is included.

Prerequisite(s): ARCH 458. Students may take this course concurrently.

ARCH 860.3 — 1/2(3S) Advanced Cultural Resource Management

Readings and discussions on methodological approaches and theory related to the management and conservation of heritage sites and materials. Examines federal and provincial legislation, contract research and public involvement. A work study program will be incorporated, involving an internship with appropriate government, museum and/or private business agencies.

Prerequisite(s): ARCH 360 or equivalent.

ARCH 870.6 — 1&2(3S) Seminar in Bioarchaeology

Guided reading and discussion course to permit advanced students to follow intensive research into special aspects of bioarchaeology.

ARCH 898.3 — 1/2/1&2(3R) Special Topics

Guided reading and discussion courses to permit advanced students to follow

intensive library research into special aspects of archaeology.

ARCH 899.6 — 1/2/1&2(3R) Special Topics

Guided reading and discussion courses to permit advanced students to follow intensive library research into special aspects of archaeology.

ARCH 990.0 Seminar

During residence, all graduate students will register in ARCH 990 and will present at least one paper based on their own research. Graduate students are required to attend and interested undergraduate students may be invited to attend.

Prerequisite(s): Enrolment in the Department of Archaeology Graduate Program.

ARCH 994 Research

Students writing a Master's thesis must register for this course.

ARCH 996 Research

Students writing a Master's thesis must register for this course.

ART — ART

Department of Art & Art History, College of Graduate Studies and Research

ART 830.6 — 1&2(1L-2S) Critical Issues in Contemporary Art and Culture

This seminar will deal with key issues in contemporary art. Primary sources, as well as subsequent interpretations and current literature all pertaining to modern art, post-modern and the most recent cutting edge art, will serve as source material for topics selected by individual students for investigation. Faculty and students will participate through ongoing presentations, discussions and written work.

Note: Students with credit for ART 430 may not take this course for credit.

ART 838.3 — 1/2(1L-2S) Extended Media

Continued research and exploration in collaborative and interdisciplinary approaches to contemporary art making. Projects will include alternative practices such as video, performance, installation, projection, and book works. Reading and discussion of related texts will accompany production of artworks. Ambitious and critical synthesis of concepts and media are expected at the graduate level.

Formerly: ART 835.
Prerequisite(s): B.F.A. degree.

ART 839.3 — 1/2(1L-2S) Extended Media

Continued research and exploration in collaborative and interdisciplinary approaches to contemporary art making. Projects will include alternative practices such as video, performance, installation, projection, and book works. Reading and discussion of related texts will accompany production of artworks. Ambitious and critical synthesis of concepts and media are expected at the graduate level.

Formerly: ART 835.
Prerequisite(s): B.F.A. degree.

ART 841.3 — 1/2(1L-2S) Sculpture

Research and continued identification of the concepts, materials, and means of sculpture and related work will be explored. Methods of construction (casting, carving, building, assembling, etc.) and presentation, both traditional and experimental approaches will be encouraged. This includes wide exploration of materials and combinations such as metals, wood, fabric, cement, and found objects. Ambitious and critical synthesis of materials, processes and concepts is expected at the graduate level.

Formerly: ART 814.

ART 842.3 — 1/2(1L-2S) Sculpture

Research and continued identification of the concepts, materials, and means of sculpture and related work will be explored. Methods of construction (casting, carving, building, assembling, etc.) and presentation, both traditional and experimental approaches will be encouraged. This includes wide exploration of materials and combinations such as metals, wood, fabric, cement, and found objects. Ambitious and critical synthesis of materials, processes and concepts is expected at the graduate level.

Formerly: ART 814.

ART 851.3 — 1/2(1L-2S) Printmaking

Studio work and exploration of the conceptual, expressive and technical means of four major print methods will be offered: Etching, Lithography, Relief Print and Serigraphy. Related photographic methods will be demonstrated. Thorough familiarity with the craft of the traditional print methods, as well as experimentation will be encouraged.

Formerly: ART 813.

Prerequisite(s): B.F.A. degree.

ART 852.3 — 1/2(1L-2S) Printmaking

Studio work and exploration of the conceptual, expressive and technical means of four major print methods will be offered: Etching, Lithography, Relief Print and Serigraphy. Related photographic methods will be demonstrated. Thorough familiarity with the craft of the traditional print methods, as well as experimentation will be encouraged.

Formerly: ART 813.

Prerequisite(s): B.F.A. degree.

ART 861.3 — 1/2(1L-2S) Photography

Continued development in the creative language of photography, both expressive and technical. The study will include still, motion, black and white, and color photography. Theory and practical application will be approached through direct experience with the camera and with the developing and printing processes.

Formerly: ART 816.

Prerequisite(s): B.F.A. degree.

ART 862.3 — 1/2(1L-2S) Photography

Continued development in the creative language of photography, both expressive and technical. The study will include still, motion, black and white, and color photography. Theory and practical application will be approached through direct experience with the camera and with the developing and printing processes.

Formerly: ART 816.

Prerequisite(s): B.F.A. degree.

ART 871.3 — 1/2(1L-2S) Painting Media

Continual identification of concepts and methods as they relate to the expression, structure, media, and skills of painting. Students may experiment with any or all painting media and work from a choice of subject matter. Emphasis is on students' artistic growth and development.

Formerly: ART 811.

ART 872.3 — 1/2(1L-2S) Painting

Continual identification of concepts and methods as they relate to the expression, structure, media, and skills of painting. Students may experiment with any or all painting media and work from a choice of

subject matter. Emphasis is on students' artistic growth and development.

Formerly: ART 811.

ART 881.3 — 1/2(1L-2S)
Drawing

Continued research and exploration of the concepts and methods of drawing as they relate to visual perception and expression, compositional design and graphic media, and skills. Use of diverse media coupled with invented and observed form is expected.

Formerly: ART 812.

ART 882.3 — 1/2(1L-2S)
Drawing

Continued research and exploration of the concepts and methods of drawing as they relate to visual perception and expression, compositional design and graphic media, and skills. Use of diverse media coupled with invented and observed form is expected.

Formerly: ART 812.

ART 898.3 — 1/2(3L)
Special Topics

Offered occasionally by regular and visiting faculty and in other special situations. Students interested in this course should contact the department for more information.

ART 899.6 — 1&2(3L)
Special Topics

Offered occasionally by regular and visiting faculty and in other special situations. Students interested in this course should contact the department for more information.

ART 922.6
Project Paper

This is a major paper and will require proper documentation. Based on appropriate research under Option A. One of the following approaches to the writing of the paper should be specified: 1) An exhibition history, the intent of which is to allow students the opportunity to examine in detail their development as artists. This paper can use other artists or periods of art history for purposes of comparison; or 2) A research paper. This paper more closely approximates the generally accepted notion of a thesis and has as its content a specific topic in the History of Art or Art Criticism.

ART 990
Seminar

All graduate students are required to attend biweekly departmental seminars during the first two years of their program. Students will present their exhibition research and participate in seminar discussions. Departmental faculty and visiting lecturers also contribute to the program.

ART 994
Research

Students writing a Master's thesis must register for this course.

ART 995
MFA Exhibition

This is a major component of the M.F.A. degree in Visual Arts. Students must select the best from work completed during the two years and mount an acceptable exhibition. This exhibition constitutes the major emphasis of the students' study and research. The examining committee for the defense of this exhibition consists of three Art Department faculty, one external examiner and a designated chair for the exam.

ARTH — ART
HISTORY

Department of Art & Art History, College of Graduate Studies and Research

ARTH 898.3 — 1/2(3L)
Special Topics

Offered occasionally by regular and visiting faculty and in other special situations. Students interested in this course should contact the department for more information.

ARTH 994
Research

Students writing an M.A. thesis must register for this course.

BIOC —
BIOCHEMISTRY

Department of Biochemistry, College of Graduate Studies and Research

BIOC 820.3 — 2(3L)
Advanced Plant Biochemistry

This advanced course examines current topics in plant biochemistry with an emphasis on metabolic and developmental integration as well as plant interaction with the environment. Current literature from these subject areas will be incorporated and emphasis given to the molecular genetic approaches utilized to elucidate our current understanding.

Prerequisite(s): BIOC 200, 220, 230, or BIOL 211; or permission of the department.

Note: Students who have credit for BIOC 420 may not take this course for credit. Offered in the academic year 2004-2005 and alternate years thereafter (2006-2007, etc.).

BIOC 830.3 — 2(3L)
Cell Biochemistry

The biochemical properties of eukaryotic cells will be investigated with special emphasis on post-translational modifications of secreted and membrane proteins, cell-cell and cell-extracellular matrix interactions, signal transduction, cell-cycle control, apoptosis, neoplastic transformation and tumor progression. Students will be asked to research one of the topics discussed in the course by consulting the current literature and prepare a term paper.

Prerequisite(s): BIOC 211; BIOC 310; or permission of the department.

Note: Offered in 2005-2006 and alternate years thereafter (2007-2008, etc.).

BIOC 843.3 — 1(3L-3P)
X Ray Crystallographic Structure Determination

Describes the principles, methodology, application and limitations of the techniques in x-ray crystallographic structure elucidations. The methods employed to solve both small molecule and macromolecular crystal structures will be discussed and a small molecular structure determination will be carried out by the students.

Prerequisite(s): BIOC 200 (or 203); or equivalent and permission of the instructor; MATH 110, and 112 or 116 are also advisable.

Note: Offered in 2005-2006 and alternate years thereafter (2007-2008, etc.).

BIOC 850.3 — 1&2(L-S)
Current Topics in Biochemistry

Reviews and discusses recent advances in Biochemistry and related areas through paper presentations by students. Students will be evaluated on their presentations and on a grant application that is prepared based on one of the papers presented.

Prerequisite(s): Permission of the department.

BIOC 851.3 — 1&2(L-S)
Current Topics in Biochemistry

Reviews and discusses recent advances in Biochemistry and related areas through paper presentations by students. Students will be evaluated on their presentations and on a grant application that is prepared based on one of the papers presented.

Prerequisite(s): Permission of the department.

BIOC 898.3
Special Topics

These courses are offered occasionally by visiting faculty and in other special situations. Students interested in these courses should contact the department for more information.

BIOC 899
Special Topics

These courses are offered occasionally by visiting faculty and in other special situations. Students interested in these courses should contact the department for more information.

BIOC 990
Seminar

All Biochemistry graduate students must register annually for this course. The Biochemistry seminar series presents a wide range of topics from the life sciences and are held throughout the year. Students in the biochemistry graduate program are required to attend these seminars, and may also be required to attend seminars in related fields given in other departments or institutions on campus.

BIOC 994
Research

Students writing a Master's thesis must register for this course.

BIOC 996
Research

Students writing a Ph.D. thesis must register for this course.

BIOE —
BIOMEDICAL
ENGINEERING

Department of Biomedical Engineering, College of Graduate Studies and Research

BIOE 800.3 — 1/2(3L-1.5L)
Advanced Biomedical Instrumentation

An introduction to some of the concepts of instrumentation and their application to measurements of biological parameters. Includes: transducers, biopotential amplifiers, electrodes, biopotential signals, electrical safety, cardiovascular and respiratory measurements, and imaging.

BIOE 802.3 — 1/2(3L)
Fundamentals of Signals Theory for Life Scientists

Signals and spectra. Bandwidth requirements. Amplitude and phase distortion. Time delay considerations. The sampling theorem. The sampling of non-periodic wave shapes. White noise. Signal to noise ratio.

BIOE 804.3 — 2(3L)
Biomaterials

An introduction to the structure and physical properties of materials of importance in bioengineering; compatibility of materials with the body; mechanisms of damage and failure of implanted materials; materials selected and fabrication.

BIOE 805.3 — 1/2(6L)
Introduction to Magnetic Resonance Imaging

Overview of magnetic resonance imaging (MRI) physics and engineering suitable for graduate students in engineering, physics, chemistry, biology or psychology. Pulse sequences; hardware design; diffusion imaging; functional MRI.
Prerequisite(s): Permission of the instructor.

BIOE 898.3 — 1/2(3L)
Special Topics

Two 3 credit-unit courses can be taken independently. Topics will be selected according to the student's specific areas of interest. They include signal analysis for the acquisition and processing of physiological data, digital and optical picture processing for medical applications, theory of bioelectrodes, biological control theory and computer simulations of biological processes (some of these topics may be presented by faculty members specializing in that particular field).

BIOE 899
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

BIOE 990
Seminar

Seminars are held periodically throughout the Regular Session or as a one-day symposium. Graduate students are required to make a presentation related to their thesis work or on a course project. In addition, graduate students may be required, from time to time, to attend seminars relevant to biomedical engineering given by faculty or visiting scientists in other departments. Students must enroll throughout their program.

BIOE 992.6
Project

Students taking the project Master's degree must register in this course.

BIOE 994
Research

Students writing a Master's thesis must register for this course.

BIOE 996
Research

Students writing a Ph.D. thesis must register for this course.

BIOL — BIOLOGY

Department of Biology, College of Graduate Studies and Research

BIOL 811.3 — 1&2(1.5S)
Cell Biology

Review of the literature on selected topics including microscopic and sub-microscopic cellular organization, and cell function.
Prerequisite(s): Permission of the instructor.

BIOL 815 — 2(3S)
Advanced Limnology

A review of current ecological and environmental issues concerning inland waters.
Prerequisite(s): BIOL 412 or permission of the instructor.
Note: Offered in 2007/2008 and in odd years thereafter (2009/2010, etc.)

BIOL 825.3 — 1(2S-4R)
Current Topics in Plant Molecular Biology

A review of recent advances in plant molecular biology, emphasizing the use of molecular techniques in studying basic plant processes.
Prerequisite(s): BIOL 420 or PLSC 416; or permission of the instructor.
Note: Offered in 2007/2008 and in odd years thereafter (2009/2010, etc.)

BIOL 827.3 — 1&2(2S-4P)
Multivariate Methods in Taxonomy and Ecology

An introduction to numerical taxonomy and quantitative phytosociology, covering estimates of resemblance, classification and ordination procedures.
Prerequisite(s): An introductory statistics course; a course in computer science, any two of BIOL 423, 472, 473, PLEC 431; or permission of the instructor.

BIOL 832.3 — 1/2(1L-1S-4R)
Control of Plant Growth and Development

Deals with certain aspects of plant growth, differentiation and morphogenesis at the genetic, cellular and organismic levels.

Prerequisite(s): BIOL 326 and BIOL 331 or permission of the instructor.
Note: Offered in 2006/2007 and in even years thereafter (2008-2009, etc.).

BIOL 836.3 — 1(1S-4R)
Advanced Plant Physiology

Selected topics dealing with recent advances in plant physiology.
Prerequisite(s): BIOL 331 or permission of the instructor.
Note: Offered in 2006/2007 and in even years thereafter (2008/2009, etc.).

BIOL 841.3 — 2(2L-2S-2P)
Advanced Plant Pathology

Selected topics in plant pathology and related aspects of applied biology.
Prerequisite(s): Permission of the instructor.
Note: Offered in 2007/2008 and in odd years thereafter (2009/2010, etc.).

BIOL 871.3 — 1/2(1S-3R-2P)
Advanced Insect Physiology

A review of recent advances in certain fields of insect physiology.
Prerequisite(s): BIOL 365, 366; or permission of the instructor.

BIOL 872.3 — 1/2(3S)
Advanced Animal Behaviour

Examination of current concepts and techniques in the study of animal behaviour.
Prerequisite(s): BIOL 472.
Note: Offered in 2006/2007 and in even years thereafter (2008/2009, etc.).

BIOL 880.3 — 2(3L)
Applied Statistics in Ecology

An overview of basic statistical methods and their applications to ecological studies. Topics include descriptive statistics, frequency analyses, experimental designs and analyses of variance, trend analyses, and analyses by rank. Designed for students involved in ecological research.
Prerequisite(s): PLSC 314 or equivalent.
Note: Offered in 2006/2007 and in even years thereafter (2008/2009, etc.).

BIOL 883 — 1(2S)
Ecology Seminar

Students and faculty reports on selected topics in aquatic and terrestrial ecology.

Note: Offered in 2007/2008 and in odd years thereafter (2009/2010, etc.).

BIOL 889.3 — 2(2L-1P)
Avian Wildlife Conservation and Management Theory in Practice

Evaluates current problems and solutions in conservation and management of wildlife, primarily birds, with emphasis on hypothesis-testing, and identification, review and application of ecological theories and new analytical techniques. Analysis of specific case-histories dealing with management of birds.
Prerequisite(s): BIOL 458 or 473; or equivalent.
Note: Offered in 2006/2007 and in even years thereafter (2008/2009, etc.).

BIOL 898.3 — 1/2/1&2 (R/T)
Special Topics

Assigned reading and tutorials, projects and/or lectures in special topics related to the student's major field of interest. Students are required to prepare three essays or term papers or their equivalent if another form of evaluation is more appropriate.

BIOL 899
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

BIOL 990
Seminar

A student seminar/poster symposium held over one day during the regular session to develop scientific communication skills. Both M.Sc. and Ph.D. students are required to participate in and pass this course for each academic year of their program.

BIOL 994
Research

Students writing a Master's thesis must register for this course.

BIOL 996
Research

Students writing a Ph.D. thesis must register for this course.

CE — CIVIL
ENGINEERING

Department of Civil & Geological Engineering, College of Graduate Studies and Research

CE 801.3 — 1/2(3L)
Indeterminate Structural Analysis

Reviews approximate methods for analyzing the effect of lateral forces on tall buildings. The analysis of arches. The slope deflection method. Matrix techniques as used in the force and displacement methods of analysis for application with digital computers.

**CE 802.3 — 1(3L)
Theory of Elasticity I**

Introduction; plane stress and plane strain; two dimensional problems in rectangular and polar co-ordinates; analysis of stress and strain in three dimensions, elementary problems of elasticity in three dimensions.

**CE 804.3 — 2(3L)
Structural Dynamics**

Behaviour of materials and structures under dynamic loading; simplified analysis and design principles of structures subjected to wind, earthquake and other dynamic loading.

Prerequisite(s): MATH 338 or equivalent.

**CE 808.3 — 2(3L)
Elastic Stability**

Examines structural stability problems; stability of equilibrium; exact and approximate solutions of elastic stability of columns including Newmark's Methods of numerical integration; study of beam-columns; local and lateral buckling of beams.

**CE 810.3 — 1(3L)
Structural Steel Design**

An advanced study of the design of structural steel members with emphasis on recent changes in design specifications, covering tension members, compression members, local and torsional buckling, beams, and beam-columns.

**CE 816.3 — 1(3L)
Prestressed Concrete**

Material, prestressing systems and loss of prestress. Analysis and design of determinate structures: working stresses, ultimate design, shear, bond, bearing and deflection. Indeterminate structures: continuous beams, floor slabs and frames.

**CE 818.3 — 1/2(3L)
Concrete Technology I**

Types of cements, compounds of cements, structure of cement paste, theory and practice of aggregate grading, fresh concrete, mix design of concrete.

**CE 819.3 — 1/2(3L)
Concrete Technology II**

Nature of strength of concrete, elasticity, shrinkage and creep, chemical and physical durability, testing of concrete, light weight and high density concretes.

**CE 821.3 — 1/2(3L-1.5P)
Surface Water Quality**

Water quality aspects of rivers and lakes and implications of waste water input are discussed. Topics include surface water quality parameters, point and non point source input characteristics, water quality measurements, mixing and self-purification processes, water quality modeling methods.

**CE 822.3 — 1/2(3L-1.5P)
Sanitary Engineering I**

Water chemistry fundamentals underlying water and waste water treatment methods and groundwater chemistry are discussed. Principles covered include kinetics, chemical equilibrium, acid-base systems, complexation, precipitation-dissolution and oxidation reduction.

**CE 823.3 — 1/2(3L-3P)
Sanitary Engineering II**

Application of physical, chemical and microbiological principles in water and waste water treatment operations processes, design and control.

**CE 824.3 — 1/2(3L)
Advanced Physical Chemical Treatment**

Detailed study of the theory and design of physical and chemical unit processes utilized in water and wastewater treatment. Equalization, sedimentation, flotation, adsorption, gas stripping, membrane process, neutralization, disinfection, water softening, chemical oxidation, ion exchange are discussed.

**CE 825.3 — 1/2(3L)
Biological Waste Water Treatment**

Detailed study of the theory and design of biological suspended-culture and attached-culture systems utilized in domestic wastewater treatment. Activated sludge processes, aerated lagoons, trickling filters, rotating biological contactors, submerged biofilm process, sequencing batch reactors, sludge digestion are discussed.

**CE 830.3 — 1/2(3L)
Advanced Open Channel Flow**

Hydraulics of open channel flow. Basic principles; specific energy; specific force; uniform flow; water surface profiles; hydraulic jump; slope-area and contracted area method; transitions for subcritical and supercritical flow; flood routing; spatially varied flow. Laboratory work includes practical design problems and some experiments in the fluid mechanics laboratory.

**CE 831.3 — 1/2(2L-3P)
Wave Mechanics of Free Liquid Surfaces**

The theory of long and short waves on open water with practical applications to regional conditions and problems. Topics include: long wave theory; applications to natural channels and canals; oscillations in chambers; tides; numerical methods of solving long wave equations - finite differences - method of characteristics - computer application; short wave theory; generation by wind, wave patterns at obstructions; shallow water effects; practical applications - wave resistant structures; sediment transport.

**CE 832.3 — 1/2(2L)
Sediment Transport and River Engineering**

Analysis, design and control of channels, canals, and rivers, with erodible boundaries. Topics include initiation of sediment movement, transport processes, sediment transport equations, scour and deposition. Regime Theory for canals and rivers, other river development equations, channel roughness, control of rivers and effects of these controls, movable bed models. Term papers on a topic chosen by the student may be required.

**CE 833.3 — 1/2(3L)
Water Resources Development**

Water availability and demand; basic data requirements; procedures for economic analysis, benefit-cost studies, and cost allocation; components and operating features of multi-purpose projects for flood control, navigation, water power, irrigation, water supply, and recreation.

**CE 835.3 — 1/2(3L)
Pumps and Hydraulic Transients**

Theory of turbomachinery; design and selection of pumps; affinity laws; pumping plant layout; water hammer in pipelines; penstocks, and pumping systems; pressure relief, surge and surge tanks. Laboratory work includes tests on pumps, water hammer and surge apparatus.

**CE 840.3 — 1/2(3L)
Surface Hydrology Prediction and Simulation**

Consists of two major parts; the first one focuses on modeling hydrologic processes and prediction of hydrologic events using the artificial neural networks (ANNs). The second part of the course focuses on presenting the concept of system dynamics and its applications in the field of hydrologic modeling. Case studies of watershed modeling, water balance, and environmental analysis will be discussed within an object-oriented simulation environment. Although environment and water resources-related applications will be dominant, the scope of the methodologies and models introduced during the course

will be broad enough to benefit other students from different disciplines across campus.

**CE 850.3 — 1/2(3L)
Geoenvironmental Engineering Fundamentals**

An introduction to chemical, physical and hydraulic properties of soils and contaminants with a focus on contaminant behaviour, fate and transport in the subsurface. The transport and attenuation processes are presented in detail, the properties controlling these processes are discussed, and the governing differential equations are derived. Special conditions such as fractured and unsaturated media are also discussed at length.

Prerequisite(s): CE 319 or GEOE 475 or SLSC 322 or equivalent.

**CE 851.3 — 1/2(3L)
Applications in Geoenvironmental Engineering**

The course will apply the fundamental chemical, hydraulic and physical properties of soils and contaminants with an emphasis on practical engineering significance. The application of these fundamentals to geoenvironmental practice and problems is illustrated through the use of case studies. Particular focus is on two broad areas; contaminant barriers/waste management and contaminated site remediation.

**CE 852.3 — 2(1L-3P)
Advanced Geotechnical Laboratory**

The course will encompass practical aspects of geotechnical laboratory testing. It will include tests for determining index properties, strength and compressibility characteristics of soils and rocks. The course requirement will include critical review and discussion of test procedure and results as well as background literature.

**CE 853.3 — 1/2(3L)
Geosynthetics**

Types of geosynthetics; index tests; thermal/mechanical properties of polymers; textile technology; puncture/tear resistance; chemical compatibility, durability and aging; interface shear strength, sliding and pullout; design methods for base reinforcement, reinforced walls and steep slopes; case studies of geosynthetics in drainage, filtration, separation, reinforcement, waste management and mining; specifications for materials, installation. Focus on design by function.

**CE 855.3 — 1/2(3L)
Advanced Soil Mechanics**

Focuses on fundamental aspects of shear strength and volume change behaviour of saturated and unsaturated soils. It will also include theoretical and practical aspects of

primary and secondary consolidation, settlement analysis and pore pressure parameters. An introduction to critical state soil mechanics and constitutive modelling of soils will also be provided.

Prerequisite(s): CE 328 or equivalent.

CE 856.3 — 1/2(3L) Advanced Earth Structures

Includes analysis and design of earth slopes, embankments and retaining structures, theory and numerical simulation of seepage through earth structures, methods of stability analysis and their application to natural and engineered slopes, field instrumentation and monitoring the performance of earth structures.

Prerequisite(s): CE 328 or equivalent.

CE 858.3 — 1/2(3L) Geotechnical Design and Analysis

Advanced topics in soil mechanics and foundation engineering: Earth pressures and design of retaining walls, braced excavations and tied back walls. Bearing capacity of shallow and deep foundations. Settlement analyses and the selection of soil deformation and strength parameters. The design of pile foundations, load test methods and analysis of data.

Prerequisite(s): CE 417 or equivalent.

CE 861.3 — 1/2(3L) Transportation Planning

Transportation administration, planning goals, the design and the methodology of a land-use transportation study, continuation of the study and implementation of proposals. Problems and issues in the coordination of transport systems and agencies.

CE 862.3 — 1/2(3L) Transportation Systems Engineering

An introduction to the systems approach and probabilistic modeling discussion of the uses and limitations of systems in planning and designing transportation facilities as well as analyzing the operation of existing transportation facilities.

CE 864.3 — 1/2(1L-3P) Terrain Analysis and Site Investigation

Air photo interpretation is used to evaluate the physical environment for engineering and environmental planning purposes. The emphasis is on the engineering significance of landforms and their materials. The site investigation portion will focus on methods to extending ground surface interpretation into the subsurface to provide an understanding of the physical environment.

CE 866.3 — 1/2(3L) Pavement Management System I

Stress analysis, theory and design of flexible and rigid pavements, aggregates, soil cement, asphalt aggregate mixtures, salt, lime and other methods of stabilization, study of road tests.

CE 867.3 — 1/2(2L-3P) Pavement Management System II

Properties and tests of bituminous materials; rheology of asphalt; asphalt mix design; construction practices and control; performance of asphalt pavements.

CE 868.3 — 1(3L) Introduction to Decision Analysis

Decision Analysis combination of systems engineering and statistical decision theory, specifically designed to address the issues of complexity and uncertainty typically related to important decisions. Students will become familiar with the discipline of Decision Analysis, be able to model and analyze decision using the Decision Analysis framework, understand and model attitudes to risks and be conversant with the software package DPL.

Prerequisite(s): Must be graduate student in Civil and Geological Engineering.

CE 871.3 — 1/2(3L) Advanced Physical Hydrogeology

Aquifer characterization; Mapping flow in regional systems; Groundwater in the hydrologic cycle; Principles of hydraulic testing; Groundwater as a resource; Stress, strain and pore fluids; Heat transport in groundwater systems.

Prerequisite(s): CE 319 or GEOE 475 or SLSC 322 or equivalent.

CE 872.3 — 1/2(3L) Numerical Analysis in Geoengineering

Focuses on the development and application of numerical and analytic solutions to the simulation of geoenvironmental and hydrogeological problems. Analytic, semi-analytic and numerical (e.g. Finite Element and Finite Difference) methods of solution will be applied to problems of seepage, contaminant transport, soil and rock deformation and stability. Special emphasis is placed on modelling techniques including dealing with complex boundary conditions and soil non-linearity.

CE 874.3 — 1/2(3L) Underground Rock Mechanics

Theories on stress distribution around openings in rock. Approaches for characterizing rock masses. Failure criteria in rock and rock masses. Underground

instrumentation, monitoring and interpretation. Underground stability design and support methods.

Prerequisite(s): GEOE 414 or equivalent.

CE 875.3 — 1/2(3L) Rock Slopes and Rock Reinforcement

Natural and engineered rock slope stability. Design for small and large scale rock slopes. Civil and mining engineer constraints for design. Slope support, remediation and dewatering. Blasting and rock fragmentation.

Prerequisite(s): CE 876 or GEOE 414 or equivalent course(s) from other recognized universities.

CE 876.3 — 1/2(3L) Mechanics of Rock Masses

In soils, deformation occurs as a result of strains throughout the soil mass, with the mass behaving essentially as a continuum. By contrast, rock response is controlled by deformations along discrete discontinuities including fissures, cracks, joints, and faults. For this reason, different approaches to characterization analysis and design are required.

Prerequisite(s): GEOE 315 or equivalent.

CE 889.3 — 2(3L) Finite Element Method

Review of stiffness matrix method, two dimensional finite element analysis, plate bending formulations and non-linear problems; field problems, seepage, settlement, etc.; analysis of shells, vibration and stability problems; introduction to finite element methods followed by a separate group studies of specific field problems related to structures, geotechnical and transportation problems, engineering mechanics, etc.

CE 898.3 — 1/2(L/S/P) Special Topics

May consist of assigned reading, lectures by staff members, discussion periods and laboratory exercises with reports. Depending on the interests of the student and his/her supervisor, the topics are selected from one of the research fields of Civil Engineering, including: Structural, Soil, or Fluid Mechanics; Sanitary Engineering; Transportation Engineering and related subjects.

CE 899.6 — 1&2(L/S/P) Special Topics

May consist of assigned reading, lectures by staff members, discussion periods and laboratory exercises with reports. Depending on the interests of the student and his supervisor, the topics are selected

from one of the research fields of Civil Engineering, including: Structural, Soil, or Fluid Mechanics; Sanitary Engineering; Transportation Engineering and related subjects.

CE 990 Seminar

A seminar is held periodically throughout the regular session. The current literature is reviewed and discussed. Graduate students are required to attend these meetings for the duration of their program.

CE 992.6 Project

Students undertaking the project Master's degree (M.Eng.) must register in this course. It consists of independent study and investigation of a real world problem, and submission of an acceptable report on the investigation.

CE 994 Research

Students writing a Master's thesis must register for this course.

CE 996 Research

Students writing a Ph.D. thesis must register for this course.

CHE — CHEMICAL ENGINEERING

Department of Chemical Engineering,
College of Graduate Studies and Research

CHE 861.3 — 1/2(3L-1P) Fundamental Biochemical Engineering

Chemical engineering students learn the fundamentals regarding the microorganisms and their industrial applications. Metabolic regulations, enzymatic and biochemical reaction are covered. Batch and continuous fermentations, design of bioreactors, aeration, mixing, sterilization and down stream processing are discussed.

Note: Students with credit for CHE 461 will not receive credit for this course.

CHE 862.3 — 1/2(3L-1P) Advanced Biochemical Engineering

Covers the most recent areas of research progress in biochemical engineering. Topics include novel bioreactors, large-scale cultivation of plant or mammalian cells, recombinant cell fermentations, novel systems and downstream processing techniques.

Prerequisite(s): CHE 461 or 861; or permission of the instructor.

CHE 873.3 — 1/2(3L)
Process Dynamics and Control

Computer-controlled systems and mathematics of discrete-data systems will be introduced. Design of deterministic digital controllers of single-input, single-output and multi-input, multi-output processes in the z-domain and in the state-space domain will be studied. Off-line and on-line process identification techniques, using the time-series approach will be investigated. Digital controllers for stochastic processes such as minimum-variance (MV) controllers, generalized MV controllers, and self-tuning controllers will be discussed. Computer aided design control system software packages will be used.

Prerequisite(s): CHE 423; or equivalent.

CHE 874.3 — 1/2(3L)
Mass Transfer

Advanced topics in mass transfer: theoretical models, absorption with simultaneous chemical reaction, with design of a packed column for absorption with reaction.

CHE 875.3 — 1/2(3L)
Reaction Kinetics and Reactor Design

Topics will include: Heterogeneous catalysis, non-ideal flow through reactors, non-catalytic gas-solid reactors and fixed and fluidized bed catalytic reactors.

CHE 877.3 — 1/2(3L)
Mathematical Methods in Chemical Engineering

Linear Algebra and numerical methods for the solution of systems of equations. Advanced numerical methods for the solution of non-linear ordinary and partial differential equations encountered in fluid mechanics, heat and mass transfer and chemical engineering kinetics, curve fitting and optimization.

Prerequisite(s): CHE 322; or equivalent.

CHE 878.3 — 1/2(3L)
Chemical Engineering Thermodynamics

Deals with the principles of thermodynamics, equations of state, phase and chemical reaction equilibria, solution theory, and applications to industrial problems.

Prerequisite(s): CHE 323; or equivalent.

CHE 881.3 — 1/2(3L)
Process Engineering

Examines the methods of process engineering used to achieve the best overall processing systems and includes;

synthesis of processing alternatives; structure of process system; process economics; optimization applications and methods; engineering in the presence of uncertainty; simulation approach to difficult processing situations; problem assignments; involving class discussion, with special emphasis on a knowledge of chemical processes. Process safety and hazard analysis will also be discussed. A term paper will be required.

CHE 882.3 — 1/2(3L)
Design of Industrial Waste Treatment Systems

Designed to provide students with fundamental information regarding air and water pollution problems. Procedures for the design of air pollution control systems and wastewater treatment plants are covered. Regulation and legislation associated with air and water pollutions are discussed.

CHE 884.3 — 1/2(3L)
Corrosion Engineering

Intended for engineers and others who wish to develop an appreciation of the principles of corrosion and corrosion control and their application to the selection of materials of construction and the protection of engineering systems.

CHE 885.3 — 1/2(3L)
Corrosion Control in Engineering Systems

Advanced course in engineering design for the prevention and control of corrosion in a wide range of engineering systems including: chemical and petrochemical plants; conventional and nuclear power plants; transportation systems; communications; structures. Several case studies of previous corrosion problems will be included.

CHE 898.3 — 1/2(3T)
Special Topics

Supervised investigation into selected aspects of advanced chemical engineering topics. This may take the form of assigned readings and seminars.

CHE 899
Special Topics

Supervised investigation into selected aspects of advanced chemical engineering topics. This may take the form of assigned readings and seminars.

CHE 990
Seminar

Papers and discussions on recent developments in chemical engineering. Graduate students are required to attend these meetings for the duration of their program. Every graduate student is expected to present a seminar related to

their research or project at some time before they receive the graduate degree.

CHE 994
Research

Students writing a Master's thesis must register for this course.

CHE 996
Research

Students writing a Ph.D. thesis must register for this course.

CHEM —
CHEMISTRY

Department of Chemistry, College of Graduate Studies and Research

CHEM 801.6 — 1/2(3L)
Modern Aspects of Chemistry

An overview of the core material required for graduate research in chemistry presented in modular form. Emphasis is placed on integrating chemical knowledge from all subdisciplines of chemistry encompassing both experimental and theoretical approaches.

CHEM 820.3 — 1/2(3L)
Physical Methods of Molecular Structure Determination

Presents the application of various spectroscopic methods to structure determination including mass spectrometry (MS), infrared spectroscopy (IR), ultraviolet spectroscopy (UV), and ¹H and ¹³C nuclear magnetic resonance spectroscopy (NMR). The majority of the course (approx. 75%) will focus on NMR based methods including multipulse and two dimensional techniques. Although aspects of the underlying theory are presented, the course focuses the integrated interpretation (as opposed to the theory) of various spectroscopic data for the purpose of structure determination; problem solving is emphasized.

CHEM 823.3 — 1/2(3L)
Selected Topics in Analytical Chemistry

CHEM 824.3 — 1/2(3L)
Analytical Separation Techniques

Basis theory and principles of separation will be discussed for modern chromatographic techniques used in qualitative and quantitative analytical chemistry. The focus will be mainly on modern liquid chromatography and capillary electrophoresis.

CHEM 825.3 — 1/2(3L)
Analytical Electrochemistry

Advanced theory of phenomena occurring at the electrode-solution interface will be

discussed in relation to their application in modern electrochemical techniques of analysis. Various practical aspects of electroanalysis will be considered including its use in qualitative and quantitative analysis and in studies of kinetics and thermodynamics.

CHEM 832.3 — 1/2(3L)
Selected Topics in Inorganic Chemistry

CHEM 834.3 — 1/2(3L)
Selected Topics in Physical Chemistry

CHEM 835.3 — 1/2(3L)
Selected Topics in Theoretical Chemistry

CHEM 836.3 — 1/2(3L)
Special Topics in Theories of Solutions

A brief but critical study of the theories and concepts of the liquid state followed by a discussion of selected topics illustrating the importance of solvent effects in the study of solutions.

CHEM 837.3 — 1/2(3L)
EPR Spectroscopy

The basic theory of EPR spectroscopy, general features and analysis of spectra, experimental methods and applications to chemical problems.

CHEM 838.3 — 1/2(3L)
Chemistry of the Excited State

The structure and reactions of atoms and molecules in electronically excited states will be discussed. Particular attention will be paid to the processes by which excited states may be produced and deactivated. Examples from recent literature will be considered.

CHEM 840.3 — 1/2(3L)
Photochemistry

An introduction to the theory and techniques of photochemistry and its applications.

CHEM 841.3 — 1/2(3L)
NMR Spectroscopy

The basic theory of NMR spectroscopy, general features and analysis of spectra, experimental methods and applications to chemical problems.

CHEM 842.3 — 1/2(3L)
Chemical Thermodynamics

Selected topics in chemical thermodynamics.

CHEM 845.3 — 1/2(3L)
Chemical Kinetics

Kinetic theories, techniques and methods of their application to reactions in the gas and liquid phase.

CHEM 848.3 — 1/2(3L)
Theoretical Chemistry

The application of the principles of quantum mechanics to the study of molecular structure.

Prerequisite(s): CHEM 346 or equivalent.

CHEM 849.3 — 1/2(3L)
Radiation Chemistry

The action of ionizing radiations on chemical systems is described.

CHEM 850.3 — 1/2(3L)
Principles of Organic Synthesis

The advantages and limitation of new and general methods of synthesis.

CHEM 851.3 — 1/2(3L)
Stereochemistry and Asymmetric Synthesis

The fundamental principles of stereochemistry and stereoisomerism in organic compounds will be described. Various strategies and methods for the synthesis of enantiomerically pure compounds will be discussed.

CHEM 852.3 — 1/2(3L)
Selected Topics in Organic Chemistry

CHEM 855.3 — 1/2(3L)
Organic Reactions

A survey of organic reactions and reagents including reaction mechanisms and synthetic applications.

CHEM 858.3 — 1/2(3L)
Natural Products Chemistry

Provides a basic knowledge of natural products chemistry with emphasis on secondary metabolism. Topics covered include an overview of primary and secondary metabolism, modern techniques for studying secondary metabolism, biological reactions, chemical interactions between living organisms, and classes of bioactive compounds grouped according to building blocks and biogenesis.

CHEM 859.3 — 1/2(3L)

Organic Chemistry of Transition Elements

Topics include the chemistry of d_0 and d_8 ligands of transition metals, the 18 electron rule, the iron group metallocenes, transition metal acetylene and carbon complexes, alkene, allyl and ethyl complexes, the use of transition metal complexes in organic synthesis.

CHEM 860.3 — 1/2(3L)
Proteins and Nucleic Acids

The structure and conformation of proteins and nucleic acids and the properties of these biopolymers in aqueous solution, methods of separation and molecular weight determination including chromatography, electrophoresis, sedimentation and diffusion are discussed. The biosynthesis of these polymers is examined in detail.

CHEM 898
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

CHEM 899
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

CHEM 990
Seminar

Papers and discussion on recent developments in Chemistry. Graduate students are required to attend these meetings for the duration of their program, and during this period, are expected to present a seminar.

CHEM 991.0 — 1/2(1S)
Literature Core Course

Offers graduate students a formal framework for the critical discussion of current chemical literature and for the critical assessment of its importance. Students will give oral presentations based on research articles from premier chemical journals.

CHEM 994
Research

Students writing a Master's thesis must register for this course.

CHEM 996
Research

Students writing a Ph.D. thesis must register for this course.

CHEP —
COMMUNITY
HEALTH &
EPIDEMIOLOGY

Department of Community Health & Epidemiology, College of Graduate Studies and Research

CHEP 800.3 — (1.5L-1.5S)
Epidemiology I

Introduces the basic epidemiologic methods used to evaluate the distribution and determinants of disease. Includes both lectures and interactive seminars to provide students with practical experience in epidemiologic problem-solving. Examples will be drawn from the fields of both communicable and non-communicable disease.

CHEP 801.3 — (1.5L-1.5S)
Epidemiology II

Advanced concepts of epidemiologic theory and methods. Advanced biostatistical techniques will be applied to a series of epidemiologic problems from different fields within epidemiology. **Prerequisite(s):** CHEP 800; or equivalent and 3 credit units in statistics.

CHEP 802.3 — (1L-2S)
Community Health Research Methods

An introduction to the concepts and principles of qualitative, quantitative and mixed method research within the field of community health. Provides an overview of all steps of the research process, with an emphasis on writing the thesis proposal. **Prerequisite(s):** Must be registered graduate student in CHEP or have permission of instructor.

CHEP 803.3 — (3S)
Health Promotion

An introduction to theory, research, and practice in health promotion. Topics include: empowerment and community, change in individuals, small group development, community organization, healthy public policy, coalition-building and advocacy, linking research and action. **Prerequisite(s):** Registered graduate student in Community Health and Epidemiology or permission of the instructor.

CHEP 804.3 — (1-2L-S)
Community Health Issues

Provides an overview of the field of community health, including health care organization and community-based

approaches to health promotion and disease prevention.

CHEP 805.3 — (3L)
Biostatistics I

Designed for life sciences students who wish to understand and apply commonly used advanced statistical methods which they are likely to encounter in their career. The emphasis is on the appropriate application of these research methods and the correct interpretation of their results. Topics covered are: analysis of variance, non-parametric methods, multiple regression and logistic regression. Computer software used: SPSS. **Prerequisite(s):** STAT 244, 245; or equivalent.

CHEP 806.3 — (3L)
Applied Statistical Methods for Follow Up Data

Explores the application of advanced multivariate statistical methods which are commonly used in life sciences and is an extension and continuation of CHEP 805. Topics covered are: general approaches for longitudinal data analysis, which include analysis of repeated measures using analysis of variance, survival analysis, statistical methods based on generalized estimating equations and maximum likelihood theory; and brief introduction to handling missing data. Computer software used: SPSS and SAS. **Prerequisite(s):** CHEP 805 or equivalent.

CHEP 807.3 — (3S)
Health Program Planning and Evaluation

Covers basic concepts and principles of the cycle of health program planning, which includes needs assessment, program development and implementation, process, impact, and outcome evaluation. Both qualitative and quantitative data collection will be addressed. Guest speakers, case studies, and assignments will link conceptual material with concrete applications. **Prerequisite(s):** CHEP 804 or permission of the instructor.

CHEP 808.3 — 2(2L-1S)
Health Policy and Politics

An introduction to theory, research and practice in the field of health policy. More specifically, the course will provide an opportunity to critically examine the process of health policy development, analysis and implementation as well as better understand what influences policy. **Prerequisite(s):** CHEP 804 or equivalent.

CHEP 898.3 Special Topics

These courses are offered occasionally by visiting faculty and in other special situations. Students interested in these courses should contact the department for more information.

CHEP 990 Seminar

A seminar is held periodically throughout the regular session during which current issues in research and practice are discussed. Graduate students are required to attend the seminars.

CHEP 994 Research

Students writing a Master's thesis must register for this course.

CHEP 996 Research

Students writing a Ph.D. thesis must register for this course.

CLAS — CLASSICS

Department of History, College of Graduate Studies and Research

CLAS 899 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

CLR — CLINICAL RESEARCH

College of Graduate Studies and Research

CLR 800.3 — 1/2(3L) Clinical Research Methodology

Will provide basic understanding, awareness and skill development in topics necessary for performing clinical research including: study design, research data collection, understanding types of clinical research studies, measurements for quantitative studies, clinical trials, qualitative methodologies, community and Aboriginal - based research, global research, research ethics, communication skills.

Prerequisite(s): Students must be enrolled in a graduate program.

CMPT — COMPUTER SCIENCE

Department of Computer Science, College of Graduate Studies and Research

CMPT 810.3 — 1/2(3L)

Algorithms

Advanced design and analysis of algorithms. Includes pattern matching in strings, augmenting algorithms on graphs (including network flows, connectivity, and matching), computational geometry (including convex hulls, Voronoi diagrams, intersection problems, and planar point location), parallel algorithms for shared memory and interconnection network models, and distributed algorithms.

CMPT 811.3 — 1(3L-1T) Advanced Human Computer Interaction

Fundamental theory in the design, implementation, and evaluation of human-computer interfaces, and understanding of the research issues underlying interaction. Topics include: general principles of design, the design of evaluation techniques, methods for prototyping and implementing graphical user interfaces, and theoretical issues underlying user input, representation, and visualization.
Prerequisite(s): CMPT 370 or permission of the instructor.

CMPT 812.3 — 1/2(3L) Knowledge Representation and Reasoning

Representation of knowledge in formal languages. Inference, logic programming, efficient automated theorem proving, search techniques. Nonmonotonic logic, diagnosis explanation and other patterns of plausible inference. Probabilistic approaches including stochastic search techniques, probabilistic nets, diagnosis, inferring structure from data, belief functions, and an overview of uncertainty formalisms.

CMPT 813.3 — 1/2(3L) Programming Language Semantics

Introduces the principal ways in which programming languages are defined. The primary focus is on denotational semantics and the underlying domain theory; model theoretic semantics and computational proof theories may also be covered. Other topics considered include operational semantics, axiomatic semantics, algebraic specifications, and category theory.

CMPT 814.3 — 1/2(3L-3P) Introduction to VLSI Systems Design

Emphasizes the design and related issues of VLSI-based systems, analysis of subsystems design approaches, specialized VLSI chips design, and VLSI impact on architectures. Includes MOS technology, CMOS circuits and logic design, array structures, subsystem design, system design aspects, and new trends in VLSI systems design.

CMPT 815.3 — 1/2(3L)

Computer Systems and Performance Evaluation

Provides a comprehensive overview of the quantitative aspects of computer systems with a particular focus on performance evaluation. Topics include performance measurement, the analysis and interpretation of measurement data, workload characterization and modeling, the design and evaluation of performance experiments, and the design and application of analytical techniques. A variety of application domains will be considered.

CMPT 816.3 — 1/2(3L) Software Engineering

Concerns the major practical and theoretical concepts used in building large-scale software systems. Emphasizes current software development methodologies and tool support that accompanies the methodologies. The areas of software development that will be emphasized are: requirements definition and analysis; system design; and implementation and testing.

CMPT 818.3 — 1/2(3L) Queuing Theory and Modeling Applications

Markov and queuing processes in maintenance, inventory and traffic problems. The analysis of queues. Transient and steady state solutions.

CMPT 819.3 — 1/2(3L) Image Processing and Computer Vision

An introduction to image processing and computer vision, including coverage of topics such as the basics of image representation and manipulation, edge detection, image segmentation, photometric stereo and shape from shading, optical flow, and pattern recognition.

CMPT 820.3 — 1/2(3L) Advanced Intelligent System

The areas of intelligent information management and intelligent user interaction are becoming more and more important. This course explores advanced techniques for the management and effective use of data in largely unstructured application environment, such as the Web, unstructured documents, user interaction, and multi-agent systems.
Prerequisite(s): Open to graduate students in computer science who have at least one undergraduate course (3 credit units) of Artificial Intelligence.

CMPT 821.3 — 1/2(3L) Advanced Topics in Programming Languages

Advanced topics in programming languages will be selected from: programming language design, programming languages semantics, code optimization, memory management, garbage collection, closures, functional programming, logic programming, aspect-oriented programming, concurrent programming, history of programming languages, advanced programming language features and their implementation, polymorphic type systems, domain specific languages.
Prerequisite(s): Open to graduate students in computer science who have at least one undergraduate course (3 credit units) in Programming Languages.

CMPT 823.3 — 1/2(3L) Compilers

The definition and classification of formal grammars. A discussion of regular and context-free grammars with their relationships to automata. Precedence, operator precedence, LR(k) and LALR(k) grammars with their associated syntactic analyzers, symbol table techniques, intermediate forms of source programs, run-time organization, code generation and optimization. Interpreters and their relation to the compilation process. Introduces translator writing systems and compiler-compilers.

CMPT 826.3 — 1/2(3L-2P) Data and Process Modeling

Data and process modeling applied to the storage and manipulation of large amounts of data. Topics include conceptual database design, transformations for database schema, high level logical design with the ER model and the relational model, and database design tools. Applications and problems with object-oriented, knowledge, hypermedia and multimedia databases are covered.

CMPT 829.3 — 1/2(3L) Computer Graphics

Introduction to computer graphics. An overview of passive and interactive graphics hardware. Software systems for graphics. Design philosophy for interactive systems. Data structure for graphics. Design of raster graphics algorithms. Rendering of realistic images using ray tracing and radiosity techniques.

CMPT 830.3 — 1/2(3L) Bioinformatics and Computational Biology

Provides an in-depth algorithms-based introduction to major concepts and techniques in bioinformatics. Topics include algorithms for structure prediction and similarity, sequence similarity and alignment, metabolic and regulatory pathways, sequence assembly, comparative genomics, expression analysis, database

searching, artificial life and biological computation.
Prerequisite(s): A previous BINF class, or at least 6 credit units of previous course work in each of computer science, statistics and the life sciences.

CMPT 831.3 — 1/2(3L)
Intractable Problems and Models of Computation

Problems with no known efficient solution are studied; exact inefficient algorithm design techniques are introduced as are efficient approximation algorithms. NP-Completeness proofs are developed as evidence of intractability. Part of the course is a rigorous and systematic introduction to models of computation via formal language theory.

NOTE: Students with credit for CMPT 461 may not take this course for credit.
Prerequisite(s): CMPT 360 or equivalent.

CMPT 832.3 — 2(3L)
Advanced Operating Systems

An advanced look at the principles of modern operating systems. The process and the kernel, communication between processes, interrupt handling in the kernel. Message passing and synchronization primitives and their implementation. Implementation of virtual memory and file systems. Device drivers and I/O.
Prerequisite(s): CMPT 332.

CMPT 835.3 — 2(3L-1P)
Foundations of Concurrent Programming

Theory and practice of concurrent programming. Process interaction using shared variables and message passing; parallel computing; development of correct programs; general problem solving techniques; scientific computing; distributed programming.
Prerequisite(s): CMPT 260 and 332 or equivalent.

CMPT 842.3 — 1/2(3L)
Mobile and Ubiquitous Computing

After a brief discussion of the basic problems in developing applications for mobile and ubiquitous computing, the class will focus on the use of languages (e.g., Java, C#) and middleware (e.g., CORBA, SOAP, WebServices and RMI) for developing mobile and ubiquitous applications.

CMPT 850.3 — 1/2(3L)
Computational Geometry

The study of geometric problems in a computational setting. May cover such topics as convex hulls, voronoi diagrams, proximity problems, linear programming, polygon decomposition, planar point location, multidimensional trees, range search, and visibility computations.
Prerequisite(s): CMPT 810 or equivalent.

CMPT 852.3 — 1/2(3L)
Formal Artificial Intelligence

The representation of knowledge in formal languages and the technical problems arising in such representations. May include the comparative study of formalisms for reasoning with uncertain information, nonmonotonic reasoning, truth maintenance, constraint satisfaction, probabilistic causal nets, and belief revision.
Prerequisite(s): CMPT 812 or equivalent.

CMPT 853.3 — 1/2(3L)
Logic Programming

An in-depth exploration into logic programming, its foundations, methods, architectures, applications, and extensions. Includes model- and proof-theoretic semantics and operational semantics. Other topics will vary according to instructor and class interest and may include: negation, implementation techniques, meta-programming, grammars, abstract interpretation, partial evaluation, constraint logic programming, extensions for parallelism, deductive databases, and amalgamating of logic programming with other declarative paradigms.
Prerequisite(s): CMPT 812 or 813 or equivalent.

CMPT 854.3 — 1/2(3L)
Topics in Hardware Architecture and VLSI

Emphasizes VLSI methodology and impact on computer architectures. Includes parallel architectures, VLSI testability and fault-tolerant computing. Particular attention will be in the design of fault-tolerant array processors, parallel architectures, neural computing, and multiple-valued logic. Various architectural and implementation issues will be addressed.
Prerequisite(s): CMPT 814 or equivalent.

CMPT 855.3 — 1/2(3L)
Computer Networks and Distributed Systems

Includes low-level protocols (e.g., channel access protocols), routing, flow control, congestion control, transport layer protocols, protocol performance, and network measurement and workload

characterization. Of particular interest are high-speed networks, B-ISDN and ATM, fast-packet switching, and gigabit networking.
Prerequisite(s): Previous course in Networks.

CMPT 856.3 — 1/2(1.5L-1.5S-1.5P)
Software Engineering

Concerned with tools, methods, methodologies, and standards in the software engineering of conventional information systems, hypermedia and multimedia systems, and knowledge-based systems. Topics are to be selected from the following: requirements specification methodologies, object oriented design; process modeling; CASE environments and standards; software testing, validation, metrics and quality assurance; reverse engineering; shells for knowledge-based systems; second generation expert systems; knowledge acquisition; and human-computer interfaces.
Prerequisite(s): CMPT 816 or 826 or equivalent.

CMPT 857.3 — 1/2(3L-1.5P)
Readings in Computational Biology

Reviews and discusses recent advances and issues in Bioinformatics through paper presentation by students. Topics will range from computational biology to artificial life and biological computation. Students will be evaluated based on their presentations and participation, as well as a small project.
Prerequisite(s): Open to students in computer science, life sciences, and natural sciences, but subject to permission of the instructors.

CMPT 858.3 — 1/2(3L)
Topics in Modeling and Operations Research

In-depth coverage of recent research areas from Operations Research, and applications to system modeling. Advanced topics from mathematical programming, queuing theory, inventory control, simulation, Markov modeling, and simulation.
Prerequisite(s): CMPT 818 or equivalent.

CMPT 859.3 — 1/2(3L)
Advanced Computer Vision and Image Processing

Advanced topics in Computer Vision. Topics may be selected from the areas of image segmentation, shape-from-shading, stereo vision, shape representation and recognition, image tracking, and active vision.
Prerequisite(s): CMPT 819 or equivalent.

CMPT 860.3 — 1/2(3L)
Advanced Algorithms

Advanced topics in algorithms. Areas covered may include parallel algorithms, distributed algorithms, on-line algorithms, graph algorithms (e.g., algorithms for special classes of graphs), advanced geometric algorithms, new algorithmic techniques, new algorithmic directions, complexity analysis, and computationally hard problems.
Prerequisite(s): CMPT 810 or equivalent.

CMPT 862.3 — 1/2(3L)
Multi Agent Systems

Covers a variety of topics and issues relating to techniques for developing the applications of multi-agent systems
Prerequisite(s): CMPT 812 or equivalent.

CMPT 863.3 — 1/2(3L)
Topics in Functional Programming

Functional programming languages permit a wide variety of semantic definitions and a wide variety of implementation approaches. Explores selected topics in the semantics and/or implementation of these languages. May include: algebraic semantics, type theory, polymorphic type deduction, inheritance, graph reduction, data flow, systolic/wavefront arrays, and a variety of semantically sound optimization techniques.
Prerequisite(s): CMPT 813 or equivalent.

CMPT 864.3 — 1/2(3L)
Theory of Concurrency

Comprehensive introduction to the theory of concurrency and concurrent programming languages. Topics include theoretical models of concurrency, high-level concurrent programming languages and their operational semantics, methods for reasoning about correctness and complexity of programs written using these languages, and issues in implementing such languages on concurrent architectures.
Prerequisite(s): CMPT 435 or equivalent.

CMPT 865.3 — 1/2(3L)
Advanced Parallel and Distributed Systems

Concerns selected design issues in distributed and parallel computer systems, particularly those most relevant to the goal of achieving high performance. In the parallel systems areas, such design issues arise in operating systems, run-time support software, compilers, and

architecture. Topics concerning distributed systems may include interprocess communications, file systems, and load sharing, with emphasis on support for advanced parallel or multimedia applications.

Prerequisite(s): Previous course in operating systems; CMPT 815; or equivalent.

CMPT 866.3 — 1/2(3L) Topics in Human Computer Interaction

Topics studied may include the analysis and design of human-computer interaction, user interface objects and tool kits, intelligent user interfaces and user modeling, adaptive system design, human-computer interaction standards, and computers in society.

Prerequisite(s): CMPT 816 or 826 or equivalent.

CMPT 867.3 — 1/2(3L) Tangible Computing

Physical artifacts that act as handles to control and represent digital data will be the focus of this course. Course participants will learn about the different aspects of design, implementation and evaluation of tangible interfaces. Students will also apply the knowledge in developing working systems that will be evaluated through user-testing.

Prerequisite(s): CMPT 481/811.

CMPT 869.3 — 1/2(3L) Middleware for Scalable Multi-Agent Systems

Foundations and recent advances relevant to implementation of scalable multi-agent systems. Review of topics from mobile agents, peer-to-peer systems, grid computing, multi-agent systems and distributed AI of special relevance to scalability. Specific theories and techniques to address middleware solutions to scalable multi-agent systems.

Prerequisite(s): CMPT 435 or both CMPT 322 and CMPT 424.

CMPT 871.3 — 2(3L) Advanced Numerical Methods for Ordinary Differential Equations

Many processes in science and engineering are modeled by ordinary differential equations (ODEs) or differential-algebraic equations (DAEs). This course provides a comprehensive treatment of numerical methods for solving ODEs and DAEs. The use of state-of-the-art algorithms and software will be emphasized.

CMPT 872.3 — 1/2(3L)

Advanced Learning Technology

Aspects of advanced learning technology are studied, including: learner modelling, instructional planning, domain knowledge representation, authoring tools, tutorial dialogue, evaluation, semantic web technology, and theories of learning. The course takes an applied perspective, with the goal of understanding current research issues involved in building intelligent systems for use by learners.

Prerequisite(s): CMPT 812 or permission of the instructor.

CMPT 873.3 — 1/2(3L) Adaptive Systems and Personalization

Research issues in adaptive systems are examined, including: user modelling, cognitive diagnosis, data mining, representations of context and affect, personal agents, collaborative filtering, group modelling, scrutability, and privacy. Issues will be explored in the context of applications such as e-learning, e-commerce, adaptive hypermedia, information systems, and recommender systems.

Prerequisite(s): CMPT 812 or permission of the instructor.

CMPT 874.3 — 1/2(3L-2P) Construction of Computational Casual Models

A mathematical language for causation and its relation to probability. Philosophical background. Pearl's causal variables, SGS models, and construction of models from data. Shafer's Causal events. Perception of causality from Michotte to the present. The metaphysics of Cheng models and their application. Actual causation. Visualizing causal models.

Prerequisite(s): CMPT 812 or permission of the instructor.

CMPT 875.3 — 1/2(3L) Texture Analysis and Synthesis

Use of texture in computer graphics and computer vision. Texture mapping, algorithms for procedural texture synthesis. Texture as a vision cue; segmentation and shape-form texture. Texture synthesis from example. Graphics hardware and shaders.

Prerequisite(s): CMPT 829.

CMPT 876.3 — 1/2(3L) Image and Animation Synthesis

An advanced course in computer graphics, concentrating on techniques for synthesizing images and animations. Physical simulation for animation. Procedural modeling and texture synthesis. Data-driven computer graphics, including

motion capture, image-based rendering and model acquisition. Further alternatives to traditional image formation methods, such as non-photorealistic rendering and point-based rendering.

Prerequisite(s): CMPT 829.

CMPT 877.3 — 1/2(3L-2P) Construction of Computer Graphics Models

Construction of computer models from data. Model acquisition. Data smoothing. Model smoothing. Surfacing algorithms. Simple shading and texturing methods. Radial basis functions (RBFs). Creation of implicit functions from RBFs. Efficient model construction with RBFs. Advanced shading and texturing. Creation of realistic and stylized images.

Prerequisite(s): CMPT 829 or equivalent.

CMPT 880.3 — 2(1.5L) Research Methods and Topics I

An introduction to research methods and research topics in computer science. Selected topics are researched under the direct supervision of faculty members, and reports on the outcome of this research are given in both oral presentations and in written papers. Required of all students in the M.Sc. program.

Prerequisite(s): Admission to the M.Sc. program in computer science.

CMPT 890.3 — 2(1.5L) Research Methods and Topics II

A follow-up to CMPT 880 is required of all Ph.D. students in Computer Science. The student focuses on two selected research areas, one oriented towards experimental aspects of computer science and the other towards theoretical aspects. Presentation of results of project work is given both orally and as written papers.

Prerequisite(s): Admission to the Ph.D. program in computer science.

CMPT 898.3 Special Topics

These courses are offered occasionally by visiting faculty and in other special situations. Students interested in these courses should contact the department for more information.

CMPT 899 Special Topics

Offered occasionally by visiting faculty and in other special situations. Students interested in these courses should contact the department for more information.

CMPT 910.0 — 1/2(40P) Research Internship

A student makes full-time formal or practical contributions to a research program in an unfamiliar environment. This course may be taken by a student from another institution working here, or by students from this institution working in an industrial or academic research program.

CMPT 990 Seminar

All graduate students are required to register and regularly attend and participate in the department seminar series throughout their period of residence. Ph.D. students are required to present a seminar based on their own research.

CMPT 994 Research

Students writing a Master's thesis must register for this course.

CMPT 996 Research

Students writing a Ph.D. thesis must register for this course.

CMRS — CLASSICAL, MEDIEVAL, AND RENAISSANCE STUDIES

Department of History, College of Graduate Studies and Research

CMRS 899 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

COMM — COMMERCE

Department of Commerce, College of Graduate Studies and Research

COMM 898 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

DRAM — DRAMA

Department of Drama, College of Graduate Studies and Research

DRAM 898 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

DRAM 899
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

DRAM 990
Seminar

DRAM 994
Research

Students writing a Master's thesis must register for this course.

EADM —
EDUCATIONAL
ADMINISTRATION

Department of Educational Administration,
College of Graduate Studies and Research

EADM 810.3 — 1/2(3S)
Change Theory and Innovation in Education

Includes presentation of theories regarding changes in education. Forces affecting change in education are studied in detail through a case study approach. Special attention is given to the role of administrators and to methods for improving the process of change in education.

Prerequisite(s): EADM 811.

EADM 811.3 — 1(3S)
History and Development of Organizational Theory

Traces major theories through the evolution of organizational thought, and examines recent trends in the study of organizations. A variety of schools of thought are investigated and utilized as perspectives from which to view educational organizations. The content is designed to provide a basis for further in-depth study of concepts and processes in educational settings.

EADM 812.3 — 1/2(3S)
Educational Finance

Financing public education; educational revenues and expenditures; principles underlying grants systems for education; alternative models for financing public education; taxation and principles of taxation; financial administration in local school systems; cost-quality relations in education; trends in educational finance;

financial planning in times of retrenchment.

EADM 813.3 — 1/2(3S)
Planning and Data Based Decision Making

Designed to provide individuals with a knowledge of educational planning at the Board of Education level. Includes such theoretical aspects as the nature of educational planning, planning concepts, and approaches and models. Investigates applied aspects such as data collection, demographic analysis and enrolment forecasting, school facilities, master plans, and new planning techniques.

EADM 816.3 — 1(3S)
Instructional Leadership and School Management

Focuses on the formal and informal organization of the school. The leadership styles of principals and vice-principals, as they affect curriculum development, implementation and evaluation, will be studied. Emphasis will be placed on organizational development strategies.

Prerequisite(s): EADM 811.

EADM 817.3 — 2(3L)
Supervision for Improvement of Classroom Instruction

Deals with the development of supervisory skills through the process of clinical supervision. Attention will be given to the role expectations of personnel involved in the supervisory process and the nature of the supervisory process as it involves classroom teachers and principals.

EADM 819.3 — 1(3S)
Leadership and Governance in First Nation Education

Focuses on First Nation educational governance, community leadership roles in Indian Control of Indian Education and exam band operated school governance across Canada. New directions in First Nation educational governance as evidenced in the Mi'kmaq Education Act and emerging administrative mechanisms will form a major concentration of the course.

EADM 820.3 — 1/2(3S)
Administrative Roles in School Systems

Examines the roles of various educational administrators: vice-principal, principal, assistant director and director. The relationships and functions associated with each of these roles will be examined from several perspectives - legislation, theoretical models, role theory, and research findings. The specific content will address means by which these roles can lead to effective administrative practice.

Prerequisite(s): EADM 811.

EADM 821.3 — 2(3S)
Organizational Behaviour in Education

Focuses on behaviour within the formal and informal contexts of the educational system. It includes such topics as motivation, group processes, communication, decision making, conflict management, leadership, power and authority.

Prerequisite(s): EADM 811.

EADM 822.3 — 1/2(3S)
Economics of Education

Concepts fundamental to an analysis of education from an economic perspective; relationships between education and the economy, and education and personal income; human capital; cost-benefit analysis in education; the planning of human resources development.

EADM 823.3 — 1/2(3S)
Planning and Management of Educational Facilities

An intensive course in the planning and management of the physical and functional aspects of elementary and secondary schools. Both theory and applications are studied. Topics include the purpose and nature of educational facilities, determining program needs, emerging awareness of facility requirements, specific facility planning activities and procedures, operationalizing new and altered facilities, evaluating completed projects, strategies for effective and efficient operation and maintenance, terminating obsolete and redundant facilities and developing an overall facility program for the school system.

Prerequisite(s): EADM 813; or permission of the department.

EADM 824.3 — 1/2(3S)
Structure and Organization of Education in Canada

Traces the historical basis and development for the present forms of education in the various provinces in Canada. It explores the current structure and organization of education in different provinces. Finally, it studies the issues and problems germane to the Canadian educational scene.

EADM 825.3 — 1/2(3S)
Educational and Administrative Law

Deals with constitutional law as applied to education and language, intentional wrong and defenses, the various aspects of negligence and its defenses, occupier's liability, employer's liability, administrative law, defamation, and human rights. Wherever relevant, a parallel tie-in will be made with statute law.

EADM 826.3 — 1/2(3S)
Human Resources Management in Education

Designed to provide a review of the literature in personnel administration in education and exposure to applications in human resources management. The topics addressed include manpower planning, recruitment of personnel, selection of personnel, placement and induction of personnel, staff development, appraisal of personnel, administration of collective agreements, legal aspects of personnel administration and supervisory practices.

Prerequisite(s): EADM 811.

EADM 827.3 — 1/2(2S)
Administration in Continuing Education

Assessments of various approaches to administration related particularly to public educational programs directed at social and technological change; case studies useful in administering continuing education programs.

EADM 829.3 — 1/2(3S)
School and Organizational Renewal

Focuses on organization development as a planned and sustained effort to apply behavioral science and school effectiveness research to school and system improvement. Strategies which involve school and system members themselves in the assessment, diagnosis and transformation of their own school organization will be studied in detail.

EADM 830.3 — 1/2(3S)
Education in Rural and Sparsely Populated Areas

The focus of this course is on the context of rural education and on the generation of possible organizational and administrative actions that can be taken to foster meeting both the objectives of education and the development of our rural communities. Governance, finance, organization and administration of rural education will be examined.

EADM 834.3 — 1/2(3L/S)
Case Studies in Educational Leadership

Considers issues and dilemmas arising from a wide variety of educational leadership cases. Classical and contemporary moral philosophies as well as professional ethics will be utilized to examine these problematic cases. The challenges associated with developing ethical frameworks for decision-making and with promoting ethical consciousness and competencies in particular education settings will be explored.

Prerequisite(s): EADM 811.

EADM 835.3 — 1/2(3S)
Governance and Policy Making in Education

Deals with the use of political, jurisprudential and organizational theories to better understand and analyse educational governance at state, system, and site-based levels. The course includes the application and assessment of various models and mechanisms of educational policy and decision making. Consideration will be given to the evolving roles and relationships of interest groups, interagency personnel, professional educators, legislators, executives, the judiciary and citizens.
Prerequisite(s): EADM 811.

EADM 836.3 — 1/2(3L)
Leading Community Development

Deals with issues, principles and strategies used to develop and maintain learning communities and effective community relations. Topics include: community-participation theory; contemporary leadership and followership theory; stakeholder collaboration; communication and conciliation strategies; the politics of diversity and inclusion; as well as approaches taken to community and capacity building in education.
Prerequisite(s): EADM 811.

EADM 841.3 — 1/2(3S)
Administration of Special Programs

Designed to make use of specialists from other departments. Focuses on the administration of special education programs in the schools.

EADM 861.3 — 1/2(3S)
Administration of Higher Education

Designed to explore the administration of institutions of higher education; namely technical institutes and vocational centres, colleges and universities.

EADM 881.3 — 1/2(3S)
Organizational Paradigms and Analysis

Analyzes a number of organizational paradigms based upon different sets of metatheoretical assumptions about the nature of social science and the nature of society. Emphasis will be placed on the paradigmatic shifts that are occurring in educational administration.
Prerequisite(s): EADM 811.

EADM 883.3 — 1/2(3L/S)
Advanced Theory of Organizational Behaviour

An advanced review of concepts in organizational behaviour. Utilizing basic tenets of philosophical thought, it will provide in-depth examination of behavioral theories of organization and will surface related research needs and applications in the context of educational organizations.
Prerequisite(s): EADM 881.

EADM 884.3 — 1/2(3S)
Critical Perspective on Policy Making in Education

An advanced doctoral level course in educational administration dealing with policy-making in education. Focuses on three main aspects of educational policy-making: building consent for educational policy; promoting deliberation, understanding, and informed action in policy-making; and synthesizing basic considerations for formulating and implementing educational policy.

EADM 885.3 — 1/2(3S)
Research Methods

Designed to explore the various methods of research, and the problems related to research design. Special emphasis will be placed on research methods related to Educational Administration.

EADM 892.3 — 1/2/1&2(3L)
Trends and Issues in Educational Administration

Selected current trends and issues in educational administration will be analyzed in detail. Literature, research and related developments in other areas will be examined. These courses will normally be taught during summer sessions by visiting professors with particular expertise.
Note: May be taken more than once on the recommendation of the Department Head.

EADM 894.3 — 1&2(P), 1(P)
Laboratory in Educational Administration

Each provides opportunities for students to apply theory to practice in undertaking field research projects which differ from thesis and project topics. Preparation of a scholarly report and regular consultation with faculty members are key course requirements.

EADM 898.3 — 1/2(R/T)
Individual Reading Course

Provides an opportunity for a student to pursue a topic of personal interest. The topic studied must fall outside the scope of educational administration courses offered, although this provision may be waived with the consent of the department. The student is responsible for defining the area of interest and approval of the project must be gained prior to registration. The student

undertakes intensive reading under the guidance of a staff supervisor, and submits a major paper for assessment on or before a date agreed upon in writing with his/her supervisor. An oral examination is also required.

EADM 899
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

EADM 990
Seminar

A required non-credit seminar for graduate students in the Master's and Ph.D. programs. Provides students with information, guidance, and some skills needed to succeed in and profit from their program of studies. Enhances skills in seminar participation, scholarly writing, library use, and computer applications. Discussions of educational issues, research opportunities, research protocols, and research funding sources are also included. Separate seminars are arranged for full- and part-time Master's students and Ph.D. students.

EADM 992.6
Project

This practicum consists of either a field project or an administrative internship planned through a process of consultation among the student, an advisor, the Department Head, and an educational administrator in the field. It is designed to provide the student with a practical experience with administrative tasks and processes in education. The student is required to file a written report on the practicum with the department.
Note: Required for the project M.Ed. program; not available as an elective in the Postgraduate Diploma program.

EADM 994
Research

A student undertaking research leading to a Master's thesis must register in this course each year until the thesis is completed. This applies to thesis work done extramurally as well as intramurally.

EADM 996
Research

Students writing a Ph.D. thesis must register in this course.

ECMM —
EDUCATION
COMMUNICATIONS
AND TECHNOLOGY

Department of Curriculum Studies, College of Graduate Studies and Research

ECMM 802.6 — 1&2(3L)
Historical and Theoretical Foundations of Educational Technology

Examines the historical, philosophical and theoretical foundations of the field of educational technology. Focuses on the maturation of theory and research in this area of study, and the impact of educational technology on educational institutions and practice.

ECMM 803.3 — 1/2(3L)
Principles and Practices of Authoring Interactive Instruction

Presents procedures and principles for planning, producing and evaluating computer-based instruction, and how to develop the necessary print-based support materials required for its implementation.
Prerequisite(s): ECMM 370 or equivalent computer applications course.

ECMM 804.3 — 1/2(3L)
Distance Education II Theory and Practice

The historical and theoretical foundations of distance education from a provincial, national and international perspective. Surveys the development, organization, and practice of distance education for various educational endeavours. Focuses specifically on distance education in Saskatchewan and compares the Saskatchewan situation with similar systems across Canada.

ECMM 873.3 — 1/2(3L)
Designing Materials for Individualized Instruction

An applied course in which principles of instructional design are used to produce self-instructional materials. Students do a major project in which they plan and implement a self-instructional module in a medium of their choice.

ECMM 874.3 — 1/2(3L-1S)
Advanced Approaches to Instructional Design

Students will learn and apply advanced concepts and approaches in instructional design including project management, client processes, and usability procedures. Students will complete an entire development process, from meeting clients and creating a design plan through product testing.

Prerequisite(s): Successful completion of ECMM 873 or an equivalent course from another university, or permission of the instructor.

ECMM 876.3 — 1/2(2L-1S)
Organization and Administration of Media Centres

An examination of the operation of audiovisual programs in elementary and secondary schools and school units. The course considers the facilities, materials, equipment and services required in an audio-visual program and the budgeting, personnel and staff relations required for its operation.

ECMM 877.3 — 1/2(2L-1S)
Advanced Cinematography in Education

Designed to allow students to continue film-making experiences encountered during ECMM 476. The student will have the opportunity to script, direct, produce, and edit an individual medium length motion picture film. The highly individualized course gives the student wide latitude and flexibility in content, technique and production time.

Prerequisite(s): ECMM 476; or experience and permission of the department.

Note: The student should be prepared to spend approximately \$25.00 on film stock and somewhat more time than is normally required for a 3 credit unit course.

ECMM 879.6 — 1&2(2L-1P)
Television in Education

Investigates development of open and closed circuit television in educational institutions and integration of television into formal and informal learning situations. Development of knowledge and skills in television production, direction and script writing will be stressed in practical laboratory situation. Students will undertake major projects simulating those now utilized in educational TV.

Prerequisite(s): ECMM 476, or experience and permission of the department.

ECMM 898.3 — 1/2/1&2(3R)
Individual Reading in Educational Technology

A study in areas of a student's interest calling for intensive reading under the guidance of a faculty member. A proposal, representing a contract for the extent and nature of the work to be done, must be approved by CGSR. The final product is a paper or media production which is graded by the faculty member and kept on file in the Department.

ECMM 899.6 — 1&2(3R)
Special Topics

A study in areas of a student's interest calling for intensive reading under the guidance of a faculty member. A proposal, representing a contract for the extent and nature of the work to be done, must be

approved by CGSR. The final product is a paper or media production which is graded by the faculty member and kept on file in the Department.

ECMM 992.6
Project

The research or developmental project, required on the project option for the M.Ed., where the nature of the research or developmental project is inter-disciplinary or multi-departmental. The project must be accepted by a committee consisting of members from the sponsoring and co-operating departments and evaluated by this committee plus an external member.

ECNT —
CONTINUING
EDUCATION

Department of Educational Foundations,
College of Graduate Studies and Research

ECNT 810.3 — 1/2(3L)
Learning for Life Practice and Theory in Adult Education

Introduces graduate students from various backgrounds to the scope and aims of modern adult education in all its diversity. The content is significantly shaped by recent studies in Canadian adult education practice and theory and these developments are viewed from international perspectives.

Prerequisite(s): Admission to the College of Graduate Studies & Research.

ECNT 830.3 — 1/2(3S)
Historical and Philosophical Foundations of Continuing Education

Enables participants to gain an understanding of the history of continuing (adult) education, with emphasis on the twentieth century North American experience. Discusses key movers and shapers of the field of practice. Provides opportunity for conducting historical-philosophical analysis and for identifying perennial ethical, social, and political problems facing adult educators.

ECNT 840.3 — 1/2(3S)
Issues in Continuing Education

Builds upon the content of ECNT 830. In-depth study and analysis of a selected topic or topics related to the history and/or philosophy of continuing (adult) education. Examples: seminal figures in the history of the field; the early literature base of continuing (adult) education; the advocates and opponents of the professionalization of the field of continuing (adult) education; the issue of mandatory continuing education; currently emerging controversial issues which affect decision making in the practice of continuing (adult) education.

ECNT 872.3 — 1/2(2S)

Program Planning of Continuing Education

Program development is examined within the context of Continuing Education. Specific elements of the program development process which will be discussed include the planning context, need identification, educational objectives, and learning experiences. Issues related to these concepts will be viewed from a theoretical framework. Participants will have an opportunity to apply or test some of this theory in an educational setting.

ECNT 875.3 — 1/2(2S)
Adult Learning and Development

Draws on research and theory in several social sciences to provide an understanding of the changing needs and capacities of adults for learning throughout the life span; optimal learning environments for adults; teacher-learner interaction in adult education; social facilitation of learning.

ECNT 878.3 — 1/2(2S)
Comparative Continuing Education

Provides participants with international perspective on the field of adult education. Critical analysis of various approaches to adult education and development is encouraged. Ethical questions confronting the individual practitioner will be explored. Previous offerings have included discussion of alternative approaches to research and practice in adult education and have analyzed the work of such adult educators as Myles Horton and Malcolm Knowles, Ivan Illich and Julius Nyerere, John Sewell and Paul Bergevin, Paulo Freire and John Lowe, John Ohliger and Ned Corbett.

ECNT 880.3 — 1/2(2S)
Community Development Process

Community development as a process in effecting social change is examined from historical and philosophical perspectives. Theory and research from the social sciences is utilized as a means for developing analytical and developmental models from which community, change and the community development process might be analyzed. Canadian programs and experiences in community development serve as basic data for the course.

ECNT 882.3 — 1/2(2S)
Evaluation of Continuing Education

Selected approaches and models of evaluation are compared and contrasted as they apply to programs of Continuing Education. Students are expected to gain experience in designing evaluation studies and in using the results of evaluation.

ECNT 885.3 — 1/2(2P)
Application of Learning Principles in Practice of Adult Education

Requires participants to undertake the role of facilitator in arranging a learning experience for an adult group, using a variety of adult education procedures. The role of the project will be primarily to help the students gain increased understanding of themselves in facilitating adult learning.

Prerequisite(s): ECNT 875; or permission of the instructor.

ECNT 889.3 — 1/2(2S)
Selected Topics in Comparative Continuing Education

Participants are encouraged to deepen their knowledge and skills in an area of their choice in adult education. In the past, mainstream adult education has been an important area for selection of such topics. Alternative adult education enterprises have also been a valuable source of subject matter for analysis and discussion: environmentalism, de-schooling, pacifism, and various freedom movements around the world.

Prerequisite(s): ECNT 878; or permission of the instructor.

ECNT 890.3 — 1/2(2S)
Community Development Practices

Using classroom and field community experiences as a means for generating information, the learner examines various community development practices on the Prairies. In so doing learners may assess their own level of competence in putting into practice community development theory, principles, and methods.

ECNT 891.3 — 1/2(2S)
Trends and Issues in Continuing Education

Some currently important aspects of the field of adult education are reviewed and analyzed.

ECNT 892.3 — 1/2(100S)
Workplace Learning

Provides a hands-on workplace learning experience in adult and continuing education. The learning experience is monitored throughout by a faculty advisor and a field-based supervisor. Placements are made with organizations that best suit students' academic interests and career aspirations.

Prerequisite(s): Admission to graduate program in Adult and Continuing Education, Educational Foundations, or Indian and Northern Education.

ECNT 897.3 — 1/2(2S)
Research Methods in Continuing Education

The first part provides background and experiences in the conduct of literary-humanistic historical research in education. The second part deals with the conduct of empirical social science research in education.

ECNT 898
Special Topics

These courses are offered occasionally by visiting faculty and in other special situations. Students interested in these courses should contact the department for more information.

ECNT 899.6
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

ECON —
ECONOMICS

Department of Economics, College of Graduate Studies and Research

ECON 800.3 — 1(3L)
Micro Economic Theory

Studies theories of exchange, consumer demand, production and cost, and pricing.

ECON 801.3 — 1(3L)
Macro Economic Theory

A survey of macro-economic theory, and includes theories of the consumption function, theories of investment, money and interest rates, monetary and fiscal policy, and general equilibrium theory.

ECON 802.3 — 2(3L)
History of Economic Theory

Examines major developments in the history of economic theory.

ECON 803.6 — 1&2(3L)
Contemporary Economic Theory

Examines recent developments in theories of consumer demand and production

ECON 804.3 — 1&2(3L-3P)
Research in Econometrics

A research project serves as the primary tool to learn econometric techniques, but is augmented by a consideration of the theoretical aspects of econometrics.
Prerequisite(s): ECON 204, 305, 211, 214 or equivalents.

ECON 805.3 — 1/2(3L)
Mathematical Analysis in Economics

A study of the mathematical formulation and investigation of economic relationships. Topics include the theory of consumer demand, theory of the individual firm, input-output analysis, models of aggregate economic activity and economic growth.

ECON 806.3 — 2(3L)
Monetary Theory

Examines the relationships between the stock of money and income, employment, and price levels.

ECON 807.3 — 1/2(3L)
Advanced Analysis of Economic Development

Studies of the economic developments of Canada and the United States are undertaken to apply modern methods, theories, and approaches to understanding Canadian and American economic development. Emphasizes understanding particularly Canadian economic and institutional trends.

ECON 808.3 — 1(3L)
Applied Econometrics Model Building and Estimation

Deals with Econometric techniques, construction of appropriate econometric models, development of data sets, and estimation and interpretation of results, as they apply to economic problems.

ECON 809.3 — 2(3L)
Advanced Techniques in Econometrics

Considers advanced topics in econometric techniques and examines recent developments in the field as they pertain to economic science.

ECON 811.3 — 1/2(3L)
International Trade Theory

Studies recent developments in the pure theory of trade. Topics include current explanations of patterns of trade and factor movements, the formation of regional free trade areas, commercial policies and international cartels.

ECON 812.3 — 1/2(3L)
International Monetary Economics

The nature of adjustment in open economics, under various international monetary systems, to real and monetary disturbances. The systems investigated will include fixed exchange rates, both with and without sterilization, flexible exchange rates and managed floating.

ECON 814.3 — 1/2(3L)
Economic Growth

The theory of economic growth with topics selected from: the role of technical progress in the growth process, vintage

production functions, putty-clay and clay-clay models, Harrod-Domar, Neoclassical and Cambridge growth models.

ECON 815.3 — 1/2(3L)
Economic History of Europe 1815 to Present

Industrialization of England and the continent, related to developments in world trade, labour markets, business and labour organization, economic policies, and social institutions. Interwar stagnation, post-World War II recovery and the common market will be considered. The economic relationships between North America and Europe will be taken into account.

ECON 816.3 — 1(3L)
North American Economic History

Examination of economic development in North America since 1800 with particular reference to the role of government.

ECON 817.3 — 1/2(3L)
Economics of Developing Countries

Deals with the theories and policies of economic development primarily in developing countries of the Third World since 1945. Topics include agricultural development, industrial development, international trade, the financing of economic development, and income distribution.

ECON 820.3 — 1(3L)
Agricultural Policy

A study of recent developments in agricultural policy. Particular attention will be paid to the role of agriculture in programs to promote economic growth and development. Major differences in national approaches to the problems of agriculture will also be emphasized.

ECON 821.3 — 2(3L)
Industrial Organization and Public Policy

An analysis of the functioning of the price system in the market economy with different structures and conduct in order to assess market performance and economic welfare. The analysis will also include an examination of public policies and institutional constraints imposed on the Canadian market economy.

ECON 823.3 — 1/2(3L)
Labour Economics

The functioning of labour markets including labour supply, labour demand, accumulation of skills, contracts, and unemployment.
Prerequisite(s): Graduate standing in economics; or permission of the instructor.

ECON 827.3 — 2(3L)
Public Utilities Economics

Analyzes the conduct and performance of telecommunications, airline, electric, pipeline, gas and railway utilities. It will focus on the economics of pricing practices, costing procedures, capitalization, depreciation policy, product strategy, peak loading, technological evolution, rate base definitions, and vertical and horizontal integration in the context of public utilities.

ECON 830.3 — 2(3L)
Topics in Public Finance

A study of modern theoretical constructs and some of their applications. Topics include cost-benefit analysis, fiscal policy, the public debt, analysis of taxes and intergovernmental fiscal relations.

ECON 831.3 — 1/2(3L)
Economics of Natural Resources

Examines the economic theories of natural resource use. Topics include: static and dynamic models of resource use; the problems arising from resource scarcities; criteria for intertemporal resource use; and public resource policies.

ECON 834.3 — 2(3L)
Health Economics

Examines health economic issues and the functioning of health care markets using microeconomic theory. Topics include health insurance and demand for health, production of health, economic evaluation methods, economic explanations for the behavior of health care providers, functioning of insurance markets, cost efficiency and regulation in health care markets.
Prerequisite(s): Permission of the instructor.

ECON 840.3 — 1&2(3L)
Canada United States Economics and Political Relations

Recent trends in the economic and political relations between Canada and the United States will be arranged with particular reference to agricultural policies; capital investment; economic fluctuations; energy resources; foreign trade; trade union links; transportation; defence; and institutional arrangements for dealing with joint problems.

ECON 845.3 — 2(3L)
Regional and Urban Development Theory

Topics include selected aspects of regional and urban development theory and a critical review of recent regional planning programs in advanced countries.

ECON 870.3 — 1/2(3L)
Topics in Behavioural Economics

Details the economics of behaviour and the importance of behavioural assumptions for the analytical predictions of economic theory, with special emphasis of the theory of the firm, household economics, experimental economics, rational choice analyses and public policy.
Note: Students may not receive credit for both ECON 470 and 870.

ECON 898.3 — 1/2(3L)
Special Topics

Reading, essays and discussions in an approved special field. This course will be offered only in special circumstances.

ECON 899.6
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

ECON 990
Seminar

Reports and discussion on current development and research. All graduate students in economics are required to register. Attendance and at least one paper is required for all postgraduate students during their time as a postgraduate student, whether for one year or more.

ECON 992.6
Project

A required course for students following the project M.A. option. A research paper on an approved topic must be submitted. The topic may be empirical in nature, or a critical review of the literature, or a critical analysis of some theoretical problem. The paper will be examined by a supervisor and two other members of the department.

ECON 994
Research

Students writing a Master's thesis must register for this course.

ECUR —
CURRICULUM
STUDIES

Department of Curriculum Studies, College of Graduate Studies and Research

ECUR 801.6 — 1&2(3L)
Principles and Practices of Curriculum Construction

A basic general curriculum theory course. Students investigate the complexities of the procedures, plans, personnel, processes, and problems in curriculum organization.

Master's and Diploma candidates in Curriculum Studies are encouraged to complete this course prior to their intramural year.

ECUR 805.3 — 1/2(3L)
Trends and Issues in Educational Research and Development

Examines contemporary school curriculum issues in the context of catalysts of change and strategies of change in schools. Attention will be devoted to problems of the design and implementation of a thesis proposal in the College of Education.
Prerequisite(s): Teaching certificate.

ECUR 807.3 — 1/2(3L)
Language Communication and Curriculum

Examines the role of languaging processes and communication upon learning in content areas. Specifically, this course will explore the relationship between the structure of language used by students as they learn in specific subject areas and verbal interaction in the classroom.

ECUR 808.6 — 1&2(3S)
Advanced Curriculum Theory

An advanced theory course for doctoral students. This course will extend students' understanding of curriculum, with particular focus on alternative understandings of curriculum and emerging curriculum paradigms. Using autobiographical awareness, students will develop a personal theory of curriculum and curriculum development.
Prerequisite(s): One of ECUR 801, ECMM 802 or equivalent.
Note: To be offered biannually.

ECUR 809.3 — 1(3L-1P)
Models and Methods for Evaluation of Educational Programs

Examines current models for the evaluation of educational programs. The emphasis is on exploring the range of options which is available to the program evaluator and on developing an awareness of the strengths and limitations of the models. Problems in carrying out educational evaluations are also studied: examples of such problems are the utilization of evaluation results and the ethics of evaluation.
Prerequisite(s): ECUR 801; or permission of the instructor.

ECUR 810.3 — 2(2L-4P)
Design and Practice of Evaluation of Educational Programs

Takes the methods of evaluating educational programs and applies them to practical situations in classrooms, schools

and school units. Particular attention will be paid to developing an awareness of the breadth of available techniques and to understanding the practical problems which arise in the conduct of evaluations.
Prerequisite(s): ECUR 809.

ECUR 819.3 — 1/2(3L)
Trends and Issues in Mathematics Education

Designed to acquaint students with recent literature in the field of mathematics education. It will focus upon translating various theories of how children learn mathematics into classroom instruction.
Prerequisite(s): 12 credit units in mathematics and 6 senior credit units in mathematics education.

ECUR 820.3 — 1/2(3L)
Introduction to Graduate Studies in Science Education

A survey of advanced studies in science education, prerequisite to all other graduate courses in science education. Topics include: the nature of the scientific enterprise; the interactions of science with society, stressing the implications to science education; new curriculum developments; objectives; and current issues and trends. Special emphasis will be placed on the philosophy and methodology inherent in these topics.
Prerequisite(s): 6 credit units of undergraduate-level science methods courses; 24 credit units of natural science courses (as defined by the Arts and Science section of the Calendar); or permission of the department.

ECUR 830.3 — 1/2(3L)
Research in Teaching Effectiveness

Designed to provide students the opportunity to learn the magnitude of research in teaching and to become familiar with the knowledge of effective teaching resulting from the research. Content will be organized by areas of concentration of research and the contributions of major researchers. Regular observations in classrooms will provide an opportunity to identify teaching behaviours discussed in the research. Students will be required to demonstrate their effectiveness in teaching in the classroom.
Prerequisite(s): A valid teaching certificate; 3 years of successful teaching experience; an undergraduate degree in Education.

ECUR 831.3 — 1/2(3L)
Analysis of Teaching

Provides knowledge of models and methods of teaching which provide the

parameters for analyzing micro teaching behaviours. Students will be expected to be competent in identifying and demonstrating models as well as analyzing the model itself.
Prerequisite(s): Research in Teacher Effectiveness; three years of successful teaching experience; an undergraduate degree in Education.

ECUR 832.3 — 1/2(3P)
Practicum

Requires students to apply in schools the knowledge of teaching and/or supervision studied in course work. The specific in-school activities will include working in a classroom, with a teacher or intern and with a group of teachers conducting an in-service program.

ECUR 843.3 — 1/2(3L)
Reading Process and Practice

Provides a theoretical and research basis for understanding reading as a socio-psycholinguistic process. The aim is to seek instructional implications of theory and research as they impact on issues of reading and constructing meaning from written discourse.

ECUR 860.6 — 1&2(3L)
Methods in Advanced French

Methods of teaching French as a second language with concentration on current issues in French Education.
Prerequisite(s): Permission of the instructor.

ECUR 870.3 — 1/2(3L)
Literacy Education and Curriculum

Examines the field of language education, emphasizing developments at the elementary, middle years and secondary school levels. Topics include language and thought, language and learning, language arts, curricula, resources, writing and the writing process, literature and the response process, and research in language education.
Prerequisite(s): 12 credit units in English and 6 senior credit units in Language Arts Education; or permission of the instructor.

ECUR 871.3 — 1/2(3L)
Trends and Issues in Study of Language

Includes the study of those aspects of linguistics, including sociolinguistics, psycholinguistics, pragmatics, applied linguistics, and other topics of language and language study, such as syntax and grammar, which have a direct relationship to classroom practice.
Prerequisite(s): 12 credit units in English and 6 senior credit units in English

Education; or permission of the department.

ECUR 872.3 — 1/2(3L)
Trends and Issues in Study of Writing

Covers theories and processes of writing and composing, the teaching of writing, and evaluation and assessment of writing.
Prerequisite(s): 12 credit units in English and 6 senior credit units in English Education; or permission of the department.

ECUR 874.3 — 1/2(3L)
Trends and Issues in Study of Literature and Response to Literature

Includes theory and research on response to literature, the teaching of literature, and literary criticism. Also deals with selection of literature, censorship, and literature-based programs.
Prerequisite(s): 12 credit units in English and 6 senior credit units in English Education; or permission of the instructor.

ECUR 888.3 — 1/2(3L)
Issues and Trends in Social Studies Education II

Extends beyond the identification and understanding of theories related to Social Studies Education as explored in ECUR 887 to an evaluation of theoretical issues as they are applied to actual programs and materials. Focus is on research and development. Included are analyses of Social Studies curricula; the evaluation of materials and programs in terms of value development, skill processes, and cognitive orientations; viewing curricular and methodological strategies in Social Studies from the perspectives of evaluation and research; opportunities to develop and critique instructional materials and associated teaching methodologies.
Prerequisite(s): At least 3 credit units in the methods of teaching social studies plus at least 12 senior Arts and Science credit units in the social sciences.

ECUR 889.3 — 1/2(3L)
Canadian Social Studies Education

Designed for senior or graduate students wishing to specialize in Social Studies Education. The present status and structure of Social Studies Education in Canada will be examined through its philosophical and historical development. Canadian Social Studies curricula will be surveyed in order to determine the contributions made by the various Social Science disciplines. Special attention will be given to strategies, materials and processes developed in Canadian Studies Projects and their

implications for Canadian Social Studies Education.

Prerequisite(s): At least 3 credit units in the methods of teaching social studies plus at least 12 senior Arts and Science credit units in the social sciences.

ECUR 891.6 — 1&2(2S)
Adult Basic Education

Deals with the upgrading of skills of adults who are termed functionally illiterate. Examines research in adult basic education, types of programs, selection of candidates, methods and materials of instruction and evaluation of progress.

ECUR 898.3 — 1/2/1&2(3R)
Individual Reading in Curriculum

A study in areas of a student's interest calling for intensive reading under the guidance of a faculty member. A proposal, representing a contract for the extent and nature of the work to be done, must be approved by CGSR. The final product is a paper or media production which is graded by the faculty member and kept on file in the Department.

ECUR 899.6
Reading Course

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

ECUR 990
Seminar in Curriculum Research

A required seminar for Master's and Ph.D. graduate students in Curriculum Studies, taken by all full-time students throughout the academic year. Ongoing research and development projects of faculty and students form the focus of first term seminars, while readings and student-identified issues form the basis for second term seminars. This seminar also provides students with information and guidance to help them profit from their program of studies, and to utilize computer technology effectively. Separate seminars are arranged for Master's and Ph.D. students. Registration in ECUR 990 seminar is required for one year only.

ECUR 992.6
Project

Research or curriculum project which is required on the project option for the M.Ed. Each project calls for intensive reading, under the guidance of a staff supervisor. A minor thesis may be required. Alternate requirement may be a curriculum project. The proposal for the minor thesis or for the project, and the oral defense, will be processed by a committee constituted in the same fashion as for a thesis committee.

ECUR 994
Research

A student undertaking research leading to a Master's thesis must register in this course each year until the thesis is completed.

ECUR 996
Research

Students writing a Master's thesis must register for this course.

EDUC —
EDUCATION

Department of Education, College of, College of Graduate Studies and Research

EDUC 899.6 — 1&2(1T-8R)
Readings Course

Provides an opportunity for students to pursue a topic of an interdisciplinary nature or multi-departmental concern. The topic must fall outside the scope of courses offered, although this provision may be waived with the consent of the departments involved. The student is responsible for defining the area of interest and the approval of the project by the sponsoring and cooperating departments must be gained prior to registration. The student undertakes intensive reading under the guidance of a staff supervisor and advisory committee and submits a major paper for assessment.

EDUC 992.6
Project

The research or developmental project, required on the project option for the M.Ed., where the nature of the research or developmental project is inter-disciplinary or multi-departmental. The project must be accepted by a committee consisting of members from the sponsoring and co-operating departments and evaluated by this committee plus an external member.

EE — ELECTRICAL
ENGINEERING

Department of Electrical Engineering, College of Graduate Studies and Research

EE 701.3 — 1/2(3L-3P)
Introductory Circuits and Electronics

A lecture/laboratory course designed for students who have little or no background experience in electronics but who wish to obtain a working knowledge of electronic devices and techniques. Fundamentals of electricity and basic laws governing voltage and current in circuit elements with direct and alternating current excitation; charge carriers in vacuum and semiconductor materials; the diode and diode circuits; the junction transistor, equivalent circuit at low frequency, the basic amplifier circuit, biasing, and digital electronics. It is expected that students will follow up with EE 702 to achieve a useful

level of experience in the application of electronic devices.

EE 702.3 — 1/2(3L-3P)
Electronic Instrumentation

A lecture/reading course for students whose main interest is in fields other than electrical engineering but who have some understanding of basic electric circuits and the principles of electronics. The course deals with the application of Instrumentation to measurement, automatic control and data acquisition. Areas of specific interest to the students are covered in more detail.

Prerequisite(s): PHYS 227 or GE 212; or equivalent experience approved by the Department Head.

EE 740.3 — 1/2(3L-3P)
Introduction to Real Time Computing

The main purpose of this course is to become familiar with the capabilities and use of the computers in the College of Engineering. Topics include capabilities of the operating systems, system utilities, real-time capabilities and their use. Main emphasis will be placed on an awareness of system capabilities and hands-on use of the system.

EE 800.3 — 1/2(3L-3P)
Circuit Elements in Digital Computations

The electrical circuit aspects of digital systems. Includes: logic devices, data bus design, processor architecture, input-output techniques, input-output devices, magnetic and electronic storage devices, computer communication techniques and devices.

EE 801.3 — 1/2(3L)
Advanced Non Linear Circuits

General principles of design of pulse circuits from the milli-second to nano-second regions. Semiconductor two and three terminal devices will be discussed with reference to pulse generation, wave shaping, etc. The operation and limitations of digital integrated circuits will be dealt with. Devices and techniques will be highlighted by investigating a number of selected applications. Some laboratory sessions may be included.

EE 802.3 — 1/2(3L)
Advanced VLSI Design and Analysis

A study of semiconductor devices with special emphasis placed on device operation in VLSI circuits. Topics include device physics, electrical characteristics, computer simulation of circuits, speed-power-area considerations, circuit synthesis and CMOS integrated circuit design. Additional lecture topics as requested may be given. A design project is also required.

EE 804.3 — 1/2(3L)**Passive and Active Linear Network Synthesis**

Positive real functions, realization of lossless one ports, RLC Driving point function synthesis, passive two port synthesis; an introduction to the synthesis of active networks.

EE 805.3 — 1/2(3L-3P)**Real Time Data Acquisition and Control**

Advanced data acquisition and control in an engineering environment. Real time control using analog and digital inputs and outputs. Processing delays associated with data acquisition software. Hardware and software techniques for noise reduction and signal conditioning.

Prerequisite(s): EE 740 and CMPT 122; or equivalent.

EE 809.3 — 1/2(3L)**Selected Topics in Electronic and Digital Systems**

Consists of regular lectures, assigned reading, reports, and laboratory exercises. Topics selected from the following areas: development of microprocessor based digital systems; large scale integrated circuit (VLSI) design and testing; computer aided design, testing and manufacture; high frequency linear network design; high speed digital design.

EE 810.3 — 1/2(3L)**Communication Theory I**

Deterministic signal theory, noise and its physical origin, random signal theory, performance of analog and digital communication systems in the presence of noise.

EE 812.3 — 1/2(3L)**Microwave Circuits**

Practical realization of microwave circuits using linear and nonlinear techniques. Topics include small signal and low noise amplifiers, power amplifiers, frequency multipliers, oscillators, and microwave subsystems. Emphasis is on circuit simulation with realistic device models and performance optimization using computer-aided design (CAD) software.

EE 813.3 — 1/2(3L)**Introduction to Pattern Recognition**

A basic introduction to pattern recognition systems, Topics include vector space representation of patterns, supervised and unsupervised systems, distance matrices, discriminant functions, probability density and parameter estimation, maximum likelihood and minimum risk classification, potential functions, feature selection and clustering. A design project is also required.

EE 814.3 — 1/2(3L)**Communication Theory II**

Efficient encoding and decoding schemes for reliable transmission of digital information over noisy channels. Topics will be chosen from the following: Algebraic coding (linear block codes, cyclic codes, BCH codes, Reed-Solomon codes), Trellis coding (convolutional codes, trellis-coded modulations, Viterbi algorithm, soft-decision decoding). Turbo-like codes (turbo-codes, low-density parity-check codes, bit-interleaved coded modulation, the forward/backward algorithm, iterative decoding).

Prerequisite(s): EE 456 or equivalent.

EE 815.3 — 1/2(3L)**Fundamentals of Wireless Communications**

The goal of this course is to study the fundamentals of wireless communications, as well as to introduce the new ideas at a level accessible to the graduate student with a basic background in probability and random processes. Examples from existing wireless communications standards will be used throughout the course.

Prerequisite(s): EE 456 and EE 845.

EE 816.3 — 1/2(3L)**Telephony**

Topics will be chosen from the following: transmission of analog and digital signals on copper telephone lines, processing and coding of analog signals for digital transmission and switching. Synchronous optical network (SONET) and transport in the global telecommunication network and physical layer transport of Internet signals.

Prerequisite(s): EE 352 and EE 456 or equivalent.

EE 818.3 — 1/2(3L)**Electromagnetic Wave Propagation**

The fundamentals of electromagnetism and its applications. Includes Maxwell's equations, multi-pole fields, electromagnetic waves, reflection and refraction, retarded potentials and radiation, dipole antennas, antenna arrays, rectangular and cylindrical waveguides, and microwave circuits.

EE 819.3 — 1/2(3L)**Selected Topics in Communications and Signal Processing**

Consists of regular lectures, assigned reading, reports and laboratory exercises. Depending on the interests of students and faculty, topics will be selected from the following areas: electromagnetic wave propagation, fiber optic transmission

systems, digital microwave and satellite transmission, image processing and pattern recognition for robotic and remote sensing applications.

EE 820.3 — 1/2(3L)**Electrical Materials Science**

Review of general solid state physics for electrical engineers. An introduction to Wave-Mechanics. Band theory of solids, metals, semiconductors and insulators. Electrical conduction in solids. Structure and properties of materials.

EE 821.3 — 1/2(3L)**Magnetic Properties of Materials**

Review of the magnetic properties of materials. Diamagnetism, paramagnetism, ferromagnetism, antiferromagnetism and ferrimagnetism with applications in electrical engineering. Magnetic domains. Soft and hard magnetic materials and applications. Basic superconductivity concepts. Type I, II and high T_c superconductors.

EE 823.3 — 1/2(3L)**Solid State Electronic Devices**

Semiconductor science. Extrinsic semiconductors. Continuity equation and applications. Photoconductivity. Principles of semiconductor devices and device models (pn junction, BJT, FET).

EE 829.3 — 1/2(3L)**Selected Topics from Optical Electronics and Imaging Science**

Basic theory emphasizing on relationships between electronic structure and optical properties of solids. Einstein A and B coefficients for stimulated emission. Gas lasers. Solid state lasers. Photodetectors. Basic concepts in optical imaging. Diffraction. Holography.

EE 830.3 — 1/2(3L)**Electronic Instrumentation**

Sensor design and application in general, with detailed examples, followed by an examination of the problems, their use in process control and data logging, and analysis and presentation of results.

EE 840.3 — 1/2(3L-3P)**Mathematical Methods in Engineering**

Iterative techniques for solving non-linear equations with one variable; techniques for solving sets of linear algebraic equations using direct and iterative methods; Iterative methods for solving non-linear algebraic equations; LU factorization and application of LU matrices; eigenvalues, eigenvectors and modal transformation, solving sets of first- and second-order differential equations; optimization techniques.

EE 841.3 — 1/2(3L-3P)**Numerical Methods in Power System Analysis**

A brief review of matrix theory. Laplace transform methods, and stability criteria of control systems. State space representation and the application of numerical techniques for investigating the effects of controller adjustments on power system dynamics. Digital computer programming methods for obtaining load flow solutions and analyzing large complex control systems.

EE 845.3 — 1/2(3L)**Random Variables in Engineering Systems**

Random variables, functions of random variables, expectations, characteristic function, joint densities and distributions, sequences of random variables, concept of stochastic processes. The emphasis is on developing a working knowledge of the above theory in engineering applications.

EE 850.3 — 1/2(3L)**Reliability Engineering**

Basic reliability concepts, elements of probability and statistical theory, application of important distributions, reliability in series, parallel and complex systems. Application of Markov chains in the evaluation of repairable system reliability. Utilization of Monte Carlo simulation in basic system reliability evaluation.

EE 851.3 — 1/2(3L)**Power System Reliability**

Reliability evaluation of static and spinning generating capacity requirements. Interconnected system reliability concepts. Transmission system reliability evaluation. Determination of composite system reliability. Distribution system reliability evaluation. Incorporation of customer interruption costs in the evaluation of power system reliability worth.

EE 860.3 — 1/2(3L)**Power System Analysis**

System representation and analytical techniques required for the solution of power system steady-state and transient problems. The use of digital computers in load flow, fault and stability studies is emphasized. HVdc transmission and power system control are briefly discussed.

EE 861.3 — 1/2(3L)**Advanced Power System Analysis**

Symmetrical components, balanced and unbalanced power system fault studies. B and O; positive plus negative, positive minus negative and O sequence components. Simultaneous faults. Sequence impedances of lines and cables. Measurement of sequence voltages, currents and impedances. Performance of relays during faults and swings are briefly discussed.

EE 863.3 — 1/2(3L)
High Voltage Direct Current Transmission

Economics of direct current bulk power transmission. Converter circuits and valve connections. Analysis of bridge connected rectifiers and inverters. Grid control, compounding and regulation. Artificial commutation of bridge rectifiers. High voltage mercury arc and thyristor valves. Control of dc transmission lines. Harmonics in ac and dc systems. Reactive power requirements. D.C. corona.

EE 865.3 — 1/2(3L)
Power System Relays and Protection

Designing electromechanical and solid-state directional and distance relays. Applying directional overcurrent, distance and differential relays for protecting lines, transformers, generators and busbars. Transient responses of current and voltage transformers and their impact on relay performance.

EE 866.3 — 1/2(3L)
Power System Modeling and Control

Modeling of power systems: synchronous machines, HVDC lines, static var compensators (SVC), loads and the power network. Small-disturbance modeling and large-disturbance modeling; control of power systems: automatic generations control (AGC), frequency and voltage control. Control of power system damping and transient stability.

EE 867.3 — 2(3L)
Economic System Operation

Basic concepts of economic system operation; determination of system transmission losses; development of transmission loss formulae co-ordination of incremental production costs and incremental transmission losses in composite hydro-thermal systems; economic load dispatch in thermal systems by dynamic programming; optimal economic operation of hydro-thermal systems; system operation in a deregulated environment; optimum coordination of active and reactive power and reserve in a deregulated system.

EE 868.3 — 1/2(3L)
Digital Techniques for Power System Measurements and Protection

Interfacing electronic devices with power systems; electronic transducers, auxiliary transformers, anti-aliasing filters, analog to digital converters, sample and hold devices and computing devices. Numerical techniques for converting quantized data to phasors and using the phasors for derived measurements, such as, power flow, apparent impedance and frequency.

EE 869.3 — 1/2(3L/R/P)

Advanced Topics in Power System Analysis and Design

Consists of assigned reading, lectures by staff members, discussion periods and laboratory exercises with reports. Topics will be selected from the following areas of analysis and design of electric power systems. Switching and lightning surges, insulation coordination; composite system reliability evaluation, reliability of substations; digital relays, analog and digital filters; sensitivity analysis and simulation of outages; second-order load flows; optimal and adaptive control of power systems; planning and operation of power systems.

EE 870.3 — 1/2(3L)
Theory of Electrical Machines

Review of fundamental laws, including Maxwell's equations. Coupling concepts, voltage equations and equivalent circuits of static and dynamic machines, operational implications of these aspects in transformers, induction and synchronous machines. Symmetrical and unsymmetrical windings, distribution of field and current-loading, production of constant and pulsating torques, harmonic torques. Introduction to generalized electrical machine theory.

EE 871.3 — 1/2(3L)
Generalized Theory of Electrical Machines

Basic principles of the general theory. The generalized rotating machines and its equation. Transformations of the equations. Applications to different electrical machines.

EE 875.3 — 1/2(3L)
Electric Machine Transient Performance

A study of the dynamic performance of interconnected synchronous machines taking into account their non-linear properties and the effects of speed and excitation control devices.

EE 880.3 — 1/2(3L)
Digital Signal Processing

Covers z-transform, structure of discrete time systems, discrete Fourier transform, FFT (Fast Fourier Transform), spectral analysis, FIR (Finite Impulse Response) filters, IIR (Infinite Impulse Response) filters, DSP (Digital Signal Processing) microprocessor applications, and introduction to spectral estimation and adaptive digital filters.

EE 898.3
Special Topics

Offered occasionally by visiting faculty and in other special situations to cover, in depth, topics that are not thoroughly covered in regularly offered courses.

EE 899.6
Special Topics

Offered occasionally by visiting faculty and in other special situations to cover, in depth, topics that are not thoroughly covered in regularly offered courses.

EE 902.6
Advanced Electrical Laboratory

Candidates for the Postgraduate Diploma may register for work in one of the Electrical Engineering Research Laboratories as in the case of the regular courses. Permission of the department must be obtained before enrolling, and will depend upon the availability of suitable facilities as well as the experience of the candidate. Normally, credit may be given for no more than 6 credit units during the academic year, following the completion of the work and the submission of a satisfactory engineering report certified by the department. This course is not acceptable for the Master's degree.

EE 990
Seminar

A seminar is held periodically throughout the regular session during which staff and graduate students discuss current research topics. Graduate students are required to attend these seminars.

EE 992.6
Project

Students undertaking the project Master's degree (M.Eng.) must register in this course. It consists of independent study and investigation of a real world problem, and submission of an acceptable report on the investigation.

EE 994
Research

Students writing a Master's thesis must register for this course.

EE 996
Research

Students writing a Ph.D. thesis must register for this course.

EFDT —
EDUCATIONAL FOUNDATIONS

Department of Educational Foundations, College of Graduate Studies and Research

EFDT 820.3 — 1/2(3S)
Early Educational Classics

Selected educational classics from antiquity to 1850 in the light of the contributions they have made to educational theory and practice.

EFDT 821.3 — 1/2(3S)
Modern Educational Classics

Selected educational classics from 1850 to the present in the light of the contributions they have made to educational theory and practice.

EFDT 822.3 — 1/2(3S)
Seminar in History of Canadian Education

Selected topics in Canadian educational history since 1867.

EFDT 823.3 — 1/2(3S)
Education and Canadian Minorities

The history of education of selected Canadian minority groups.

EFDT 830.3 — 1/2(3S)
Methods of Investigation in Philosophy of Education

An introduction to basic methods of engaging in philosophy of education focusing on such modes as conceptual analysis, phenomenology, existentialism, critical theory, and pragmatism.

EFDT 831.3 — 1/2(3S)
Existentialism and Education

Highlights critical issues raised by existentialists which, in turn, serve as the starting point for thinking about the individual and education.

EFDT 832.3 — 1/2(3S)
Phenomenology and Education

Inquiry into the value for education of phenomenological theory and methodology. Major works of selected phenomenologies are examined.

EFDT 833.3 — 1/2(3S)
Conceptual Analysis and Education

An analysis of educational concepts using the techniques of modern conceptual analysis to illuminate ethical, epistemological, and other educational problems.

EFDT 835.3 — 1/2(3S)
Problems in Philosophy and Education

Topics selected by the instructor and students.

EFDT 836.3 — 1/2(3S)
Contemporary Education in Theory and Practice

A critical analysis of contemporary educational practice in the light of recent literature on educational theory.

EFDT 837.3 — 1/2(3S)
Educational Philosophies and Curriculum

Deals with the philosophical foundations of curriculum theory and clarifies the basis from which educational programs can be analysed. Contemporary philosophical issues related to the curriculum and school programs are examined. The writings of selected educational philosophers are studied.

EFDT 840.3 — 1/2(3S)
Research Design in Sociology of Education

Gives students the opportunity to apply research methods to specific problems in sociology of education. Whenever possible, students will participate in ongoing research in the department.
Prerequisite(s): ERES 800.

EFDT 841.3 — 1/2(3S)
Sociological Theories of Education

Examines the contributions made by functionalism, conflict theory, and interactionism to educational theories. The status of the 'new' sociology of education is critically assessed.
Prerequisite(s): EFDT 440; or permission of the department.

EFDT 850.3 — 1/2(3S)
Comparative Studies in Education

Focuses on methodological issues in comparative education and introduce the student to landmarks in cross-national research.
Prerequisite(s): Permission of the department.

EFDT 851.3 — 1/2(3S)
International Education and Modernization

Focuses on educational issues in development and modernization, and the role of education in international understanding and cooperation.

EFDT 854.3
International Study Tour England

Pre-departure readings and seminars introduce students to the culture of the designated country and to the history and structure of its education system. Lectures, seminars, observation, and journals are used to develop an analysis of the relationships between cultural tradition, economic and political structures, and education.

EFDT 860.3 — 1/2(3S)

Seminar in Anthropology and Education

Investigation of selected problems in anthropology and education.

EFDT 870.3 — 1/2(3S)
Interdisciplinary Seminar in Foundations of Education

A consideration of important educational issues from the anthropological, comparative, historical, philosophical and sociological points of view and the possible implications for a comprehensive theory of education.

EFDT 871.3 — 1/2(3S)
Student Seminar

Under appropriate faculty supervision, students will assume major responsibility for initiating and developing the content and form of the course.

EFDT 872.3 — 1/2(3S)
Experience of Women in Canadian Education

Through historical and contemporary sources, students study a range of women's educational experience with the goal of understanding how women of various socio-cultural groups are marginalized in Canadian society. Using feminist and auto/biographical scholarship, we analyze how gender structures formal and informal education, and trace efforts to achieve equality for women through education.
Prerequisite(s): EFDT 482 and 483; or their equivalents.

EFDT 873.3 — 1/2(3S)
Feminist Thought and Implications for Canadian Education

Focuses on Western feminist thought from the early modern period to the present, especially the concern for women's relation to education. Through study of selected theorists, students consider many sites of inequality for women and current implications for Canadian education.
Prerequisite(s): EFDT 872.

EFDT 874.3 — (3S)
School Plus and Education for Justice Compassion and Diversity

Explores frameworks for developing educational theory and practice committed to justice, compassion, and diversity; assists students in formulating principles for educational analysis and proposals; and examines key assumptions and concepts in relation to transformative education.

EFDT 880.3 — 1/2(3S)
Process Philosophy Ecological Education for Regeneration

Utilizes process thought as a theoretical approach to ecological education; analyzes ideas such as integral development, emergence, and transformation in ecological education; and investigates critical pedagogies, educational policy and leadership, and curriculum development.

EFDT 881.3 — 1(3S)
Education Wisdom Nature

Traces the concept of wisdom from earliest times through a decline in interest during the Enlightenment to its present-day resurgence among feminist theologians, deep ecologists, and First Nations peoples. Conceptions of wisdom and their emotional and cognitive preconditions are explored. Educational implications are considered.

EFDT 882.3 — 1/2(3S)
Education and Moral Development

Theoretical aspects of moral education are investigated including the possibility of reasoning morally, the case for developmental hypothesis, the cultivation of moral sentiments, the role of conscience in moral experience and the fostering of moral character.
Prerequisite(s): PHIL 230 or 233; or equivalent.

EFDT 883.3 — 1/2(2S-1P)
Moral Education in Practice

An introduction to a variety of materials and strategies used for the purposes of moral education and apply these in simulated classroom and school settings.

EFDT 898
Individual Reading

Provides students with an opportunity to study in areas of their own interest. Under the direction of a staff advisor, they plan and follow a reading program and prepare a major paper.
Note: Students may take up to 12 credit units of individual reading in their graduate program.

EFDT 899.6
Readings Course

Provides students with an opportunity to study in areas of their own interest. Under the direction of a staff advisor, they plan and follow a reading program and prepare a major paper.

EFDT 990
Seminar

This is a non-credit seminar designed for students in residence. Students and faculty explore issues in the general field of

educational foundations using literature that is both challenging and current.

EFDT 992
Project

A compulsory course for those registered for the project Master's route. The project must be accepted by a committee of the department and evaluated by the committee plus an external member.

EFDT 994
Research

Students undertaking research leading to a Master's thesis must register in this course each year until the thesis is completed (applies to thesis work done extramurally as well as intramurally).

EIND — INDIAN AND NORTHERN EDUCATION

Department of Educational Foundations, College of Graduate Studies and Research

EIND 800.3 — 1/2(3L)
History of Indian and Native Education in Central and Atlantic Canada

The nature of history as it pertains to Indian and Inuit people. Describes and analyzes the chronological development of schooling for the indigenous people in Central and Atlantic Canada. Historical origins of contemporary issues in education are examined.

EIND 810.3 — 1/2(3L)
History of Indian and Native Education in Western and Northern Canada

A review and examination of educational practices of Indian and Inuit people of Western and Northern Canada both before and after the arrival of Europeans. The course outlines the involvement in schooling of the Hudson's Bay Company, missionaries and governments. Contemporary developments in education for Indian, Metis and Inuit people are discussed.

EIND 851.3 — 1(3S)
Decolonizing Aboriginal Education

Intended to address colonization and imperialism among Aboriginal peoples, focusing specifically on the role education has played in achieving cognitive imperialism, critique the tenets of cognitive imperialism in English language, and education policy, politics, and practice, and evaluate international options for restoring Aboriginal communities.

EIND 852.3 — 1/2(3S)
Theory and Practice of Anti-Racist Education

Examines the historical, economic and political processes and practices of

racialization, and the ways in which these processes and their effects become entrenched in our social and educational institutions. Theories and practices of integrative anti-racist education will be explored, including its applications in a variety of work places.

Prerequisite(s): Admission to the College of Graduate Studies and Research.

EIND 855.3 — 1/2(2L-1P)
Cross Cultural Research Methodology

A methodology course dealing with the adaptation of various research approaches to the study of variables across cultures. Students are expected to become involved in the design and conduct of a cross-cultural research study.

EIND 860.3 — 1/2(3S)
Cross Cultural Education within Circumpolar Countries

A survey of systems, programs, teaching approaches and the development of curriculum materials for the education of minority groups resident in circumpolar countries and areas. The focus is on Greenland, the Scandinavian countries, northern Russia, Alaska and northern Canada.

EIND 870.3 — 1/2(3S)
Cross Cultural Education within Third World Countries

A survey of the development of schooling for indigenous and minority cultures within a sample of Third World countries. Focus will be on the aborigines of Australia, the Maoris of New Zealand, the Indians of Latin and South America and the original people of African countries.

EIND 871.3 — 2(3S)
Aboriginal Languages and Linguistic Diversity in Education

This seminar explores the state of Indigenous languages, the interrelated threats to linguistic diversity, and its foreseeable consequences for Indigenous knowledge, heritage, identity, human rights, and social justice. It critically examines post-colonial educational programming aimed at recovering, sustaining, and developing Indigenous languages.

Prerequisite(s): Admission to Graduate Studies and Research.

EIND 898
Individual Reading Course

Students select a specific area of interest within the field of Indian and Northern education. In consultation with a faculty advisor, the student delineates the subject of study, research methodology, bibliography and working arrangements. A

completed report or mini-project is evaluated by a committee of faculty within the program in consultation with the student.

EIND 899.6 — 1&2(R)
Readings Course

Students select a specific area of interest within the field of Indian and Northern education. In consultation with a faculty advisor, the student delineates the subject of study, research methodology, bibliography and working arrangements. A completed report or mini-project is evaluated by a committee of faculty within the program in consultation with the student.

EMUS — MUSIC EDUCATION

Department of Music, College of Graduate Studies and Research

EMUS 860
Psychology of Music

EMUS 861
Test and Measurements

EMUS 863
History of Music Education

EMUS 864
Seminar in Conducting

EMUS 865
Seminar in Applied Music

EMUS 869
Seminar in Music Education

EMUS 898
Special Topics

EMUS 899
Special Topics

EMUS 994
Research

ENG — ENGLISH

Department of English, College of Graduate Studies and Research

ENG 801.3 — 1/2(2S)
Introduction to Textual Scholarship

An introduction to textual authority, including the study of bibliographic description, editorial technique, textual transmission, database searches, and the history of modes of publication.

ENG 802.6 — 1&2(2S)
Studies in Literary and Cultural History

Studies of specific literary periods, literary movements, issues of influence, reputation or reception. Theories of literary history may also be studied.

ENG 803.3 — 1/2(2S)
Topics in Literary and Cultural History

Particular topics in the study of periods, movements, issues of influence, reputation or reception. Theories of literary history may also be studied.

ENG 804.6 — 1&2(2S)
Studies in Individual Authors

Studies in an author or selected authors writing in English.

ENG 805.3 — 1/2(2S)
Topics in Individual Authors

Particular topics in the work of an author writing in English, or on particular works in the author's oeuvre.

ENG 810.6 — 1&2(2S)
Studies in National and Regional Literatures

Studies in national and regional literatures (Canadian, American, English, Irish, etc.) and other constructions of nationality (postcolonial, aboriginal, ethnic, etc.).

ENG 811.3 — 1/2(2S)
Topics in National and Regional Literatures

Particular topics in national and regional literatures and constructions of nationality.

ENG 816.6 — 1&2(2S)
Studies in Literary and Cultural Theory

Studies in selected literary and/or cultural theories, from Plato to the present.

ENG 817.3 — 1/2(2S)
Topics in Literary and Cultural Theory

Particular topics and issues in selected theories, or on particular theorists.

ENG 818.6 — 1&2(2S)

Studies in Methods and Texts

Studies in the application of selected methods in the practical criticism of selected texts.

ENG 819.3 — 1/2(2S)
Topics in Methods and Texts

Particular topics and issues in the application of selected methods to selected texts.

ENG 842.6 — 1&2(2S)
Studies in Genres and Contexts

Studies in traditional or emerging genres of writing, and in their intertextual, disciplinary, and extraliterary contexts.

ENG 843.3 — 1/2(2S)
Topics in Genres and Contexts

Particular topics and issues in traditional or emerging genres of writing, and in their intertextual, disciplinary and extraliterary contexts.

ENG 898.3 — 1/2(2S)
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

ENG 899.6 — 1&2(2S)
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

ENG 990 — 1&2(9P)
Professional Development Seminar

All graduate students are required to attend the series of workshops entitled Conversations on Graduate Studies in English in their first year of graduate work. All Ph.D. students are required to give a seminar presentation in anticipation of their dissertation defence. All graduate students must attend the Ph.D. seminar presentations plus department colloquia. **Prerequisite(s):** Admission to M.A. or Ph.D. program in English.

ENG 992.6
Project

Students taking the project-based M.A. must register in ENG 992.6, which requires appropriate work leading to the completion of the 25-30 page research project. **Prerequisite(s):** Admission into the M.A. project-based program.

**ENG 994
Research**

Students writing a Master's thesis must register for this course.

**ENG 996
Research**

Students writing a Ph.D. thesis must register for this course.

**ENVE —
ENVIRONMENTAL
ENGINEERING**

Department of Engineering, College of, College of Graduate Studies and Research

**ENVE 810.3 — 1/2(3L)
Environmental Issues and Law**

Designed for graduate students particularly in the areas of Engineering, Agriculture, Resources and Environmental Studies with no legal background. This course explores the legal aspects of environmental protection, environmental offences, constitutional law, environmental impact assessment, environmental audit and professional responsibility in relation to environmental advice and decision-making.

Prerequisite(s): Registration in a Graduate Studies Program.

**ENVE 898.3 — 1/2(3L)
Special Topics**

Two 3 credit courses can be taken independently. Topics will be selected according to the student's specific area of interest.

**ENVE 990
Seminar**

A seminar is held each week throughout the regular session during which students, staff, and invited speakers discuss current research topics. Students are required to attend and to present at least one seminar each academic term.

**ENVE 992.6
Project**

Students taking the non-thesis Master's degree must register in this course.

**ENVE 994
Research**

Students writing a Master's thesis must register in this course.

**ENVE 996
Research**

Students writing a Ph.D. thesis must register in this course.

**EP — ENGINEERING
PHYSICS**

Department of Physics & Engineering Physics, College of Graduate Studies and Research

**EP 898.3
Special Topics**

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

**EP 899.6
Special Topics**

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

**EP 994
Research**

Students writing a Master's thesis in Engineering Physics must register for this course.

**EP 996
Research**

Students writing a Ph.D. thesis in Engineering Physics must register for this course.

**EPSE —
EDUCATIONAL
PSYCHOLOGY AND
SPECIAL
EDUCATION**

Department of Education, College of, College of Graduate Studies and Research

**EPSE 843.3 — 1(1L-1S-1P)
Theory of Educational and
Psychological Measurement**

A theoretical examination of the basic problems of psychological measurement, together with the statistical procedures relevant to the understanding and evaluation of tests. Both classical test theories and item response theory models are examined.

Prerequisite(s): Admission into the Master's Program in Education Psychology and Special Education or permission of Department Head/Graduate Chair.

**EPSE 844.3 — 2(1L-2P)
Advanced Test Theory and Instrument
Construction**

A detailed examination of test theory within an instrument development context.

Both classical test and item response theories are examined from the perspective of designing various measuring instruments. Educational and psychological test, questionnaires, interview schedules, and program evaluation instruments are among the information gathering devices which may be considered depending upon the professional interests and needs of the students. A practical skill development component is built in.

Prerequisite(s): EPSE 843 and admission into the Master's Program in Educational Psychology and Special Education or permission of Department Head/Graduate Chair.

**EPSE 851.3
Measuring Resiliency in Children with
Exceptionalities**

Designed to introduce students to conceptual frameworks wherein exceptional children are viewed from a perspective of resiliency rather than deficit. Emphasis will be directed toward examining models that emphasize the measurement and assessment of determinants of developmental resiliency, as well as indicators of resiliency.

Prerequisite(s): Admission into the M.Ed. in Educational Psychology and Special Education, or permission of Department Head/Graduate Chair.

Note: This is a compulsory course for students in the M.Ed. in Educational Psychology & Special Education program.

**EPSE 859.3 — 1/2(1L-2S)
Seminar in Language and Learning
Disability**

An in-depth study of the most recent theories in the field of learning disabilities. Each student will undertake a major literature search and present one aspect of basic skills, the models of processing and the way learning disabilities interfere with normal acquisition of this basic skill.

Prerequisite(s): Admission into the Master's Program in Educational Psychology and Special Education or permission of Department Head/Graduate Chair.

**EPSE 868.3 — 1(3S)
Behaviour Disorders Theory and
Practice**

Focuses on the empirically-based education and clinical management of behaviour disorders in children and adolescents. Critical issues related to theory, assessment practices, and treatment approaches are examined.

Prerequisite(s): Admission into the Master's Program in Educational Psychology and Special Education or permission of Department Head/Graduate Chair.

**EPSE 886.1 — 1/2(1S)
Trends and Issues**

Reviews the theoretical and practical bases of emerging trends in the education of children and youth with special education needs. Regular faculty with specific expertise or visiting scholars on sabbatical leave will offer the course periodically. The course is adaptable for intensive, short-term offerings by outstanding visiting scholars.

**EPSE 887.2 — 1/2(2S)
Trends and Issues**

Reviews the theoretical and practical bases of emerging trends in the education of children and youth with special education needs. Regular faculty with specific expertise or visiting scholars on sabbatical leave will offer the course periodically. The course is adaptable for intensive, short-term offerings by outstanding visiting scholars.

Prerequisite(s): Admission into the Master's Program in Educational Psychology and Special Education or permission of Department Head/Graduate Chair.

**EPSE 888.3 — 1/2(3S)
Trends and Issues**

Reviews the theoretical and practical bases of emerging trends in the education of children and youth with special education needs. Regular faculty with specific expertise or visiting scholars on sabbatical leave will offer the course periodically. The course is adaptable for intensive, short-term offerings by outstanding visiting scholars.

Prerequisite(s): Admission into the Master's Program in Educational Psychology and Special Education or permission of Department Head/Graduate Chair.

**EPSE 898.3 — 1/2(1&2(3P)
Special Topics**

Offered occasionally by visiting faculty and in other special situations. Students interested in these courses should contact the department for more information. Consists of writing a minor thesis based on extensive readings or on experimental study. The project must be planned, carried out and reported by the student under the supervision of a faculty supervisor.

**EPSE 899.6
Special Topics**

Offered occasionally by visiting faculty and in other special situations. Students interested in these courses should contact the department for more information.

Consists of writing a minor thesis based on extensive readings or on experimental study. The project must be planned, carried out and reported by the student under the supervision of a faculty supervisor.

EPSE 990 Seminar

Non-credit course for graduate students in Educational Psychology and Special Education. On-going research and development projects of students from the focus of a series of seminars.

EPSE 994 Research

A student undertaking research leading to a Master's thesis must register in this course each year until the thesis is completed. This applies to thesis work done extramurally as well as intramurally. **Prerequisite(s):** Admission into the M.Ed. in Educational Psychology and Special Education.

Note: This is a compulsory course for students in the M.Ed. in Educational Psychology & Special Education program.

EPSE 996 Research

Students writing a Master's thesis must register for this course.

EPSY — EDUCATIONAL PSYCHOLOGY

Department of Educational Psychology & Special Education, College of Graduate Studies and Research

EPSY 994 Research

A student undertaking research leading to a Master's thesis must register in this course each year until the thesis is completed (applies to thesis work done extramurally as well as intramurally).

EPSY 996 Research

Offered to students undertaking research in a Ph.D. program.

Prerequisite(s): Registration in a Ph.D. program in the department of Educational Psychology and Special Education.

ERES — EDUCATION RESEARCH

Department of Education, College of, College of Graduate Studies and Research

ERES 800.3 — 1/2(2L-2P)

Research Methods Introductory

Introduction to research methods, with special reference to research in Education. The basic principles of research, both quantitative and qualitative, are discussed. Skills necessary for the production of research proposals are developed, e.g. techniques for surveying the research literature, and the collection and analysis of data.

ERES 840.3 — 1/2(3L-1P) Statistical Methods Intermediate

Selected parametric and non-parametric inferential tests. Analysis of variance, one-way and factorial designs, planned and post-hoc comparisons. Computer applications of these techniques with real and/or artificial educational and social science data will be an essential component.

Prerequisite(s): Permission of the instructor.

ERES 841.3 — 2(3L-1P) Statistical Methods Advanced

Selected experimental and quasi-experimental designs relevant for research in education and behavioral sciences. Multiple and step-wise regression. Introduction to selected multivariate techniques. The use of the various techniques in actual and simulated data in education and behavioral sciences will be an essential component.

Prerequisite(s): ERES 840.

ERES 845.3 — (3S) Naturalistic Research Methods

Offers the opportunity to learn and practice inquiry processes for conducting naturalistic (qualitative) research. Within selected theoretical frameworks, the following techniques will be studied: framing the study, participant observation, interviewing, analytic induction and constant comparison, reporting.

Prerequisite(s): ERES 800.

ERES 898.3 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

ERES 899.6 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

FAMS — FOOD AND APPLIED MICROBIOLOGICAL SCIENCES

Department of Applied Microbiology & Food Science, College of Graduate Studies and Research

FAMS 898.3 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

FDSC — FOOD SCIENCE

Department of Applied Microbiology & Food Science, College of Graduate Studies and Research

FDSC 812.3 — 1(3L) Fluid Food Products

Designed to introduce students to the production and processing of milk, alcoholic beverages, soft drinks and other fluid food products.

FDSC 817.3 — 1(3L-3P) Analytical Techniques in Food Science

Modern analytical techniques and instruments for routine analysis and research on food products. Basic principles, analytical methods, applications, precision and sampling problems are discussed. Seminar and written assignments on current topics. **Prerequisite(s):** BIOC 220 (or 203); or permission of the instructor.

FDSC 830.3 — 2(3L-4P) Processing of Oilseeds and Legumes

A detailed study of the structure, composition and processing of the principal oilseeds and legumes. Refining and utilization of the food, feed and industrial products will be discussed. Techniques for the component extraction of oil, protein, starch and fiber will be demonstrated in the pilot plant. **Prerequisite(s):** BIOC 220 (or 203) or PLSC 420; or permission of the instructor.

FDSC 840.3 — 2(3L) Carbohydrates and Functional Properties

The physical and chemical characteristics of carbohydrates of plant origin will be discussed; their functional properties and interactions with other food components will be emphasized.

FDSC 898.3 Special Topics

Assigned reading, tutorials and laboratory techniques in special areas related to the student's major field of interest. Students will be required to prepare reviews or seminars in specific topics.

FDSC 899.6 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

FDSC 990 Seminar

Current literature in the field of Food Science is reviewed and discussed. Staff and students present papers on current research topics. Graduate students are required to attend and participate.

FDSC 992.6 Project

Students registering for the project Master of Agriculture degree must register in this course.

FDSC 994 Research

Students writing a Master's thesis must register for this course.

FDSC 996 Research

Students writing a Ph.D. thesis must register for this course.

FIN — FINANCE

Department of Finance & Management Science, College of Graduate Studies and Research

FIN 801.3 — 1(1.5L-1.5S) Advanced Corporate Finance

Provides students with a fundamental understanding of the current issues of interest in research in the modern theory of corporate finance. It provides students with a theoretical background in areas such as security issuance, capital raising and corporate governance. Presentation and discussion of articles from academic journals are used as tools to enhance student learning. Commonly used empirical research methodologies are also introduced.

FIN 802.3 — 1(1.5L-1.5S) Advanced Investment Theory

Examines the main theoretical and empirical themes of investments. Beginning with the classic efficient markets research from the 1960s, we

progress through important new developments from the past two decades. The theoretical material is from a textbook specifically intended for finance M.Sc. students. Articles from leading academic journals present the empirical research. Extensive student discussion is used throughout the semester.

FIN 803.3 — 2(2L-1P) **Empirical Methods in Finance**

Presents a critical look at current financial models and gives the student experience in the systematic analysis of financial data. Characteristics of financial data will be explored using tests for stationarity, co-integration and GARCH analysis as well as other techniques. Students are exposed to a suite of analytical tools that allow rigorous assessment of the characteristics of the financial data and models.

FIN 805.3 — 1/2(3L) **Capital Market Theory**

Introduces students to the theory and practices of capital markets with emphasis on fixed income securities. Topics include basic bond mathematics, term structure of interest rates, interest rate models, interest rate derivatives, interest risk management and computer modeling of fixed income securities.

FIN 898.3 **Special Topics**

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

FIN 990 **Seminar in Finance**

A forum in which faculty members, visiting professors and M.Sc. students will present research papers. All students that are undertaking the M.Sc. program are required to attend and present at least one paper during their program

FIN 994 **Research in Finance**

Students undertaking research should register in this course each year until completion of the program.

FREN — FRENCH

Department of Languages & Linguistics,
College of Graduate Studies and Research

FREN 815.6 — 1&2(3L) **French Poetry**

A study of French poetry from the medieval period to the present.

FREN 817.3 — 1/2(3L) **Advanced Studies in 17th Century French Literature**

In a given year, a special topic in French literature of the 17th century will be studied, e.g., the theatre of Corneille and Racine; the novel; secondary genres (fables, sermons, maxims, portraits, correspondence).

Prerequisite(s): Admission to graduate studies in French.

FREN 818.3 — 1/2(3L) **Advanced Studies in 18th Century French Literature**

In a given year, a special topic in French literature of the 18th century will be studied, for example, novel, theatre, Encyclopedistes, etc.

Prerequisite(s): Admission to graduate studies in French.

FREN 819.3 — 1/2(3L) **Advanced Studies in 19th Century French Literature**

In a given year, a special topic in French literature of the 19th century will be studied, e.g., the second, disillusioned romantic generation (Flaubert, Baudelaire, Rimbaud and Mallarmé;), which idolizes art, the antithesis of money.

Prerequisite(s): Admission to graduate studies in French.

FREN 820.3 — 1/2(3L) **Advanced Studies in French Literature of 20th Century**

One aspect of 20th-century literature will be studied in depth, for example, the absurd and engagement, 20th-century attempts at tragedy, Dada and Surrealism, the Nouveau-roman.

Prerequisite(s): Admission to graduate studies in French.

FREN 840.6 — 1&2(3) **Seminar in French or French Canadian Literature**

FREN 843.3 — 1/2(3L) **Advanced Studies in Quebec Novel**

Advanced studies of a special topic in the Quebec novel, e.g., women writers, the social novel, the nouveau-roman, etc.

Prerequisite(s): FREN 343 and admission to graduate studies in French.

FREN 845.3 — 1/2(1.5L-1.5P) **Advanced Studies in Quebec Modern Drama**

Advanced studies in Quebec modern drama, theory and practice. In the lab, students will work under the direction of an experienced actor and stage director.

Prerequisite(s): FREN 345 and admission to graduate studies in French.

FREN 897.3 **Selected Topics in French**

Offered in collaboration with the University of Regina and taught jointly by faculty members from both campuses. It may, for example, be given over two weekends, one in Saskatoon and one in Regina, on two related topics in areas such as literature, civilization, cinema, and translation. Otherwise, distance technology may be used. The topics change every year.

Prerequisite(s): FREN 220 or FREN 230 or equivalent, and 6 credit units of French or French Canadian Literature at the 300- or 400- level.

FREN 898.3 — 1/2(3R) **Special Topics**

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

FREN 899.6 — 1&2(3R) **Special Topics**

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

FREN 994 **Research**

Students writing a Master's thesis must register for this course.

GE — GENERAL ENGINEERING

Department of Engineering, College of,
College of Graduate Studies and Research

GE 898.3 **Special Topics**

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

GEOG — GEOGRAPHY

Department of Geography, College of
Graduate Studies and Research

GEOG 801.3 — 1/2(3L) **Advanced Spatial Analysis**

Deals with quantitative methods of spatial analysis as they are used in the field of geography. Emphasis is placed on the application of techniques, practical exercises and projects.

GEOG 803.3 — 1/2(S) **Research in Geography**

The purpose of this course is to introduce graduate students to theoretical and practical issues in geographical research. Its specific objective is to demonstrate and promote professional practices in geography culminating in a research plan that will serve as the basis for developing a graduate research proposal.

Note: Required only for M.A. and M.Sc. students, however Ph.D. students may enroll on recommendation of their supervisor.

GEOG 804.3 — 1/2(1L-2S) **Contemporary Issues in Geographic Thought**

Encourages debate and critical assessment of the philosophies of and practices in contemporary physical and human geography. While the course content varies, the issues addressed may include definitions of science and nature, issues of representation and responsibility, and the possibility of synthesis in geography.

Note: All graduate students (M.A., M.Sc. and Ph.D.) must take GEOG 804 or GEOG 890.

GEOG 806.3 — 1/2(1L-2S) **Advanced Spatial Analysis in Physical Geography**

Examines topics in the area of digital terrain analysis, automated watershed segmentation and parameterization, and the application of GIS to problems in earth and environmental science. Topics will vary with the instructor and students.

GEOG 822.3 — 1/2(3L) **Advanced Geographic Information Science**

Geographic Information Science is the systematic study and theory of digital representations of the Earth, and the processes that can be applied to that information. Students will explore contemporary theory and research in GIScience to better understand how technology can be used for geographic inquiry.

Prerequisite(s): Training in GIS, Cartography, or related technical or theoretical area.

GEOG 827.3 — 1/2(1L-2S) **Principles of Hydrology**

A seminar course designed to explore recent developments in hydrology. Topics to be covered at the discretion of the instructor.

GEOG 833.3 — 1/2(1L-2S)
Advanced Climatology

Designed to acquaint students with the theory and methods of research in synoptic climatology. Involves a critical review of literature on selected topics dealing with the problem climates of the earth. Seminar discussions will be focused to identify research problems in synoptic climatology and various methods used in solving these problems.

GEOG 835.3 — 1/2(1L-2S)
Advanced Geomorphology

A seminar course designed to explore recent developments in geomorphological theory and the analysis of geomorphological processes. Topics to be covered at the discretion of the instructor.

GEOG 840.3 — 1/2(1L-2S)
Problems in Transportation

The examination of current research themes and problems in transportation geography. Alternate topics may be covered to reflect student needs.

GEOG 841.3 — 1/2(1L-2S)
Regional Development

A review of the theories of regional development: cumulative causation, forward and backward linkages, export-base, growth poles, and associated concepts of core-periphery diffusion, and spread-backwash processes. This course examines applications of those concepts in North America and the world.

GEOG 845.3 — 1/2(2L)
Advanced Urban Geography

A survey of various theories of social and policy planning and their application to the geographical organization and planning of Canadian communities. The emphasis of this course lies on the links between political, economic and social processes within urban areas.

GEOG 847.3 — 1/2(1L-2S)
Geography of Northern Development

Problems of development in northern Canada and the application of geographic methods to solve these problems. Students will participate in these discussions by presenting their critical comments on various development questions and by giving written reports on case examples. Each student will prepare a major essay.

GEOG 848.3 — 1/2(1L-2S)
Advanced Geography of Population

Focuses on geographical theories of population and/or migration which have particular application for understanding the spatial changes in population. Each of these theories will be discussed and analyzed by students in the seminar. Each student will prepare a major essay on one of these geographical theories.

GEOG 860.3 — 1/2(3S)
Social Geography

A review of the approaches to social geography, encompassing space and social theory. Areas of focus include: place and identity, health geography and issues in research.

GEOG 871.3 — 1/2(1L-2S)
Advanced Biogeography

A review and discussion of current methods, problems and research areas in biogeography.

GEOG 880.3 — 1/2(3S)
Environmental Geographies

Introduces a range of philosophical perspectives, topical issues, and methodological approaches to studies in environmental geography. Considers research focused on applied research about management strategies and policy making as well as theoretical work focused on politics associated with environmental problems. Also examines possible synergies between the two.

Prerequisite(s): Permission of the instructor.

GEOG 885.3 — 1/2(3L-1S)
Advanced Applications of Environmental Management

Using a collaborative learning model, this course will analyze theoretical and practical problems associated with defining and evaluating resource and environmental management and its associated strategies.

Prerequisite(s): Undergraduate degree.

GEOG 886.3 — 1/2(3S)
Advanced Environmental Impact Assessment

A project-based course focusing on emerging concepts and broader applications of environmental assessment principles and practices. Course topics varying from year to year following developments in the field, and may include such topics as cumulative effects assessment, strategic environmental assessment, project scoping, assessment methods and techniques, monitoring and follow-up.

Prerequisite(s): GEOG 386; or 6 credit units in advanced environmental management; or permission of the instructor.

GEOG 890.3 — 1(1S-2P)
Landscape Analysis

A practical course in field data collection, research methodology and applications in physical geography, including biogeography, geomorphology and remote sensing.

Prerequisite(s): All graduate students (M.A., M.Sc. and Ph.D.) must take GEOG 804 or GEOG 890.

GEOG 898.3 — 1/2(3S)
Special Topics

A reading course for graduate students focusing on areas for which there is no regular graduate course or for making up the deficiencies in the research program.

GEOG 899.6 — 1&2(3S)
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

GEOG 990
Departmental Seminar

During residence, candidates will register in GEOG 990 and will present at least one paper based on their own research (likely thesis research).

GEOG 994
Research

Students writing a Master's thesis must register for this course.

GEOG 996
Research

Students writing a Ph.D. thesis must register for this course.

GEOL — GEOLOGY

Department of Geological Sciences,
College of Graduate Studies and Research

GEOL 815.3 — 2(3L)
Glacial Geology

Landforms and sediments related to glaciations. Continental glaciation during the Pleistocene and its deposits. Methods of investigation used in reconstructing the glacial history of a region. Glacial features on maps and air photographs.

GEOL 816.3 — 2(3L-3P)
Quaternary Stratigraphy

Litho-, bio-, and chrono-stratigraphy of Quaternary glacial fluvial, lacustrine, and

marine sediments. The reconstruction of Quaternary history through the recording, investigating, dating and correlating of Quaternary sedimentary sequences. The importance of sedimentological, stratigraphical, and structural characteristics of Quaternary deposits for practical use in science and engineering.

GEOL 822.6 — 1&2(2L-3P)
Analytical Geochemistry

Analytical techniques employed by earth scientists for determining the compositions, ages, and provenance of minerals and rocks. The theory, operation, and information that can be obtained from a variety of instruments will be studied. These instruments will include the X-ray diffractometer, the X-ray fluorescence spectrometer, the electron microprobe and scanning electron microscope (SEM), the atomic-absorption spectrometer, the gas chromatograph, and isotope ratio and solid source mass spectrometers.

Prerequisite(s): GEOL 324, and 325.

GEOL 828.6 — 1&2(3L)
Geochemistry

The theory and application of instrumental techniques to the geochemistry of minerals and rocks. Topics include: terrestrial and cosmic abundance of elements; theory of element partitioning and its application to geothermometry and geobarometry; the behaviour of major and trace elements during partial melting and fractional crystallization; radiogenic and stable isotopic systems.

GEOL 829.6 — 1&2(3L)
Petrology

Dynamic and comprehensive treatment of important aspects of igneous and metamorphic petrology at an advanced level. Problems of current interest will be analyzed and discussed through integrated lectures, seminars, and laboratories.

GEOL 832.3 — 1/2(1.5L-1.5S)
Considerations in Palaeontology

Application of the concepts and principles of palaeontology to the interpretation of sedimentary rock sequences.

GEOL 835.3 — 1/2(1S-1P-1R)
Palyology

Advanced studies on fossil dinoflagellates and acritarchs, and spores and pollen, emphasizing their variation through geological time and their use in palaeoecological interpretation. (Practical work on material from North American and European sedimentary sequences will form a major part of this course).

GEOL 836.3 — 1/2(1.5L-1.5S)
Fossils and Organic Evolution

Concepts of organic evolution, stressing the evidence afforded by the fossil record. Topics will include biostratigraphy, variability, adaptation, natural selection, radiation, extinction, and evolution in time and space.

**GEOL 841.3 — 1/2(1.5L-1.5S)
Sedimentary Processes**

Advanced-level consideration will be given to one or more of the following topics: fluid mechanics and its role in the interpretation of deposition of sediment; experiments in sedimentology and their role; biological and chemical processes and their influence on sedimentation; diagenesis of sediments.

**GEOL 842.3 — 1/2(1.5L-1.5S)
Sedimentary Depositional Environments**

Investigations of selected modern environments of sedimentation and their application to the reconstruction of ancient sedimentary environments. May include consideration of a broad spectrum of environments or may focus on a few closely related environments and give them more detailed consideration.

**GEOL 848.3 — 1(3L)
Concepts in Stratigraphy**

The historical development of the concepts and principles of stratigraphy and the relative geologic time scale; the classification of stratigraphic units using a comparison of various stratigraphic codes; international problems in stratigraphic classification and correlation.

**GEOL 849.3 — 2(1L-1S-1R)
Selected Problems in Stratigraphy**

Application of the concepts and principles of stratigraphy, including sequence stratigraphic perspectives, to the interpretation of sedimentary basins.

**GEOL 853.6 — 1&2(3L)
Structural Geology**

The geometry and mode of formation of deformational structures in rocks on local and regional scales. Emphasis will be placed on mapping techniques in structurally complex terrains, the analysis of polyphase deformation, and the textures of deformed rocks. Some attention will be given to rock and crystal deformational processes and to the mechanics of faulting and folding.

**GEOL 865.3 — 1/2(1.5L-1.5S)
Analysis of Mineral Deposits**

Advanced level consideration of structural, magmatic, and hydrothermal processes involved in the formation and evolution of mineral deposits, and their relationship to the Earth and the environment. The application of petrological and

geochemical techniques to mineral deposit research. Problems of current interest will be addressed through lectures, and student presentations.

Prerequisite(s): Permission of the instructor.

**GEOL 880.3 — 1(3S)
Seismology**

Topics selected from the theory of propagation of seismic waves in layered media; theory of reflection and refraction of spherical waves, present advances in numerical filtering; information theory as related to geophysics.

**GEOL 881.3 — 1(3S)
Gravity and Magnetic Interpretation**

Mathematical and computer techniques of interpreting gravity and magnetic maps including analytical models, Fourier techniques, analytical continuation, application to actual problems. Special topics according to student needs.

**GEOL 882.3 — 1/2(3S)
Selected Topics in Geophysics**

The detailed content may vary from year to year in accordance with the specific interests of students but will include some consideration of electrical methods, well-logging techniques, and other fields of applied geophysics.

**GEOL 883.3 — 2(3S)
Advances in Exploration Geophysics**

A presentation of modern geophysical theories, emphasizing recent advances in interpretation and the influence of geophysical theories and methods on the development of modern geological thought. Topics include seismic stratigraphy, direct detection of hydrocarbons, crustal structure, rock magnetism, and airborne survey systems.

**GEOL 884.3 — 1/2(2L-2P)
Geophysical Inversion**

A practical course on inversion techniques in geophysics. Linear discrete inverse problems will be discussed, and an appreciation for the concepts of non-uniqueness, determinacy, and the use of a priori information will be emphasized. Students will be encouraged to use the techniques discussed in class in a computer laboratory and will be required to complete a term project with a written report, and a seminar.

Prerequisite(s): MATH 226, 338, GEOL 483, GEOE 414; or permission of the instructor.

**GEOL 898.3
Special Topics**

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

**GEOL 899.6
Special Topics**

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

**GEOL 990
Seminar**

Presentation of papers by faculty, visiting scientists, and graduate students. Graduate students are required to attend and interested undergraduates may be invited to attend. Satisfactory participation in this course is required of all graduate students throughout their period of residence.

**GEOL 994
Research**

Students writing a Master's thesis must register for this course.

**GEOL 996
Research**

Students writing a Ph.D. thesis must register for this course.

GERM — GERMAN

Department of Languages & Linguistics, College of Graduate Studies and Research

**GERM 898.3
Special Topics**

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

**GERM 899.6
Special Topics**

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

**GSR — GRADUATE
STUDIES AND
RESEARCH**

College of Graduate Studies and Research

**GSR 898.3
Special Topics**

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

GSR 984

Critical Thinking Skills for Graduate Students Multi Disciplinary Perspective

Designed for graduate students who wish to enhance their ability to think critically about complex societal issues associated with professional practice, whether in arts, humanities, or sciences. GSR 984 makes extensive use of multidisciplinary group discussions with other graduate students. Over 9 evening sessions a series of moderators will present topics such as basic elements of critical thinking, the influence of personality on our thinking, teamwork and leadership, business and ethical reasoning, indigenous cultures and knowledge, etc.

**GSR 985
Introduction to Ethics and Integrity**

Introduces principles of ethical decision-making in the contexts of research, teaching, supervision, consultation, and collegial relationships. Covers issues related to integrity in research, ownership of data, and authorship. In co-operation with the Office of Research Services, gives information needed for successful application for university ethics approval of proposed research. Discusses handling of complaints of ethical misconduct. Teaches participants to identify, formulate, and resolve ethical dilemmas following a structured process which includes consultation and reference to professional codes of ethics. The course is intended for beginning graduate students in departments or colleges which do not have their own courses in this field.

**GSR 987
Dynamics of Science Scientists and Science Societal Interactions**

Designed for all graduate students and postdoctoral fellows who have an interest in science and technology issues; students working in science and technology disciplines should find this course particularly useful. Case studies and a group/class-discussion format are used to promote discussion on broad issues in science such as: how scientific knowledge is created; how science evolves and works (history and philosophy of science); the nature of scientific discoveries; the selection of research topics and the values within the scientific community; competition and ethical issues; and public trust of science.

Prerequisite(s): Graduate student in science or science related area.

**GSR 989
Introduction to University Teaching**

Designed for individuals who have no formal preparation in university teaching. It focuses on the core activities of teaching, examines their relevance, and illustrates how they are best accomplished. Practical application of the core activities to the student's field of specialization is emphasized.

HIST — HISTORY

Department of History, College of Graduate Studies and Research

HIST 801.3 — 1/2(3S)
Studies in Ancient and Medieval History

HIST 820.6 — 1&2(3S)
Themes in Early Modern European History

HIST 821.3 — 1/2(3S)
Studies in Early Modern European History

HIST 830.6 — 1&2(3S)
Themes in Modern European History

HIST 831.3 — 1/2(3S)
Studies in Modern European History

HIST 840.6 — 1&2(3S)
Themes in British and Imperial History

HIST 841.3 — 1/2(3S)
Studies in British and Imperial History

HIST 848.6 — 1&2(3S)
Themes in Asian History

HIST 849.3 — 1/2(3S)
Studies in Asian History

HIST 850.6 — 1&2(3S)
Themes in Canadian History

HIST 859.3 — 2(3S)
Studies in Canadian History

HIST 860.6 — 1&2(3S)
Themes in Western Canadian History

HIST 861.3 — 1/2(3S)
Studies in Western Canadian History

HIST 870.6 — 1&2(3S)
Themes in the Americas

HIST 871.3 — 1/2(3S)
Studies in the Americas

HIST 880.3 — 1/2(3S)
History of History

HIST 881.3 — 1/2(3S)
Historiography

HIST 882.3 — 1&2(3S)
History Beyond Documents

HIST 892.3 — 1/2(3S)
Applied History

HIST 898.3 — 1/2(3S)
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

HIST 899.6 — 1&2(3S)
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

HIST 990 — 2(1.5S-1.5R)
Seminar

Students and faculty will make presentations concerning their current research. All candidates for a graduate degree must make one presentation. Attendance is required throughout the graduate program.

HIST 994
Research

Students writing a Master's thesis must register for this course.

HIST 996
Research

Students writing a Ph.D. thesis must register for this course.

INDR — INDUSTRIAL RELATIONS

Department of Industrial Relations & Organizational Behaviour, College of Graduate Studies and Research

INDR 898.3
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

INTD — INTERDISCIPLINARY GRAD STUDIES

College of Graduate Studies and Research

INTD 898.3
Special Topics

Topics will be selected according to the student's specific area of interest.

INTD 899.6
Special Topics

Topics will be selected according to the student's specific area of interest.

INTD 990
Seminar

Students are required to attend and to present at least one seminar each academic term.

INTD 992.6
Project

Students taking the project Master's degree must register in this course.

INTD 994
Research

Students writing a Master's thesis must register in this course.

INTD 996
Research

Students writing a Ph.D. thesis must register in this course.

ITDL — INTERDEPARTMENTAL COURSES

College of Graduate Studies and Research

ITDL 810.3 — 1&2(3P)
Principles and Applications of Electron Microscopy

Work will include specimen preparation, ultramicrotomy, study of the principles and practice with the use of the microscope and related equipment, and evaluation and interpretation of electron micrographs.
Prerequisite(s): Permission of the instructor.

KIN — KINESIOLOGY

Department of Kinesiology, College of Graduate Studies and Research

KIN 803.3 — 1/2(R)
Biomechanics

Topics include kinetic measurements, segmental energy and power flow, stresses and strains on human tissue, modeling and simulation.

Prerequisite(s): KIN 442 or equivalent.

KIN 804.3 — 1/2(3L)
Perception and Action

Examines current topics in motor control research. A particular focus will be the interaction between the perceptual and motor systems during the production of movement. In addition to providing a foundation in the fundamental tools for examining human motor behaviour (and inferring the underlying cognitive/functional organization), this course will critically examine the theories driving current research. Many opportunities to conduct and present research will be given.

Prerequisite(s): KIN 322.

KIN 805.3 — 1/2(3L)
Physiology of Exercise

A reading course for the student interested in a specialized approach to the study of exercise physiology. Detailed papers will be presented by the students in both required and selected areas of exercise physiology. In addition laboratory experiences may be assigned to supplement the assigned readings. General emphasis is placed on the cardiopulmonary response to various types of exercise, but other areas such as the muscle physiology and biochemistry of exercise are considered.
Prerequisite(s): KIN 225 and 226, or permission of the instructor.

KIN 806.3 — 1/2(3L)
Physical Growth and Development

Examines special topics related to growth and physiological development. Special emphasis is placed on the influence of exercise, physical activity, and athletic performance on the dynamics of growth. The course consists of special readings and

assigned topics dealing with physiological function, exercise tolerance, strength and motor performance as they relate to the growth of the child.
Prerequisite(s): KIN 320 or permission of the instructor.

KIN 807.3 — 1(3L)
Research Methods in Kinesiology

Intended to provide students with an introduction to research methods and design in Kinesiology research. Content of the class includes basic principals of both quantitative and qualitative research methods. Emphasis will be placed on developing skills necessary for an effective research proposal.
Prerequisite(s): Undergraduate course in statistics.

KIN 808.3 — 2(3L)
Data Analysis in Kinesiology

Intended to provide students with a review of quantitative data analysis. Content of the class will include the basic theory behind quantitative analysis, illustrated with hands on practical examples using available computer software. Emphasis will be placed on acquiring the knowledge to be able to apply and understand the statistical techniques using SPSS.
Prerequisite(s): Undergraduate course in statistics.

KIN 809.3 — 1/2(3S)
Health Aspects of Physical Activity and Physical Fitness

Involves a comprehensive investigation of the health implications of physical activity and exercise. Topics will include health aspects of exercise as related to current knowledge, gaps in knowledge and research needs.

KIN 810.3 — 1/2(3L)
Psychology of Sport

Focuses on the contemporary issues of sport psychology emphasizing: presentation of the major issues in sport psychology and presentation of knowledge of both the methods and experimental foundation of sport psychology. Issues to be covered include an overview of sport psychology, competition, competitive anxiety, management of anxiety, motivation, imagery and personality as well as other contemporary concerns as they relate to sport.
Prerequisite(s): KIN 231 or equivalent.

KIN 811.3 — 2(3S)
Seminar in Adapted Physical Activity

The purpose of this seminar is to examine adapted physical activity from a socio-psychological perspective. Students will increase their understanding of the assumptions, constraints, and affordances that influence research in the area of disability and physical well being and health.

KIN 830.3 — 1/2(3L)
Psychosocial Aspects of Health and Exercise Behaviour

Focuses on the psychosocial aspects of health and exercise behavior. An in-depth study and application of theoretical research to practical field settings is a central theme.

KIN 860.3 — 1/2(3L)
Research in Physical Education Quantitative and Qualitative

Provides the student with a comprehensive understanding of the findings and implications of research on teaching and instruction in physical education. This course will engage the student in a critical analysis of pedagogical research.
Prerequisite(s): ERES 800 or equivalent.
Note: Intended for students in the M.Ed. in physical education pedagogy program. M.Sc. program students will not receive credit for this course.

KIN 861.3 — 1/2(3L)
Contemporary Issues in Physical Education

Required by students enrolled in the joint M.Ed. program in Physical Education Pedagogy. The purpose of this course is to familiarize the student with the major issues facing the instruction of school-based physical education programs. The intent will be to encourage participants to take a stand on major issues and to support their positions.

KIN 898.3 — 1/2(3R/P)
Special Topics

Studies in selected areas of physical education may be undertaken by advanced students with the consent of the College Graduate Committee. This work consists of essay writing, special readings and reports on assigned topics relating to a common subject or upon a series of laboratory studies.

KIN 899.6
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

KIN 990
Seminar

Review of related scientific studies. Graduate students are required to attend and present papers during their period of candidacy.

KIN 994
Research

Students writing a Master's thesis must register for this course.

KIN 996
Research

Students writing a Ph.D. thesis must register for this course.

LAW — LAW

Department of Law, College of Graduate Studies and Research

LAW 801.3 — 1&2(3S)
Native Rights I

A range of areas relating to the legal status and rights of native people both in Canada and also in such other countries as the United States, New Zealand and Australia. Includes aboriginal land rights, treaty rights, hunting and fishing rights, the Indian Act, constitutional structures, human rights, affirmative action, the impact of the criminal law, taxation and commercial law. Assessment will be based primarily upon a series of written assignments submitted by the student, approximately 6-8 tutorial papers.

LAW 802.3 — 1/2(3S)
Native Rights II

Covers specific topics in areas relating to the legal status and rights of native people not covered in LAW 801. Assessment will be based primarily upon written assignments submitted by the student, approximately 2-4 tutorial papers.

LAW 810.3 — 1/2(3S)
Jurisprudence

Current debates within the Western idea of law will be at the core of the literature canvassed in this seminar. The selected topics addressed will not be restricted to legal theory, but may extend to writers in the fields of political and moral philosophy.

LAW 815.3 — 1(3L)
Environmental Law

Surveys the actual and potential role of law in protecting the integrity of the environment from threats posed by exploitation of resources, rapid development and population growth.
Note: Students may not receive credit for both LAW 444 and 815.

LAW 816.3 — 1&2(3S)

International Sales and Finance Law

Addresses a variety of issues pertinent to such inter-jurisdictional transactions of sale. Techniques for the financing of sales will be examined including factoring, forfeiting and leasing. Methods of payment such as letters of credit and international electronic payment systems will be considered. Domestic and international arbitration legislation and procedures will be examined.
Note: A student may not receive credit for this course and the corresponding undergraduate level course.

LAW 819.3 — 1&2(3S)
Indigenous Peoples in International and Comparative Law

The question of legal rights of indigenous peoples has emerged in a number of states during the last half of the twentieth century, and has influenced developments in the work of the United Nations, the Organization of American States, their constituent organizations, and of inter-governmental and non-governmental organizations. Explores these international and comparative developments, with a focus on Constitutional, legal and policy developments in selected states.
Note: A student may not receive credit for this course and the corresponding undergraduate level course.

LAW 822.3 — 1&2(3S)
International Law

The legal principles governing the conduct of states and other subjects of international law will be examined. Topics studied will include the creation and ascertainment of international law, application of international law in domestic and international tribunals, sovereign immunity, diplomatic relations, law of armed conflict, international protection of human rights and international environmental protection.
Note: A student may not receive credit for this course and the corresponding undergraduate level course.

LAW 823.3 — 1&2(3S)
Human Rights Seminar

Students will gain an understanding of contemporary debates about universalism and of the meaning of human rights in Canada with attention to political theory and international underpinnings. The concept of discrimination and the constitutional position of human rights and fundamental freedoms in Canada. Detailed analysis of the concept of equality as it is embedded in domestic anti-discrimination law and enshrined in section 15 of the Charter.

Note: A student may not receive credit for this course and the corresponding undergraduate level course.

LAW 824.3 — 1&2(3S)
Sentencing in Criminal Justice System

Selected topics relevant to sentencing in the criminal justice system combining theory, doctrine and practice. Theoretical aims of punishment and their translation into current legal doctrine and practice will be discussed, with particular emphasis on the Canadian and Saskatchewan context. **Note:** A student may not receive credit for this course and the corresponding undergraduate level course.

LAW 825.3 — 1&2(3S)
Criminal Procedure

Jurisdiction, including classification of offences, time limitations, jurisdiction under the Charter; pre-trial procedure and practices, including search and seizure, arrest and detention, right to counsel; judicial interim release (bail); the preliminary inquiry and the process of discovery; the charging process, including stays and withdrawals; pleas; trials; trial by jury.

Note: A student may not receive credit for this course and the corresponding undergraduate level course.

LAW 828.3 — 1&2(3S)
Graduate Jurisprudence Seminar

This mandatory seminar investigates, across time and space, manifestations of, and alternative answers to, theoretical questions of law such as the nature of law and judicial reasoning, tensions between natural law and positivism, law and morality, law and politics, law and justice, law and order, and law and the economy.

LAW 829.3 — 1&2(3S)
Secured Transactions and Negotiable Instruments

At a graduate student level, the basic features of secured transactions law and negotiable instruments law are examined. Students are given the opportunity to examine, principally in the context of consumer-level credit transactions, the basic concepts and practical application of The Personal Property Security Act. In addition, peripheral statutory measures affecting secured transactions such as The Limitation of Civil Rights Act, The Saskatchewan Farm Security Act and The Exemptions Act are examined. In the second part of the course, the concept of negotiability is examined in the context of the provisions of the Bills of Exchange Act. The practical application of negotiable instruments law are addressed in the context of the banking system. A student

may not receive credit for this course and the corresponding and undergraduate level course.

LAW 830.3 — 1&2(3S)
Alternative Dispute Resolution

Students conduct an examination of the forms and functions of major disputing processes - negotiation, mediation, and adjudication. These are the processes which are critical to lawyers and other persons concerned with preventing or resolving disputes. Alternate methods of dispute resolution (ADR) will be studied from theoretical, critical and practical perspectives. Emphasis will be placed on the role of the lawyer in ADR processes.

LAW 831.3 — 1&2(3S)
Mediation Processes

Explores the mediation process from both a theoretical and a practical skill-based point of view. In addition to examining the stages of mediation and the role of the mediator, the seminar will deal with the use of mediation in different settings, such as family, labour, commercial and criminal law. Critical issues such as the impact of power imbalances, culture and gender will be discussed. Through the use of simulations, students experience the mediation process as lawyers, clients and mediators. Students receive a clinical placement.

LAW 832.3 — 1&2(3S)
International Trade Law

A study of the important law aspects of major international trade agreements will be examined. International economic integration arrangements, and international business transactions. The following topics will be examined: The World Trade Organization Agreement (WTOA), the North American Free Trade Agreement (NAFTA), Canadian trade law and some aspects of international private trade law. **Note:** A student may not receive credit for this course and the corresponding undergraduate level course.

LAW 839.3 — 2(3L)
Canadian Legal History

Introduces students to fundamental developments in Canadian legal history and uses a historical perspective to enhance understanding of Canadian legal heritage: English, European and American influences; the interplay of colonialism and the role of Aboriginal peoples; the legacy of civil, common and customary law.

LAW 898.3 — 1/2(3S)
Special Topics

Individualized research projects may be undertaken with the supervision of faculty members often in conjunction with courses offered in the College of Law. Topics are

chosen in consultation with faculty advisors to complement areas of thesis research. Assessment will be based primarily upon a series of written assignments prepared by the student over the term. Topics chosen may be selected from the following areas: Aboriginal Law, Commercial Law, Constitutional Law, Criminal Law, Agricultural Law or Human Rights, subject to faculty availability.

LAW 899.6 — 1&2(3S)
Special Topics

Individualized research projects may be undertaken with the supervision of faculty members often in conjunction with courses offered in the College of Law. Topics are chosen in consultation with faculty advisors to complement areas of thesis research. Assessment will be based primarily upon a series of written assignments prepared by the student over the term. Topics chosen may be selected from the following areas: Aboriginal Law, Commercial Law, Constitutional Law, Criminal Law, Agricultural Law or Human Rights, subject to faculty availability.

LAW 990
Seminar

Presentations regarding current research will be made by visiting faculty, faculty and graduate students. All graduate students in residence must make a presentation at least once each year. The seminar may also seek to provide for review of current literature and developments.

Note: All graduate students are required to attend, and to participate in the course to the satisfaction of the Law Graduate Studies Committee. This is a non-credit course.

LAW 994
Research

Completion of original research and writing of an LL.M. thesis.

LING —
LINGUISTICS

Department of Languages & Linguistics,
College of Graduate Studies and Research

LING 898.3
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

LING 899.6
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

LING 994
Research

Students writing a Master's thesis must register for this course.

MATH —
MATHEMATICS

Department of Mathematics & Statistics,
College of Graduate Studies and Research

MATH 814.6 — 1&2(3L)
Numerical Solution of Ordinary and Partial Differential Equations

Ordinary Differential Equations: One-Step methods for initial-value problems, multi-step methods, boundary-value problems; discussion of discretization error and propagation of errors, convergence, and stability. Partial Differential Equations: Some finite-difference schemes for hyperbolic, parabolic and elliptic partial differential equations, their stability and convergence; applications. **Prerequisite(s):** MATH 314 and 338; knowledge of a programming language.

MATH 818.3 — 1/2/1&2(3L)
Special Topics in Applied Mathematics

The topics to be discussed will be related to recent developments in applied mathematics (numerical analysis, differential equations, mechanics, applied analysis, etc.) of interest to the instructor and students.

Prerequisite(s): A graduate course in applied mathematics, or permission of the department.

MATH 830.6 — 1/2(3L)
Applied Functional Analysis

Cauchy sequences, uniform convergence (e - d); Hilbert spaces; distributions and Sobolev spaces; boundary - value problems in (partial) differential equations; variational methods; weak solutions; Lax - Milgram lemma; finite element method. **Prerequisite(s):** A course in linear algebra and an intermediate level calculus course.

MATH 832.3 — 1/2(3S)
Mathematical Foundations of Classical Mechanics

Symplectic geometry, canonical transformations, Poisson structures, Lagrangian systems, Legendre transformations, Hamiltonian systems, non-relativistic and relativistic mechanical systems.

Prerequisite(s): MATH 350 or permission of the department.

MATH 833.3 — 1/2(3L)
Mathematical Foundations of Quantum Theory

Linear operators in Hilbert space, spectral theorem for self-adjoint operators, axioms of non-relativistic quantum mechanics, measurements, Schrodinger and Heisenberg pictures, commutation relations.

Prerequisite(s): MATH 373 or permission of the department.

MATH 834.3 — 1/2(3L)
Mathematical Foundations of Relativity

Space-time as a differentiable manifold, Minkowski space equations of general relativity, Cauchy problem, cosmological models.

Prerequisite(s) or Corequisite(s): MATH 350; or corequisite MATH 852; or permission of the instructor.

MATH 835.3 — 1/2(3L)
Non Linear Analysis

Non-linear P.D.E. including: Einstein's equations, Yang-Mills equations, non-linear wave and Schrodinger equations, Korteweg-de Vries equation. Also examines infinite dimensional Hamiltonian systems, classical field theories, conservation laws, symmetry groups. Inverse scattering method, Backlund transformations.

Prerequisite(s): MATH 852 and a course in Functional Analysis, or permission of the department.

MATH 837.6 — 1&2(3L)
Differential and Integral Equations

Existence and uniqueness theory, self-adjoint and non-self-adjoint boundary-value problems, Poincare-Bendixson theory, integral equations of the Fredholm Type, singular integral equations, solutions of differential equations in a Banach space.

Prerequisite(s): MATH 366 and 371.

MATH 838.6 — 1&2(3L)
Theory of Partial Differential Equations

The Cauchy problem, Dirichlet and Neumann problems, existence and uniqueness.

Prerequisite(s): MATH 439.

MATH 851.6 — 1/2(3L)
Differential Geometry

Differentiable manifolds (over \mathbb{R} & \mathbb{C}), tensor fields, differential forms, and Lie groups. Stoke's theorem, Poincare and

Dolbeault lemmas. Sheaf cohomology theory and the De Rham theorem. Vector bundles, connections and Chern classes, and Grassmannians. Dolbeault cohomology, Elliptic operator theory and the Hodge theorem. Poincare and Serre duality.

Prerequisite(s): MATH 350 or permission of the department.

MATH 852.3 — 1/2(3L)
Differential and Riemannian Geometry I

Manifolds, tensor fields, integral curves and flows, Lie derivative, exterior calculus, Frobenius Theorem, vector and principal bundles, connections, curvature, Cartan equations, holonomy, Riemannian and pseudo-Riemannian geometry, equivalence problem.

Prerequisite(s): MATH 350.

MATH 860.6 — 1&2(3L)
Algebraic Number Theory

Valuations, p-adic numbers, quadratic forms, the Hasse-Minkowski theorem, modules, orders, Dirichlet's unit theorem, divisor theory for algebraic number fields.

MATH 862.3 — 1/2(3L)
Algebra I

Rings, modules, ideals, factorization, field theory, Galois theory.

Prerequisite(s): MATH 360.

MATH 863.3 — 1/2(3L)
Algebra II

Commutative algebra, multilinear algebra, non-commutative algebra.

Prerequisite(s): MATH 862.

MATH 871.3 — 1/2(3L)
Abstract Analysis

Basic Measure and Integration Theory. Regular Borel Measure. The Radon-Nikodym Theorem, Product Measure and Fubini's Theorem. Fourier Analysis on \mathbb{R}^n .

Prerequisite(s): MATH 373.

MATH 872.0 — 1/2/1&2(3L)
Special Topics in Pure Mathematics

The topics to be discussed will be related to recent developments in an area of pure mathematics (analysis, topology, algebra, etc.) of interest to the students and instructor.

MATH 875.3 — 1/2(3L)

Functional Analysis

Introduces functional analysis with an emphasis on Banach and Hilbert spaces. The main results of Hahn-Banach, Krein-Milman and Banach-Steinhaus are developed and used to study concrete spaces, operators, the projection lattice and the ideal of compact operators on Hilbert space.

MATH 876.3 — 1/2(3L)
Banach Algebras and Spectral Theory

The necessary theory of Banach Algebras and the functional calculus are developed for the spectral theorem for bounded self-adjoint operators on Hilbert space. Various applications and extensions presented.

Prerequisite(s): MATH 875 or equivalent.

MATH 879.3 — 1/2(3L)
Complex Analysis

After a review of basic properties of analytic functions the course will cover such topics as: Analytic Continuation, Riemann Mapping Theorem, Mittag-Leffler's Theorem, Runge's Theorem, Picard's Theorem, etc.

Prerequisite(s): MATH 379.

MATH 881.6 — 1&2(3L)
General Topology

MATH 882.3 — 1/2(3L)
Algebraic Topology I

Two-dimensional Manifolds, the Fundamental Group including the Seifert-Van Kampen Theorem, Applications to Knot Theory and Group Theory.

Prerequisite(s): MATH 485.

MATH 883.3 — 1/2(3L)
Algebraic Topology II

Covering spaces, Triangulations, Simplicial Homology, Degree and Lefschetz Number, Knots and Covering Spaces.

Prerequisite(s): MATH 882.

MATH 898.3
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

MATH 899.6
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

MATH 990
Seminar

All graduate students in the department enroll each year. Students attend the regular department colloquia. After the first year in their program, they are expected to join the regular seminar series in their area of specialization.

MATH 992.6
Project

Students undertaking the project Master's degree (M.Math.) must register for this course.

MATH 994
Research

Students writing a Master's thesis must register for this course.

MATH 996
Research

Students writing a Ph.D. thesis must register for this course.

MBA — MASTER
BUSINESS
ADMINISTRATION

Department of Management & Marketing, College of Graduate Studies and Research

MBA 801.12 — 2(3L)
Foundations of Management

Foundations of Management considers environmental and organizational factors, planning tools, approaches and other issues managers consider as they set the direction of their organizations. It is a twelve week intensive course. Students meet daily for 4.5 hours. Labs as needed, times vary.

Prerequisite(s): Admission to the MBA program.

MBA 809.3 — 2(3L)
Research Methods

Students examine the principles and procedures associated with the collection and the analysis of relevant information in the context of current research in business administration. Students have the opportunity to apply these principles at each stage of the research process: problem definition, research design, data collection, data analysis and report preparation.

Prerequisite(s): MBA 801.

MBA 815.3 — 1/2(3L)
Management of Contemporary Aboriginal Organizations

Examines Aboriginal culture in order to assist the student in understanding the different values and world views that survive in Aboriginal communities and their relevance to the resolution of contemporary organizational and management problems. Similarities, differences, and ethical considerations in Aboriginal management will be compared with corporate management and mainstream organizations. The course will touch on research issues, and explore the way in which post-modern and post-colonial ideas and methods may lend to a deeper and more localized understanding of Aboriginal organizations.

Prerequisite(s): MBA 801. Non MBA students with appropriate background admitted by permission of instructor.

MBA 816.3 — 1/2(3L)
Contemporary Issues in Aboriginal Economic and Business Development

This seminar and case based course provides the student with the opportunity to learn about current and topical contemporary Aboriginal Issues in Aboriginal Economic and Business Development in Canada. It will clarify how an understanding of these national issues can assist the manager in the Aboriginal environment to make more informed decisions at local and regional levels. The course will start with a review of the major issues touched upon in the previous three specialization courses, and then frame a number of current issues for critical review. The participant will be introduced to timely readings, case scenarios, and guest presentations.

Prerequisite(s): MBA 801. Non-MBA students with appropriate background admitted by permission of instructor.

MBA 817.3 — 1/2(3L)
Indigenous Economic Development

Surveys a number of different approaches and issues in economic development utilized by the Indigenous peoples of Canada. The course examines in particular the management issues arising from various strategies, approaches, and institutions created, adapted, and utilized in this effort.

Prerequisite(s): MBA 801. Non MBA students with appropriate background admitted by permission of instructor.

MBA 818.3 — 1/2(3L)
Treaty Self Government Land Claims and Implications for Management Decision Making

Students examine the historical and external environment factors that impact on

social, cultural, political, and economic development in Aboriginal communities, particularly business initiatives undertaken by economic development corporations, government agencies, research and planning groups, Aboriginal organizations, and individual entrepreneurs. An assessment of how community and economic development and self-governing arrangements affect issues such as education, health, and justice is undertaken.

Prerequisite(s): MBA 801. Non MBA students with appropriate background admitted by permission of instructor.

MBA 820.3
New Era in Agribusiness Management

Designed to provide an in depth look at the trends and challenges facing agribusiness managers today. The course will provide agribusiness managers with the concepts and tools required to build a sustainable competitive advantage in an ever-changing economic environment. These concepts and tools are necessary for agribusiness managers to lead their human and capital resources for profit and success.

Prerequisite(s): MBA 801. Non MBA students with appropriate background admitted by permission of instructor.

MBA 821.3
Strategic Agribusiness Planning

Designed to provide students with concepts and tools to successfully develop and manage all components of the strategic business plan. Students will be required to assess business plans, discuss approaches to maximizing the effectiveness of the business plan as a management tool, and develop an actual business plan as a course project.

Prerequisite(s): MBA 801. Non MBA students with appropriate background admitted by permission of instructor.

MBA 822.3
Strategic Agribusiness Management

Designed to provide students with concepts and tools to enhance a manager's abilities to implement and control strategic decisions within the agribusiness firm. All components of the agribusiness strategic plan will be operationalized in a hands-on agribusiness simulation in a competitive environment. Students will be learning analytical processes, applying quantitative and technical tools, and applying strategic management concepts in an integrated agribusiness setting.

Prerequisite(s): MBA 801. Non MBA students with appropriate background admitted by permission of instructor.

MBA 823.3
Biotechnology Management

Assists students to develop a framework for understanding and analysing the influence of external dimensions - such as government policy - upon the research, development and commercialization of biotechnology based products.

Prerequisite(s): MBA 801. Non-MBA students with appropriate background admitted by permission of instructor.

MBA 824.3
Biotechnology Commercialization

Provides a practice oriented bridge between the laboratory and world of commerce. It examines the theory and practices of launching new business ventures in the biotechnology industry through the research, development, preparation and presentation of a Business Plan. Practising biotechnology managers, entrepreneurs and special advisors will describe their activities and experiences in a series of seminars.

Prerequisite(s): MBA 801. Non-MBA students with appropriate background admitted by permission of instructor.

MBA 828.3 — 1(3S)
Business Policy and Strategy

Attempts to develop an understanding of the processes of policy formulation and implementation in the environmental setting in which they are made; to demonstrate the relevance of certain approaches and tools to the analysis and solution of business policy problems in real life situations; and to deal with the total organization and integrate various functional areas in making business policy decisions.

Prerequisite(s): MBA 801, 3 specialization electives.

MBA 832.3
Management Information Systems

Concerned with problems in the implementation of modern computer based management information systems. It provides an overview of the principal types of software support and concentrates on managerial problems in the selection and control of projects, and policy issues in the selection of a systems philosophy for the organization.

Prerequisite(s): MBA 801.

MBA 843.3 — 1/2(3S)
Leadership

The role of a manager requires organizing, controlling, planning, and motivating others to perform the work of the

organization. However, the manager is also a person with needs and career aspirations as well as responsibilities to a boss and subordinates. From the manager's point of view, how does one survive the experience? Topics include leadership, evaluation, career issues, problem solving, stress and coping.

Prerequisite(s): MBA 801. Non-MBA students with appropriate background admitted by permission of instructor.

MBA 845.3
International Markets

Examines the dynamics of global international economic transformations and considers the types of markets, opportunities and challenges that arise as a result. The course will be integrated across business functional areas. The pedagogy involves a mixture of lectures, workshops, case studies, and experiential learning activities. From time to time, special guest speakers with international business experiences will be invited to give in-class talks to the students.

Prerequisite(s): MBA 801. Non MBA students with appropriate background admitted by permission of instructor.

MBA 847.3 — 1/2(3L)
International Business Environment

Examines legal and policy issues raised by doing business internationally, as well as unique challenges in dealing with international financial markets and international accounting. The course will be integrated across business functional areas. The pedagogy involves a mixture of lectures, workshops, case studies, and experiential learning activities. From time to time, special guest speakers with international business experiences will be invited to give in class talks to the students.

Prerequisite(s): MBA 801. Non MBA students with appropriate background admitted by permission of instructor.

MBA 848.3 — 1/2(3S)
Management of International Business

Management of International Business examines unique strategic and human resource issues that arise as a result of doing business in an international context. The course will be integrated across business functional areas. The pedagogy involves a mixture of lectures, workshops, case studies, and experiential learning activities. From time to time, special guest speakers with international business experiences will be invited to give in-class talks to the students.

Prerequisite(s): MBA 801. Non MBA students with appropriate background admitted by permission of instructor.

MBA 849.3**International Internship Planning**

Designed to provide specific knowledge about particular countries that will be the focus of the student's international experience, including a study of the business culture, competitive opportunities, challenges in analyzing and setting the directions for successful business operation in these markets, and skills for doing research in foreign environments.

Prerequisite(s): MBA 801.

MBA 852.3**Canada's Health Care Systems**

Introduces students to the administrative and financial structures of health care services in Canada and to the role expectations of different interest groups and stakeholders involved in the delivery of health services. Examines the organizational structure and operations of health care delivery systems and agencies. Explores the operations of community health centers, hospitals, rehabilitation facilities, long term care institutions, home health care services and various other public health services.

Prerequisite(s): MBA 801. Non MBA students with appropriate background admitted by permission of instructor.

MBA 853.3**Seminar in Health Care Organizational Regulation and Policy**

Explores management issues unique to health care organizations. It includes an examination of the regulation of health care organizations. Also covered are such topics as cost benefit/cost-effectiveness/cost-efficiency analysis, managerial accounting as it relates to the health care environment, health care finance and the management of case mix systems.

Prerequisite(s): MBA 801. Non MBA students with appropriate background admitted by permission of instructor.

MBA 864.3**Health Care Ethics and Law**

Divided into three major sections. Section 1 explores the theory of ethics and places ethical issues and problem solving in a practical context, and focuses the law portion on issues pertaining to health care management. Section 2 provides a brief overview of the Canadian legal system. Section 3 covers such legal concerns of patients and health care providers as negligence, informed consent, and the regulation of health professions.

Prerequisite(s): MBA 801. Non MBA students with appropriate background admitted by permission of instructor.

MBA 867.3**Health Policy and Politics**

Deals with program and service planning for health care at the institutional, community, regional and provincial, national and international levels. The course takes a macro approach to broad health policy and planning goals and follows these policies through to the level of institutional implementation. Policy analysis is an important component and much class time is spent analysing real life policy documents.

Prerequisite(s): MBA 801. Non-MBA students with appropriate background admitted by permission of instructor.

MBA 992.6**Project in Business Research Methodology**

Provides students with an opportunity to develop research skills through completion of a major project. The topic must be empirical in nature, and can be an area of interest to the individual student within the context of their specialization.

Prerequisite(s): Successful completion of MBA 801, 809, 3 specialization electives.

ME — MECHANICAL ENGINEERING

Department of Mechanical Engineering, College of Graduate Studies and Research

ME 840.3 — 1/2(3L)**Theory of Inelastic Behaviour**

Foundation of plasticity theory. Plastic hardening. Applications involving plastic and elasto-plastic materials under various load/deformation conditions. Numerical techniques of solution.

ME 841.3 — 1/2(3L)**Inelastic Behaviour of Materials**

Extremum principles and energy methods of solutions of elasticplastic deformation. Theorems of limit analysis by energy methods. Applications in metal forming processes. Finite deformation theory. Applications of viscoelastic models and their associated constitutive equations.

ME 843.3 — 1/2(3L-2P)**Materials Characterization Techniques**

An overview of both the established and new materials characterization techniques, including mechanical characterization (hardness measurements, tensile test), electrical characterization techniques (electrical resistivity), x-ray diffraction, thermal analysis (e.g. DTA, DSC, TGA, TMA, DMA), optical microscopy, electron microscopy (e.g. SEM, TEM, EDS, WDS), and surface analysis.

Prerequisite(s): Graduate standing or permission of Department Head.

ME 845.3 — 1/2(2L-1P-.5S)**Mechanics of Time Dependent Materials**

Basic methods of structural analysis for creep and viscoelastic behaviours. Mathematical Models of transient and steady creep for metals at elevated temperatures. Stress relaxation. Creep rupture. Numerical Solution of creep problems. Linear and Nonlinear Viscoelastic Theories for Polymers and Synthetic Materials. Heredity. Modified Superposition Principles and Thermodynamics Viscoelastic Theories. Numerical Methods for Nonlinear Viscoelastic Materials.

Prerequisite(s): ME 323, 324 and 450.

ME 854.3 — 1/2(3L)**Mechanical Vibrations**

Topics covered include the study of the fundamental single-degree-of-freedom systems and the complex multiple-degree-of-freedom systems using Newton's law of motion, the energy method. Rayleigh's method, Lagrange's equations, the mechanical impedance method, influence coefficients, and matrix methods. Special topics include the study of transient vibration of continuous media. Solutions to the various differential equations encountered are presented.

Prerequisite(s): ME 321 or equivalent.

ME 855.3 — 1/2(2L-1P-.5S)**Optimization in Structural Design**

Optimization theory and its applications to Structural Design. Basic concepts and terminology of the nonlinear constrained optimization problems. Numerical algorithms based on mathematical programming techniques and methods using optimality criteria. Structural optimization systems making use of the Finite Element Method Techniques are discussed and used to solve some practical problems.

Prerequisite(s): ME 323 and 450.

ME 856.3 — 1/2(3L)**Weighted Residual Methods in Mechanical Engineering**

Review of general weighted residual methods. Development of finite element, boundary element and mixed techniques, for approximate solutions of field problems of interest to mechanical engineers. Time dependent and steady state solutions will be demonstrated with problems drawn from solid mechanics, fluid flow and heat transfer.

Prerequisite(s): ME 450.

ME 857.3 — 1/2(3L)**Topics in Finite Elasticity**

A review of tensor analysis, general theory of elasticity or finite deformations, constitutive equations, special problems with exact solutions, developments of plate and shell theories, solution by classical and weighted residual methods.

Prerequisite(s): CE 802 or permission of the instructor.

ME 858.3 — 1/2(2L-1P-.5S)**Mechanics of Thin Walled Structures**

Warping, stability, imperfection sensitivity and other problems specific for thin-walled beams, plates, membranes and shells are discussed. The emphasis is on the physical interpretations of the governing equations (mostly nonlinear) and on the numerical solution methods. Behaviour of thin-walled pressure vessels, containers, pipes, element of aircrafts and space stations, etc., may be analyzed as the practicum.

Prerequisite(s): ME 323 and 450.

ME 860.3 — 1/2(3L)**Fluid Power Control**

Advanced analysis of hydraulic and electrohydraulic systems including; transient behaviour of fluid circuits and transmission lines, control components and actuators; investigation and design of closed loop systems; application of Bond graphs.

Prerequisite(s): ME 431 and 335.

ME 861.3 — 1/2(3L)**Numerical Control**

An introduction to feedback control systems operating on discrete rather than continuous data. Topics include: digital transducers, incremental and absolute modes of control, analog to digital conversion techniques, synthesis of combinational, sequential, comparator and interpolation circuits, transient response of digital systems, stability and compensation, introduction to sampled-data control systems.

Prerequisite(s): ME 431.

ME 862.3 — 1/2(3L)**Analysis and Synthesis of Linear Control Systems**

Extension of linear feedback control principles emphasizing transfer functions and frequency response. Stability - Routh, Hurwitz, root locus, Nyquist. Bode plots.

Compensation - series and minor loop equalization. Parameter plane analysis.
Prerequisite(s): ME 431 or permission of the instructor.

ME 863.3 — 1/2(3L)
Advanced Topics in Linear Control Systems

State-space approach; concepts in linear continuous and discrete systems; controllability, observability, and minimal realizations. Multivariable systems. Advanced methods of stability analysis. Introduction to optimal control systems.
Prerequisite(s): ME 862.

ME 864.3 — 1/2(3L-3P)
Random Processes and Signal Processing

Mathematical description of random process, Pseudo-random signals; response characteristics of physical systems; mathematical theory analyzing random data; analog and digital measurement techniques; analysis of non-stationary data; estimation theory, Kalman-Bucy filtering theory; special techniques and applications.
Prerequisite(s): Permission of the instructor.

ME 865.3 — 1/2(3L)
Nonlinear Systems

Definition and classification of nonlinearities; analysis of non-linear systems emphasizing perturbation, piece-wise linearization, phase-plane trajectories and first harmonic approximation; singularities; periodic solutions and limit cycles; stability; frequency response.
Prerequisite(s): MATH 338 or equivalent.

ME 867.3 — 1/2(3L)
Applied Stochastic Optimization and Control

Calculus of extreme and single stage decision process; variational calculus and continuous optimal control; discrete maximum principle; optimum control of disturbed parameter systems; optimum state estimation in stationary and nonstationary processes; dynamic sensitivity in optimum systems; computational methods in optimum systems control; invariant imbedding; state incremental dynamic programming.

ME 869.3 — 1/2(3L-3P)
Adaptive Control Systems

Concept of adaptive control emphasizing dynamic response characteristics; types of adaptivity and the performance criterion in both linear and nonlinear control systems;

dynamics of the parameter-perturbation processes, static and dynamic considerations; methods of process identification including correlation, series expansions, Laguerre and orthonormal functions; realization of adaptive control systems through the automatic adjustment of system parameters including an introduction to computer-controlled systems.

Prerequisite(s): ME 862 and 864.

ME 870.3 — 1/2(3L)
Solar Energy Conversion

A senior engineering course in heat transfer. Presents methods of predicting solar radiation as well as sources of solar radiation data. Solar energy conversion device characteristics are analyzed; these include water ponds, solar collectors; solar cells, windows and other absorbers. Solar energy conversion systems are simulated.

ME 871.3 — 1(3L)
Experimental Fluid Mechanics

The fundamentals of experiment planning including parametric design of experiments and experimental trajectories are introduced. Experimental techniques for pressure, temperature, and flowrate measurement are discussed. Particle Image Velocimetry, Laser Doppler Velocimetry, Phase Doppler Particle Analysis, and Hotwire Anemometry are treated in detail. Finally, the application of uncertainty analysis to experimental techniques in the thermal sciences is considered.
Prerequisite(s): ME 335 or equivalent.

ME 872.3 — 1/2(3L)
Fundamentals of Fluid Dynamics

Development and study of the fundamental principles of fluid dynamics as applied to a continuum. Development of the constitutive equations of fluids. Analysis of incompressible inviscid and viscous flows including vortex motion, fluid jets, and flow over bodies. Student interests may determine some problem examples.

ME 873.3 — (3L)
Advanced Topics in Fluid Dynamics

Represents a further study of viscous, incompressible flow (specifically turbulent flows). Hydrodynamic stability and the transition to turbulent flow are first considered, followed by a study of fully developed turbulence. Of specific interest is the development of turbulence models for prediction methods. Various topics in advanced theoretical fluid mechanics are also covered, especially the application of special analytical techniques.

ME 874.3 — 1/2(3L)
Heat Transfer

The three modes of heat transfer are treated in this advanced course; a) conduction - two and three dimensional heat conduction with time dependent boundary conditions and distributed heat sources; composite and anisotropic media; analytical and numerical methods; b) convection - differential and integral equations of the boundary layer, momentum and heat transfer in laminar and turbulent internal and external flows, forced and free convection; numerical methods; c) radiation - radiative exchange among various surfaces including; blackbody; gray-diffuse, real materials and specular; numerical methods.

ME 875.3 — 1/2(3L)
Heating Ventilating Air Conditioning

Advanced topics on: human comfort and health, indoor air quality, and psychrometry, air infiltration in buildings, cooling and heating loads for buildings; air distribution and heat recovery systems; simulation of building characteristics and systems under various weather conditions including heating and cooling equipment and natural daylighting; optimization of the thermal design and HVAC systems for buildings.

ME 876.3 — 1/2(3L)
Multiphase Flow and Heat Transfer

The fundamental concepts of the flow of multiphase mixtures, momentum and energy equations for two-phase systems, convective boiling and condensation heat transfer processes, elementary thermodynamics of vapour/liquid systems.
Prerequisite(s): ME 417.

ME 877.3 — 1/2(3L)
Thermodynamics

The kinetic theory of gases is developed to illustrate the molecular description of classical quantities such as temperature, pressure and work. Transport properties such as viscosity, thermal conductivity and mass diffusivity are investigated using kinetic theory. Statistical approaches based on classical and quantum mechanics are used to describe the microscopic behaviour of substances. The microscopic interpretation of entropy is discussed. The link between microscopic behaviour and macroscopic thermodynamic properties is investigated.

Prerequisite(s): ME 417 or equivalent.

ME 878.3 — 1/2(3L)
Compressible Fluid Dynamics

Acoustical waves; one-dimensional, isentropic flow and normal shocks are reviewed. Internal flows including the effects of area variation, friction and heat transfer are studied. External flows are then considered including oblique shocks and the method of characteristics.

ME 879.3 — 1/2(3L)
Numerical Fluid Dynamics and Heat Transfer

An introduction to numerical methods for solving the transport equations for flow of a viscous, incompressible fluid, including convective heat transfer. A control volume based finite difference method will be adopted. Students will have the opportunity to develop their own working codes for specific two-dimensional problems.
Prerequisite(s): ME 872.

ME 880.3 — 1/2(3L)
Heat and Mass Transfer in Porous Media

The principles of heat and mass transfer in porous media for single or two-phase flows: conduction, convection and radiation, macroscopic and microscopic flow models, thermodynamics of capillary systems, transport from porous surface interface, local volume averaging methodology, simultaneous heat and mass transfer and flow with phase change (e.g. drying theory). Finite difference numerical models and boundary conditions are developed for the above phenomena and applied to typical physical problems.
Prerequisite(s): Undergraduate courses in thermodynamics, heat transfer and fluid mechanics and at least one graduate course in heat transfer of fluid mechanics; or permission of the instructor.

ME 881.3 — 1/2(3L)
Selected Topics in Materials

Topics include: crystallography; theory of dislocations; experimental techniques in metallurgy; theory of diffusion; macroscopic and microscopic aspects of fracture.
Prerequisite(s): ME 474.

ME 885.3 — 1/2(3L)
Neural Networks Theory and Application

Biological basis of neural networks; static and dynamic neural structures; multilayered feedforward neural networks; radial basis function networks; dynamic neural networks; fuzzy neural networks; and identification, control, vision, and pattern recognition using neural networks.
Prerequisite(s): A basic understanding of signals and dynamic systems.

ME 886.3 — 1(3L-9P)
Advanced Engineering Design Methodology

The selected effective design methodologies such as Axiom design, design for manufacturing, modular design and robust design and design for control are discussed. The emphasis is placed on the general idea of these methodologies. Computer implementations of these methodologies are discussed. Applications of these methodologies to some typical engineering problems are also discussed.

ME 887.3 — 2(3L)
Introduction to Microsystems

Fundamental concepts of Microsystems and Microelectromechanical devices (MEMS) will be discussed. Materials and fabricating technologies for MEMS are outlined; this will include use of the LIGA technique and Synchrotron X-ray. Modeling of MEMS will be discussed which include mechanics, thermal fluid, and micromechanics. MEMS packing issues will be discussed. Several case studies will be provided for better understanding.

ME 898.3 — 1/2(3L/R/P)
Special Topics

Consists of assigned reading, lectures by faculty members, discussion periods, and laboratory exercises with reports. Depending on the interests of the student and the supervisor, topics may be selected from one of the following research fields in Mechanical Engineering: applied mechanics, bioengineering, control systems, design and manufacturing, fire protection engineering, fluid dynamics, fluid power, heat transfer, machine design, materials science and metallurgy, robotics, thermal systems, or thermodynamics.

ME 899.6
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

ME 990
Seminar

A seminar is held periodically throughout the regular session. The current research and literature is reviewed and discussed.

ME 992.6
Project

Students undertaking the project Master's degree (M.Eng.) must register in this course. It consists of independent study and investigation of a real world problem, and submission of an acceptable report on the investigation.

ME 994
Research

Students in the M.Sc. program must register for this course.

MED 996
Research

Students in the Ph.D. program must register for this course.

MED — MEDICINE

College of Graduate Studies and Research

MED 990
Seminar

Reports and discussion of current research.

MED 996
Research

Students writing a Master's thesis must register for this course.

MGT —
MANAGEMENT

Department of Management & Marketing,
College of Graduate Studies and Research

MGT 994
Research

Students writing a Master's thesis must register for this course.

MICR —
MICROBIOLOGY

Department of Microbiology and
Immunology, College of Graduate Studies
and Research

MICR 716.3 — 2(3L-1S)
Microbial Physiology

Molecular structures, functions and regulatory mechanisms relating to growth, membrane transport, metabolism, macromolecular synthesis and gene expression in microorganisms.
Prerequisite(s): MICR 216; BIOC 200 or permission of the coordinator.

MICR 717.3 — 1(3L)
Molecular Virology

Representative members of known animal virus families are used as models of biological events at a macromolecular level. Topics are virus purification and analysis methods, virus structure and self-assembly, viral genomes and genome expression, virus proteins and their function, and virus-cell interactions during lytic, transforming, persistent and slow virus infections. For further graduate training in virology, see VTMC 833.

MICR 787.3 — 1(3L)
Microbial Genetics

Bacterial and bacteriophage genetic systems will be discussed with a view to understanding their genomes, gene

regulation, replication, mutagenesis, repair, and recombination, and their practical use as tools for molecular genetics experimentation and biotechnology.
Prerequisite(s): BIOC 200 or equivalent; BIOL 211; MICR 214, 216.

MICR 814.3 — 1(3S)
Advanced Microbial Physiology

Consideration of advanced topics and current research relating to molecular structures, functions and regulatory mechanisms in the growth, membrane transport, metabolism, macromolecular synthesis, chemotaxis and gene expression of microorganisms.
Prerequisite(s): MICR 416 or MICR 716 or permission of the course coordinator.

MICR 816.3 — 1(3L)
Genetic Analysis of Eukaryotic Microorganisms

Review various biochemical, genetic and molecular biological approaches in the study of model unicellular eukaryotic microorganisms, primarily *Saccharomyces* yeasts. Emphasis will be on genome organization and manipulation, DNA metabolism, control of gene expression and cell cycle regulation. The complete yeast genome sequence and its application will be discussed. Experimental strategies developed in these lower eukaryotes for the study of other organisms will also be discussed.
Prerequisite(s): BIOL 211 and MICR 387 or permission of the instructor.

MICR 820.3 — 1(3L)
DNA Repair and Mutagenesis

Explores the process of DNA damage, repair, mutagenesis and impacts on cell survival, molecular evolution and human diseases. Emphasis is given to molecular, cellular, genetic and biochemical analysis of each repair pathway in various organisms. Students are expected to be familiar with the technologies and strategies in the investigations.

MICR 821.3 — 1(3L-1S)
Principles of Immunology

Emphasizes the fundamental aspects of immunology dealing with the structure, genetics and function of antibody molecules, and the cellular and molecular regulation of immune responses. A portion is devoted to regulation of the immune response to tumours and particular parasites.

MICR 823.3 — 2(3L-3S)
Immunopathogenesis of Microbial Infections

Explores model systems to gain an understanding of how microbial infections are contained by the host's innate and cognate defense systems and how the activation of the cellular and molecular immune mechanisms contribute to pathology. Topics include: basic mechanisms of immune-cell migration and inflammation, functions of microbe induced cytokines, microbe initiated inflammatory responses such as toxic shock syndrome and granulomas, microbe initiated autoimmune and immunodeficiency diseases and control of microbial infections by immunomodulation and vaccination.
Prerequisite(s): MICR 421 or equivalent.

MICR 825.3 — 2(3L)
Molecular Basis of Microbial Pathogenesis

Explores ways in which microbial pathogens, particularly bacteria, interact with their hosts from a molecular and genetics perspective. Topics include general virulence mechanisms of pathogens; bacterial virulence factors and their genetic regulation; molecular genetic approaches to studying pathogenesis; and various model systems which have been used to understand pathogenic mechanisms.
Prerequisite(s): MICR 216 and a course in molecular genetics or molecular biology, or permission of the department.

MICR 827.3 — 2(3-4S)
Advanced Cellular and Molecular Immunology

Assesses the current understanding of the immune system, and the experimental means by which this has been achieved, by analyzing papers from the current and past literature.
Prerequisite(s): Permission of the department.

MICR 850.3 — 2(3S)
Tumor Biology

Discussion of current aspects of tumor biology including tumor metastasis, signal transduction, oncogenes and tumor suppressor genes, tumor immunology and tumor markers. Papers from the current scientific literature in these areas will be analyzed.
Prerequisite(s): BIOC 430 or 830 or permission of the department.

MICR 860.3 — 1&2(1S)
Seminar in Immunology

Current research in immunology and related areas will be presented and discussed by students and faculty,

alternating weekly. Each term, each credit student will present a seminar on a recent publication from the literature and submit a term paper critically analyzing and comparing the presented data with other published information on the subject.
Prerequisite(s): 3 credit units senior undergraduate and/or graduate courses in Immunology.

MICR 861.3 — 1&2(1S)
Seminar in Molecular Microbiology

Current research in molecular microbiology and related areas will be presented and discussed by graduate students and faculty. Each student will present a seminar in each term in addition to submitting 2 papers which critically analyze the latest results in a focused area of research.

MICR 898.3 — 1/2(2L/R)
Special Topics

Study in selected areas of microbiology may be undertaken by senior students with permission of the department. The study will be arranged to suit the requirements of individual students. It may consist of lectures, essays, literature surveys and reports on assigned topics related to a specific subject. Laboratory work may be required.

Prerequisite(s): An introductory Microbiology course and permission of the department.

MICR 899.6
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

MICR 990
Seminar

Graduate students are required to present one seminar per year on their research during Term 1 or Term 2 in the Microbiology Graduate Seminar Series. The presentation will include a review of current literature and description of research progress by the student. Yearly registration, attendance and participation is required throughout the graduate program.

MICR 994
Research

Students writing a Master's thesis must register for this course.

MICR 996
Research

Students writing a Ph.D. thesis must register for this course.

MKT —
MARKETING

Department of Management & Marketing,
College of Graduate Studies and Research

MKT 898.3
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

MKT 899.6
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

MKT 994
Thesis

Students writing a Master's thesis must register for this course.

MKT 996
Research

MPAC — MASTER
PROFESSIONAL
ACCOUNTING

Department of Accounting, College of
Graduate Studies and Research

MPAC 801.2
Business Environment

Gives students a hands-on opportunity to develop the ability to analyze and formulate firm strategy. Both technical skills and an understanding of the bigger picture are emphasized.

Prerequisite(s): Admission to Graduate Studies and permission of the department.

MPAC 802.3
Corporate Financial Management
Policies Strategies and Decision Making

Provides comprehensive coverage of finance theories and concepts. In addition, the course provides an in-depth analysis of the nature and fundamental characteristics of the increasingly complex financial instruments and transactions that businesses undertake.

Prerequisite(s): Admission to Graduate Studies and permission of the department.

MPAC 803.4
Financial Reporting and Accountability

Provides a review and extension of students' knowledge of generally accepted accounting principles. In addition, students learn how to integrate and apply their extensive technical knowledge in a wide variety of organizations.

Prerequisite(s): Admission to Graduate Studies and permission of the department.

MPAC 804.4
Strategic Management Accounting

This is a capstone course in management accounting which serves to review previous managerial concepts, integrate them into a wider management decision making framework, and show how cost information needs to be related to the broader, strategic context of the organization.

Prerequisite(s): Admission to Graduate Studies and permission of the department.

MPAC 805.3
Managing Modern Business

Helps to develop an awareness of how organizational behavior issues, concepts and theories can inform and enrich personal, inter-personal and analytical skills. Students learn that developing these skills is necessary in contemporary accounting practice so that they become more influential in delivering their expertise.

Prerequisite(s): Admission to Graduate Studies and permission of the department.

MPAC 806.4
Assurance for Modern Business
Government and Not for profit
Organizations

Examines the provision of assurance in modern business, government, and not-for-profit organizations. Students are introduced to several emerging areas in which assurance is provided, and study in detail financial statement auditing and related professional services.

Prerequisite(s): Admission to Graduate Studies and permission of the department.

MPAC 807.2
Information Systems Design Control
and Audit

Focuses primarily on the business side of Information Technology and aligning Information Technology with business needs, using real world examples and knowledge.

Prerequisite(s): Admission to Graduate Studies and permission of the department.

MPAC 808.4
Taxation

Examines many tax issues and planning opportunities professional accountants encounter. The course follows the life cycle of a business from startup to eventual sale, windup or dissolution. Personal tax and estate planning issues relevant to individual taxpayers are also discussed.

Prerequisite(s): Admission to Graduate Studies and permission of the department.

MPAC 809.2
Entrepreneurship and Small Business
Management

From the viewpoints of the small business owner/manager and the small business consultant, this course examines the research, analytical, and planning processes required for venture start-up. It also considers the on-going management processes required for the venture to be successful in the long run.

Prerequisite(s): Admission to Graduate Studies and permission of the department.

MPAC 810.3
Professionalism Skills Application and
Integration

This capstone course focuses on application and integration of multi-disciplinary knowledge required for the successful practice of professional accounting. Professional and analytical skills are developed through active learning using business simulations, article reviews, workshops, discussion and reflection.

Prerequisite(s): Admission to Graduate Studies and permission of the department.

MPAC 898.3
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

MPAC 899.6
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

MPAC 992.3
Research Project

Through undertaking a series of academic article critiques, this course provides students with an opportunity to develop insights into, and an appreciation for, the academic research process.

Prerequisite(s): Admission to Graduate Studies and permission of the department.

MUAP — MUSIC APPLIED

Department of Music, College of Graduate Studies and Research

MUAP 820.0 — 1&2(3P) Wind Orchestra

To develop and refine students' musicianship and musical growth through Wind Orchestra rehearsals and performances. To help students make better musical decisions through experiencing and performing a wide variety of musical styles presented in rehearsals.

Prerequisite(s): MUAP 420.

MUS — MUSIC

Department of Music, College of Graduate Studies and Research

MUS 840.3 — 1/2(3S) Seminar in Music Literature

A seminar in which students will conduct intensive studies of a clearly defined repertoire. This repertoire may be identified by any one of a number of criteria (medium, style, style-period, nationality, composer) provided that it is directly related to the student's specific area of graduate study.

MUS 841.3 — 1/2(3S) Advanced Bibliography and Research Techniques

An in-depth examination of significant research materials in the principal area of applied music, music theory and musicology. Focuses on the effectiveness of research at the graduate level through the preparation of seminars, papers, and the proposing of the topic for the M.Mus. thesis.

MUS 842.6 — 1&2(3S) Seminar in Composition

Composition in the smaller and larger forms. Works for vocal and instrumental ensemble, chorus, band, and orchestra will be included among the major projects. Composition for the theatre will also be considered as will composition utilizing the synthesizer and the computer.

MUS 843.3 — 1/2(3S) Seminar in 20th Century Music Materials

Examines current tendencies in orchestration and composition. It will examine the role of the synthesizer and the computer in musical analysis, in music printing, and in composition. Contemporary vocal and instrumental performance practices will also be considered.

MUS 844.6 — 1&2(1S) Applied Performance Seminar

The intensive study of a wind, percussion, string, keyboard instrument or the voice will include advanced performance techniques, repertoire and recital preparation.

MUS 845.3 — 1/2(3S) Seminar in Music Analysis

The student applies theoretical knowledge to the analysis of complete compositions. Structures and relationships revealed by the analysis will be applied to the particular area of specialization.

MUS 850.3 — 1/2(3S) History of Theory

Examines a representative group of music theorists covering the period from antiquity to the present era.

MUS 851.3 — 1/2(3S) Seminar in Music Theory

Emphasizes the basic tenets with special attention given to chromatic harmony, contrapuntal practices, analysis, and selected 19th- and 20th-century theoretical concepts.

MUS 852.3 — 1/2(3S) Seminar in Performance Practices

A detailed discussion of selected problems and aspects of performance practices of a particular period or genre of music. Considers aspects of articulation, ornamentation, style, tempo, dynamics, organology, iconography, tuning and temperament and will also include the reading of selected treatises on performance practices.

MUS 853.3 — 1/2(3S) Seminar in Musicology I

A research seminar on selected topics in musicology, chosen from the Middle Ages, Renaissance, or Baroque eras. May focus on the study of manuscripts, repertoires of monophonic and/or polyphonic music, the development of genres, the examination of style(s), the consideration of composers and significant monuments of music.

MUS 854.3 — 1/2(3S) Seminar in Musicology II

A research seminar on selected topics in musicology, chosen from the Classical Period, Romantic Period or 20th century. May focus on the study of manuscripts, repertoires of polyphonic music, the development of genres, the examination of style(s), the consideration of composers and significant monuments of music.

MUS 855.3 — 1/2(3S) Seminar in 20th Century Music Theory

Encompasses the major theoretical thought of the 20th century, both that which deals with new approaches to the study of earlier music and that which presents new methods or systems of musical organization.

MUS 856.3 — 1/2(3S) Approaches to Study of Music Theory

Studies the way in which music theorists have approached the various traditional theoretical disciplines: tonal harmony, counterpoint, form, stylistic analysis and ear training. Focuses on the most recent approaches with a study of earlier theorists in order to establish historical context.

MUS 898.3 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

MUS 899.6 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

MUS 994 Research

Students writing a Master's thesis must register for this course.

NS — NATIVE STUDIES

Department of Native Studies, College of Graduate Studies and Research

NS 802.3 — 1/2(3S) Applied Native Studies Research Methods

Emphasizes the development of skills to conduct research on, for and with Native peoples. Technical skills, evaluation skills and ethical issues will be addressed.

NS 803.3 — 1/2(3S) Theoretical Issues in Native Studies

Critically examines theoretical developments in Native Studies and relevant cognate disciplines, such as Sociology, History, and Anthropology where Native issues are being addressed.

NS 898.3 Special Topics

Concentrated reading and research in selected areas of Native Studies.

NS 899.6 Special Topics

Concentrated reading and research in selected areas of Native Studies.

NS 990 Seminar

All students will be required to register for and attend for one year NS 990 (Graduate Seminar) and offer one seminar on their thesis research prior to graduation.

NS 994 Research

Students writing a Master's thesis must register for this course.

NS 996 Research

Students writing a Ph.D. thesis must register in this course.

NURS — NURSING

Department of Nursing, College of, College of Graduate Studies and Research

NURS 812.3 — 1/2(3S) Leadership in Nursing

Facilitates the critical analysis of leadership concepts, functions, and skills in the nursing role. Ongoing integration of theoretical and research principles are stressed.

Prerequisite(s) or Corequisite(s): NURS 891 or permission of the instructor.

NURS 813.3 — 1/2(3S) Teaching in Nursing

Surveys issues, trends, and methods of nursing education. An examination of the nature of instruction in nursing education, staff development programs, and patient teaching is the main focus.

Prerequisite(s) or Corequisite(s): NURS 891 or permission of the instructor.

NURS 882.3 — 1/2(3P) Practicum

Opportunity is provided to test and evaluate selected frameworks related to teaching, leadership, or research with an expert in one of those areas. The focus is on the integration of theory, research and practice.

Prerequisite(s) or Corequisite(s): NURS 812 or NURS 813 for course-based stream; NURS 892 for thesis stream.

NURS 883.3 — 1(3S)

Theory of Primary Health Care and Advanced Psychiatric Mental Health Nursing

Will explore and evaluate major nursing and counseling theories within the specialty of Psychiatric/Mental Health Nursing. Topics such as professional role, ethics, therapeutic relationships, and application of the nursing process in Psychiatric/Mental Health Nursing will be examined within a Primary Health Care and Biopsychosocial framework.
Note: First offered in the academic year 2006-2007. Nurse Practitioner students will be expected to have or develop a foundation of advanced pathophysiology during the program. For the 2006-2007 academic year, the course Pathophysiology for Nuring Practitioners will be provided by distance from McMaster University as part of a partnership between the College of Nursing and the Council of Ontario University Programs in Nursing (COUPN).

NURS 884.3 — 1(2S-1P) Advanced Health Assessment and Diagnostic Reasoning

With an emphasis on patterns of mental health/illness, this course builds on participants' skills and knowledge in the conduct of comprehensive and holistic health assessment across the lifespan. Models of diagnostic reasoning are investigated, critically analyzed, and employed to make a diagnosis within the scope of practice of the RN (NP). Data from clinical, theoretical and research-based sources are synthesized to plan, implement, and evaluate client care.
Corequisite(s) or Prerequisite(s): NURS 883.
Note: First offered in the academic year 2006-2007. Nurse Practitioner students will be expected to have or develop a foundation of advanced pathophysiology during the program. For the 2006-2007 academic year, the course Pathophysiology for Nuring Practitioners will be provided by distance from McMaster University as part of a partnership between the College of Nursing and the Council of Ontario University Programs in Nursing (COUPN).

NURS 885.3 — 1(3S) Therapeutic Modalities in Advanced Nursing Practice

Focuses on therapeutic approaches of advanced nursing practice with individuals, families, groups, and communities. The emphasis will be on the integration of counseling theories and interventions with clients who have mental health needs and common medical disorders in an interdisciplinary context.
Corequisite(s) or Prerequisite(s): NURS 883, NURS 884.
Note: First offered in the academic year 2006-2007. Nurse Practitioner students will be expected to have or develop a foundation of advanced pathophysiology during the program. For the 2006-2007

academic year, the course Pathophysiology for Nuring Practitioners will be provided by distance from McMaster University as part of a partnership between the College of Nursing and the Council of Ontario University Programs in Nursing (COUPN).

NURS 886.3 — 2(3S) Pharmacotherapeutics in Advanced Nursing Practice

Clinicians must integrate information about a patient's mental and physical status with current standards and new evidence for diagnosis and treatment. With emphasis on self-directed learning, students will develop acumen for diagnostic reasoning and clinical decision-making regarding pharmacotherapeutics through discussion and debate, bringing existing scientific evidence to bear on case presentations and clinical problems.
Prerequisite(s): NURS 883, NURS 884, and NURS 885.
Note: First offered in the academic year 2006-2007. Nurse Practitioner students will be expected to have or develop a foundation of advanced pathophysiology during the program. For the 2006-2007 academic year, the course Pathophysiology for Nuring Practitioners will be provided by distance from McMaster University as part of a partnership between the College of Nursing and the Council of Ontario University Programs in Nursing (COUPN).

NURS 887.0 — SP&SU(40P) Practicum I Advanced Nursing Practice in Primary Health Care

The student will provide direct care in selected primary health care settings. Students will have the opportunity to demonstrate primary health care skills and advanced practice clinical judgment. Scholarly activities in this clinical practicum will be designed so that the student will gain experience in consultation, education, integration of theory, research and clinical knowledge related to the goals of multidisciplinary health services and systems.
Prerequisite(s): NURS 883, NURS 884, NURS 885, and NURS 886.
Note: First offered in the academic year 2007-2008. Nurse Practitioner students will be expected to have or develop a foundation of advanced pathophysiology during the program. For the 2006-2007 academic year, the course Pathophysiology for Nuring Practitioners will be provided by distance from McMaster University as part of a partnership between the College of Nursing and the Council of Ontario University Programs in Nursing (COUPN).

NURS 888.3 — 1(3S) Emerging Challenges in Diverse and Vulnerable Populations

Examines emerging challenges in advanced nursing practice within the context of the current social, cultural, and political reality. Special consideration is paid to the determinants of health, implications for health across the life span, and populations that are diverse and vulnerable.

Prerequisite(s): NURS 883, NURS 884, NURS 885, NURS 886, NURS 887.
Note: First offered in the academic year 2007-2008. Nurse Practitioner students will be expected to have or develop a foundation of advanced pathophysiology during the program. For the 2006-2007 academic year, the course Pathophysiology for Nuring Practitioners will be provided by distance from McMaster University as part of a partnership between the College of Nursing and the Council of Ontario University Programs in Nursing (COUPN).

NURS 889.0 — 1(40P) Practicum II Advanced Nursing Practice with Vulnerable Populations

Students will have the opportunity to demonstrate primary health care skills and advanced practice clinical judgment with a selected vulnerable population. Scholarly activities in this clinical practicum will be designed so that the student will gain experience in consultation, education, integration of theory, research and clinical knowledge related to the goals of multidisciplinary health services and systems.
Prerequisite(s): NURS 883, NURS 884, NURS 885, NURS 886, and NURS 887.
Corequisite(s) or Prerequisite(s): NURS 888.
Note: First offered in the academic year 2007-2008. Nurse Practitioner students will be expected to have or develop a foundation of advanced pathophysiology during the program. For the 2006-2007 academic year, the course Pathophysiology for Nuring Practitioners will be provided by distance from McMaster University as part of a partnership between the College of Nursing and the Council of Ontario University Programs in Nursing (COUPN).

NURS 890.3 Independent Reading and Study

Provides an opportunity for a student to pursue a topic of interest outside the scope of other courses offered. The course could explore a topic of a multidisciplinary nature. The student is responsible for defining the area of interest. Approval of the student's advisor must be obtained before registering for the course. A paper or papers will be required for satisfactory completion of the course.

NURS 891.3 — 1/2(3S) Concept Clarification in Advanced Nursing Practice

Considers the current stage of theory development in nursing, critical thinking,

and clarification of concepts and relationships among them that are central to advanced nursing.

NURS 892.3 — 1/2(3S) Research Methods

Focuses on research methodology with application to clinical nursing problems. Major emphasis will be placed on elements of the research process, critical analysis and evaluation of nursing research, quantitative and qualitative research design, and developing proposals for nursing research investigations.
Prerequisite(s) or Corequisite(s): NURS 891 or permission of the instructor.

NURS 893.3 — 1/2(3S) Qualitative Research Methods

Provides opportunity for in-depth examination of the main traditions of qualitative research inquiry and methods. Included are: critical discussion of all elements of method and experience of writing a qualitative proposal with respect to nursing issues.

NURS 894.3 — 1/2(3S-3P) Systematic Reviews of Healthcare Interventions

Healthcare professionals will be instructed on how to systematically review the effectiveness of an intervention based primarily on randomized controlled trials and if appropriate summarize the evidence using statistical techniques.
Prerequisite(s): Three credit units graduate-level STAT; NURS 892 or equivalent is preferred.

NURS 898.3 Special Topics

A combination of seminars, guided reading and special projects in selected areas of nursing. The topics to be considered will relate to the special interests of students enrolled in the course. A practicum or internship may be one of the learning methods used. Reports on readings and projects will be required.

NURS 899.6 Special Topics

A combination of seminars, guided reading and special projects in selected areas of nursing. The topics to be considered will relate to the special interests of students enrolled in the course. A practicum or internship may be one of the learning methods used. Reports on readings and projects will be required.

NURS 990 Seminar

This departmental seminar includes reports and discussion of current nursing research. Graduate students are required to attend and participate throughout their program.

NURS 993.3 — 1/2(3S) Publishable Paper

Provides assistance with writing a publishable paper. Students in the course-based option will be given credit for this course upon presentation of a paper that is suitable for peer review in a professional journal.

Prerequisite(s): NURS 812, 813, 891, 882 and 892.

NURS 994 Thesis

Students writing a Master's thesis must register in this course.

NURS 996 Research

Students writing a Ph.D. thesis must register for this course.

NUTR — NUTRITION

Division of Nutrition & Dietetics, College of Graduate Studies and Research

NUTR 810.3 — 2(3L/S) Advances in Human Nutrition Research

Recent human nutrition research is described and discussed, with emphasis on micronutrient nutrition. Students read the current literature and participate in classroom lectures and seminars.

Prerequisite(s): Undergraduate courses in NUTR at the second-year level and above.

NUTR 820.3 — 2(3L) Current Issues in Nutrition

An in-depth examination of contemporary issues such as diet and heart disease, influence of lifestyle factors on nutrition, nutrition labelling and health claims, and nutraceuticals. Controversies in nutrition and cultural aspects of food are also discussed.

Prerequisite(s): Senior-level NUTR course or permission of the instructor.

NUTR 825.3 — 1(3L-1.5T) Nutritional Assessment

Theory and methods of nutritional assessment for individuals and groups, including methods for assessment of dietary intake, biochemical, anthropometric and clinical evaluation.

Prerequisite(s): Senior-level NUTR course or permission of the instructor.

NUTR 850.3 — 1(3L/P) Nutrition Program Planning and Evaluation

Provides an understanding of the theories, principles and techniques involved in planning and evaluating nutrition programs. Students will work together to plan a nutrition program for a local agency or organization.

Prerequisite(s): NUTR 350 or permission of the instructor.

NUTR 898.3 — 1/2(R) Special Topics

Advanced level of guided reading and special projects in selected areas of nutrition.

NUTR 899.6 — 1&2(R) Special Topics

Advanced level of guided reading and special projects in selected areas of nutrition.

NUTR 990 Seminar

Staff and graduate students present papers and discuss current research topics at meetings held regularly throughout the year. Graduate students under the direction of the Division are required to attend these seminars.

NUTR 994 Research

Students writing a Master's thesis must register for this course.

NUTR 996 Research

Students writing a Ph.D. thesis in Nutrition must register for this course.

OB — ORGANIZATIONAL BEHAVIOUR

Department of Industrial Relations & Organizational Behaviour, College of Graduate Studies and Research

OB 898.3 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

OBGY — OBSTETRICS AND GYNECOLOGY

Department of Obstetrics, Gynecology & Reproductive Sciences, College of Graduate Studies and Research

OBGY 801.3 — 1(3L) Reproductive Molecular Biology

This course, intended primarily for graduate students in Life and Health Sciences, will develop theoretical ability applying basic knowledge in molecular biology to reproductive biology. Among the topics covered are molecular biology of reproductive hormones, transgenesis, molecular biology of fertilization and embryo development and molecular basis of hormone therapeutic interventions.

OBGY 898.3 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

OBGY 990 Seminar

Reports and discussion of current research.

OBGY 994 Research

Students writing a Master's thesis must register for this course.

PATH — PATHOLOGY

Department of Pathology, College of Graduate Studies and Research

PATH 842.6 General Pathology I Principles with Special Topics in Chemical Pathology

Lectures and reports on special projects aimed at students with a non-medical background to introduce current topics in the area of human pathology. Emphasis will be placed on lab management, quality control and recent laboratory techniques involved in the detection of drugs/drugs of abuse in a chemical pathology lab.
Prerequisite(s): Permission of the instructor/department.

PATH 843.6 General Pathology II Systemic with Special Topics in Chemical Pathology

Lectures and reports on special projects aimed at students with a medical and non-medical background to introduce current topics in the area of human pathology. Emphasis will be placed on pathological process, diagnostic enzymology, various metabolic diseases, disorders of cardiovascular system, diagnostic clinical toxicology, and assessment of high-risk pregnancy.

Prerequisite(s): Permission of the instructor/department.

PATH 898.3 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

PATH 899.6 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

PATH 990 Seminar

A seminar is held jointly with other medical departments. Graduate students are required to attend and take part in the seminar throughout their program.

PATH 994 Research

Students writing a Master's thesis must register for this course.

PATH 996 Research

Students writing a Ph.D. thesis must register for this course.

PCOL — PHARMACOLOGY

Department of Pharmacology, College of Graduate Studies and Research

PCOL 832.6 — 1&2&3(3R-3P-3T-3S) Select Studies in Pharmacology

Work in selected areas of pharmacology may be undertaken by graduate students with the consent of the Graduate Chair of the Department. The student will work directly with a selected supervisor (i.e., a faculty member with expertise in the area selected). An Advisory Committee may also be established (optional) to include resource faculty, also with expertise in the area of interest. The student will be assigned topics to be researched and will be required to prepare reports, in the form of quality scientific manuscripts. The supervisor may also choose to supplement assigned topics with a series of laboratory exercises.

PCOL 843.6 — 1&2(3R-3T-3S) Current Pharmacology

Supervised departmental tutorials reviewing current literature and topics of interest. Students are required to prepare

and present their reviews and to participate in the discussions.

Prerequisite(s): PCOL 301 or 350 or 850.

PCOL 850.6 — 1&2(3L-1S) Graduate Pharmacology

Deals with the pharmacokinetics, pharmacodynamics, therapeutic uses and toxicity of drugs. Advanced pharmacological concepts, principles and methods are presented and discussed in weekly research seminars.

Prerequisite(s): HSC 208 and BIOCH 211, or their equivalents.

PCOL 851.3 — 1/2(3L-3R-3T-3S) Recent Advances in Pharmacology

Deals in a practical manner with the most recent developments in drug therapy. Emphasizes new approaches to pharmacotherapy as well as new individual drugs. Instruction in the techniques of new drug appraisal will be given with heavy emphasis on the areas of pharmacodynamics, pharmacokinetics, therapeutics and toxicology.

Prerequisite(s): PCOL 301 or 350 or 850, or permission of the course coordinator.

PCOL 853.3 — 1/2(3L) Neuropharmacology

An advanced course on drug-induced changes in neural functioning. Focuses on research procedures useful in determining the mechanisms of action of drugs affecting the central nervous system, the autonomic nervous system and the neuromuscular junction. Extensive use is made of recent literature.

Prerequisite(s): PCOL 301 or 350 or 850, or permission of the course coordinator.

PCOL 854.3 — 1/2(4L) Cardiovascular Pharmacology

An advanced course on the interaction of drugs with the regulatory systems of the circulation. Evaluation of methods used to monitor cardiovascular function from the whole animal level to the molecular level are emphasized.

Prerequisite(s): PCOL 301 or 350 or 850, or permission of the course coordinator.

PCOL 856.6 — 1&2(3L-3R-3P-1S) Molecular Aspects of Anticancer and Antiviral Chemotherapy

An advanced course for M.Sc. or Ph.D. students dealing with molecular mechanisms of action of chemotherapeutic agents with particular emphasis on

anticancer and antiviral drugs. Assigned topics and seminars will accompany didactic sessions. This material may also be supplemented by a series of laboratory exercises.

Prerequisite(s): PCOL 301 or 350 or 850, or permission of the course coordinator.

PCOL 868.3 — 1/2/3(3L) Psychopharmacology

An introduction to the effects of drugs on brain function and behaviour. Designed to assist clinical psychologists and others in understanding the actions and mechanisms of various psychoactive drugs.

Prerequisite(s): Registration in the Clinical Psychology Graduate Program, or in other graduate programs upon approval of the student's Advisory Committee.

PCOL 898.3 — 1/2(2R-2P-2T) Special Topics

Work in selected areas of pharmacology may be undertaken by graduate students with the consent of the Graduate Chair of the Department. The student will work directly with a selected supervisor (i.e., a faculty member with expertise in the area selected). An Advisory Committee may also be established (optional) to include resource faculty, also with expertise in the area of interest. The student will be assigned topics to be researched and will be required to prepare reports, in the form of quality scientific reviews. The supervisor may also choose to supplement assigned topics with a series of laboratory exercises.

PCOL 899.6 — 1/2(2R-2P-2T) Special Topics

Work in selected areas of pharmacology may be undertaken by graduate students with the consent of the Graduate Chair of the Department. The student will work directly with a selected supervisor (i.e., a faculty member with expertise in the area selected). An Advisory Committee may also be established (optional) to include resource faculty, also with expertise in the area of interest. The student will be assigned topics to be researched and will be required to prepare reports, in the form of quality scientific reviews. The supervisor may also choose to supplement assigned topics with a series of laboratory exercises.

PCOL 990 — (1S) Seminar

Graduate students in the Department must register for this course each year of their graduate program. The students are required to attend, and to take part in departmental seminars throughout their program.

PCOL 994 Research

Students writing a Master's thesis in the Department of Pharmacology must register for this course.

Prerequisite(s): Students must be registered in the College of Graduate Studies and Research M.Sc. program.

PCOL 996 Research

Students writing a Ph.D thesis in the Department of Pharmacology must register for this course.

Prerequisite(s): Students must be registered in the College of Graduate Studies and Research Ph.D. program.

PHAR — PHARMACY

Division of Pharmacy & Nutrition,
College, College of Graduate Studies and Research

PHAR 831.3 — 1/2(3S) Natural Products

Advanced study of medicinal compounds of natural origin, including antibiotics, alkaloids, glycosides, and steroids. The preparation and presentation of papers is required.

Prerequisite(s): BIOC 211 (or 203) and permission of the instructor.

PHAR 832.3 — 1(3L) Drug Design

Consideration is given to the way in which new drugs are developed and the importance of drug latention is stressed. Some of the chemical, physicochemical and biochemical parameters affecting bioactivity are outlined.

Prerequisite(s): Permission of the instructor.

PHAR 841.3 — 1(3L-1T) Selected Topics in Pharmaceutical Sciences

Introduction to concepts in industrial pharmaceutical sciences. Topics include structure-activity relationships, drug disposition, pharmacogenomics and how these disciplines relate to the drug development process. A written report and oral presentation describing the development of a drug candidate from target through to marketing are expected.

Prerequisite(s): Permission of the instructor; enrollment in life sciences or physical sciences field.

PHAR 847.3 — 1/2(3L/P) Specialized Topics in Pharmaceutics

An advanced course involving the principles in product development.

PHAR 848.3 — 2(3L-2P) Advanced Pharmacokinetics and Pharmacodynamics

Qualitative and quantitative aspects of drug absorption, disposition, metabolism and excretion, and drug pharmacodynamics.

The course emphasizes the use of pharmacokinetic/pharmacodynamic equations and the analysis of the data.

Prerequisite(s): Basic course in pharmacokinetics or permission of the instructor.

PHAR 854.3 — 1/2(3L) Metabolic Transformations of Xenobiotics

An advanced study of the basic principles of the metabolism of foreign compounds in mammals. The xenobiotics covered will include drugs, food additives, agricultural chemicals and industrial chemicals. The detoxification and toxicological implications of metabolism are emphasized.

PHAR 856.3 — 1(3L-4P) Forensic Toxicology

Deals with the analytical procedures involved in the detection of chemicals and drugs in the body tissues and fluids, and the identification of drugs of abuse. Appropriate analytical chemical techniques are discussed and used during the practical component of the course.

PHAR 857.3 — 1/2(S) Advanced Pharmacotherapy I

A detailed drug therapy course designed to prepare the student for the advanced clinical clerkship. Pathophysiology, clinical presentation, laboratory and clinical monitoring, monitoring and therapeutic regimens, both current and investigational, will be discussed. Topics include cardiovascular and pulmonary disorders, infectious disease and diabetes.

Prerequisite(s): Undergraduate courses in pharmacotherapeutics; and permission of the instructor.

PHAR 858.3 Advanced Pharmacotherapy II

A detailed drug therapy course designed to prepare the student for the advanced clinical clerkship. Pathophysiology, clinical presentation, laboratory and clinical monitoring, monitoring and therapeutic regimens, both current and investigational, will be discussed. Topics

include psychiatric, neurologic and renal disorders, hematology and rheumatology. **Prerequisite(s):** Undergraduate courses in pharmacotherapeutics; and permission of the instructor.

PHAR 862.3 — 1/2(2L-12C)
Advanced Clinical Pharmacy I

Advanced course in clinical pharmacy designed to enhance the student's practical knowledge of drug therapy and to attain skills in interprofessional and patient communications. Practical experience in an ambulatory and institutional health care environment will be featured. **Prerequisite(s):** Completion of a degree in Pharmacy or equivalent, and permission of the instructor.

PHAR 863.3 — 1/2(2L-12C)
Advanced Clinical Pharmacy II

Continuation of PHAR 862, with focus on more advanced experiences in drug monitoring. Practical experience in the ambulatory and institutional health care environment will be a featured part of this course. **Prerequisite(s):** PHAR 862 or permission of the instructor.

PHAR 864.3 — 1/2(3L)
Advanced Patient Education for Pharmacy Practice

Advanced level training in the complexities and nuances of educating today's patients about drug-related matters. The focus will be on the process of the encounter rather than actual content. **Prerequisite(s):** Undergraduate degree in Pharmacy or in a health-related discipline or permission of instructor.

PHAR 870.3 — 1/2(3L)
Research Methods in Pharmacy Practice

Research methods and outcomes in pharmacy practice settings will be studied. The principles of qualitative and quantitative research are discussed in the context of patient education, adherence, disease state management and quality of life. Issues relating to primary data collection in health care settings and administrative databases will be considered. **Prerequisite(s):** STAT course, undergraduate degree in Pharmacy or permission of instructor.

PHAR 898.3
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

PHAR 899.6
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

PHAR 990
Seminar

Papers and discussion on recent developments in pharmaceutical fields. Graduate students are required to attend and to take part in the seminars.

PHAR 994
Research

Students writing a Master's thesis must register for this course.

PHAR 996
Research

Students writing a Ph.D. thesis must register for this course.

PHIL —
PHILOSOPHY

Department of Philosophy, College of Graduate Studies and Research

PHIL 808.3 — 1/2(3S)
Topics in Greek and Roman Philosophy

A seminar on philosophic thought in Ancient Greece; topics include the metaphysical, epistemological and ethical theories of Plato and Aristotle; ancient schools such as the Stoics and Neo-Platonists.

PHIL 813.3 — 1/2(3S)
Topics in 17th and 18th Century Philosophy

A seminar in early modern philosophy concentrating on one or more of the empiricists- Locke, Berkeley, Hume- or the rationalists- Descartes, Spinoza and Leibniz.

PHIL 814.3 — 1/2(3S)
Kant

A seminar on Kant's critical philosophy, with an emphasis on his Critique of Pure Reason.

PHIL 815.3 — 1/2(3S)
Topics in 19th Century Philosophy

A seminar on one or more of the authors or themes that dominated philosophical thought in Europe during the Nineteenth Century, concentrating on the post-Kantian

philosophers whose works were central in the development of modern European thought.

PHIL 816.3 — 1/2(3S)
Topics in Continental Philosophy

A seminar on modern existentialism, phenomenology or critical theory; including figures such as Kierkegaard, Nietzsche, Husserl, Heidegger, Sartre, Merleau-Ponty, Foucault and Habermas.

PHIL 817.3 — 1/2(3S)
Topics in Contemporary Analytic Philosophy

A seminar on the developments in Anglo-American analytic philosophy during the Twentieth century, from the period of the philosophical writings of Russell and Moore up to the works of Putnam, Kripke, and Davidson.

PHIL 818.3 — 1/2(3S)
Topics in Pragmatism

A seminar on pragmatism including the early pragmatists, such as James, up to the works of Quine and Rorty.

PHIL 819.3 — 1/2(3S)
Wittgenstein

A seminar on the thought of Wittgenstein covering either, or both, of the Tractatus and the Philosophical Investigations.

PHIL 820.3 — 1/2(3S)
Philosophical Texts

A seminar concentrating on an important recent philosophical text. The content will vary from year to year.

PHIL 826.3 — 1/2(3S)
Seminar in Philosophy of Mind

A seminar on topics in the philosophy of mind and cognitive science. Topics may include consciousness, mental representation, intentionality, qualia, supervenience, theoretical reduction, emotion, action and agency.

PHIL 833.3 — 1/2(3S)
Seminar in Ethics

A seminar in ethical theory and metaethics; topics include the cognitive status of moral judgements, the logic of ethical argument, and the nature of moral reasoning.

PHIL 842.3 — 1/2(3S)
Topics in Philosophical Logic

A seminar on philosophical issues pertaining to logic and its use as a philosophical tool. Topics may include the logical form of natural language, the nature of logical consequence, theories of truth, quantification and ontology, modality,

conditionals, presupposition and logical pluralism.

PHIL 844.3 — 1/2(3S)
Seminar in Epistemology

A seminar on current issues in epistemology; topics may include the nature of belief, truth, justification, internalism/externalism, and naturalized epistemology.

PHIL 845.3 — 1/2(3S)
Seminar in Metaphysics

A seminar on the nature of metaphysics; topics may include existence, ontology, substance, universals, necessity, identity and change, time and space, causation, and free will.

PHIL 846.3 — 1/2(3S)
Seminar in Philosophy of Language

A seminar on philosophical problems about language; topics may include how language represents reality, traditional accounts of meaning, reference, predication and expression.

PHIL 851.3 — 1/2(3S)
Seminar in History and Philosophy of Science

A seminar on conceptual, epistemological and historical topics in the philosophy of the physical and biological sciences; topics may include the nature of scientific rationality, objectivity, explanation in science, and scientific realism.

PHIL 862.3 — 1/2(3S)
Seminar in Social and Political Philosophy

Examines a recent topic, political philosopher, movement or theory. Topics studied will vary from year to year.

PHIL 871.3 — 1/2(3S)
Seminar in Aesthetics

Examines the philosophical problems related to the arts; topics may include the nature of art, meaning and expression in art, and the nature of aesthetic value judgements.

PHIL 898.3
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

PHIL 899.6
Special Topics

Offered occasionally in special situations. Students interested in these courses should

contact the department for more information.

PHIL 990 Seminar

This seminar meets every two weeks throughout both terms of the regular academic year. Under the direction of a faculty member of the department, graduate students study current literature on selected topics and also present papers on their research projects. All graduate students in Philosophy are required to attend this seminar throughout their program and are expected to present at least one paper to the seminar every year.

PHIL 994 Research

All Masters' students must register in this course.

PHSI — PHYSIOLOGY

Department of Physiology, College of Graduate Studies and Research

PHSI 798.3 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

PHSI 799.6 Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

PHSI 835.3 — (3L) Gasotransmitter in Biology and Medicine

Deals with the biology and medicine of gasotransmitters including nitric oxide, hydrogen sulfide and carbon monoxide. The role of gasotransmitters in cardiovascular and respiratory diseases will be specially dealt with. Environmental toxicological aspects and community health issues related to gasotransmitters will be discussed.
Prerequisite(s): Undergraduate degree courses in Biomedical Sciences. Permission from the program supervisor.
Note: Offered in alternate years.

PHSI 836.3 — 1/2(3L) Excitable Cells

The integrated study of bioelectrical mechanisms of cellular excitability and excitation coupled functions including contraction, secretion and signal transduction.
Formerly: PHSIO 736.

Note: Contact the department for availability. Students with credit for PHSI 335, 336, 425, or 736 may not take this course for credit.

PHSI 837.3 — 1/2(3L) Cellular Basis of Physiological Function

Cellular mechanisms underlying physiological functions in mammals. Topics include mechanisms of communication between cells, uptake and secretion of water, ions, nonelectrolytes and macromolecules, and integration of cell functional and metabolic activities.
Formerly: PHSIO 737.
Prerequisite(s): Permission of instructor.
Note: Contact the department for availability. Students with credits for PHSI 335, 337, 425 or 737 may not take this course for credit.

PHSI 838.0 — 1/2(3L) Career Development Essentials for Graduate Trainees

Provides knowledge about issues relevant for a successful competitive career development for graduates. This knowledge includes ethics in research, animal use, student-supervisor relationship and best practices, integrity in scientific research, authorship issues, grant writing skills, presentation skills as a lecturer and use of multimedia, patents and related issues. The course is intended to provide an all-round development of health sciences graduates at the University of Saskatchewan. The knowledge and broad-based skills gained through this course will give the graduates a competitive edge over graduates from other universities.
Prerequisites: Registered as a graduate student in Health Sciences or other degree.

PHSI 845.3 — 1/2(2L&1S) Ion Channels Principles and Methodology

Explores ion channel mechanics and the role of a variety of ion channels in normal and pathological cellular functions. Students will become familiar with the methodologies used in the study of ion channels, with a special emphasis on patch-clamp technology.
Prerequisite(s): Permission of the coordinator.

PHSI 846.3 — 1/2(3L) Cardiovascular Physiology

Review of the functions and control of the heart and blood vessels in humans and other mammals, and of the mechanisms regulating arterial pressure, blood volume and blood flow. Offered alternate years.
Formerly: PHSIO 826.

Note: Students with credit for PHSI 346, 426 or 826 may not take this course for credit.

PHSI 847.3 — 1/2(3L) Respiratory Physiology

Mechanisms of respiratory gas exchange at the lungs and tissues; gas transport in the blood; acid-base balance and regulation of the respiratory system under a variety of conditions such as exercise, high altitude, diving, and certain disease states.
Formerly: PHSIO 747.
Note: Offered in alternate years. Students with credits for PHSI 347, 427, 747 or 827 may not take this course for credit.

PHSI 848.3 — 1/2(3L) Endocrinology

Nature, action and control of endocrine secretions. Topics include neuroendocrinology and examples of hormonal control in reproduction, metabolism, growth, calcium homeostasis and gastrointestinal functions.
Formerly: PHSIO 748.
Note: Offered in alternate years. Students with credits for PHSI 348, 434, 748, or 834 may not take this course for credit.

PHSI 850.3 — 1/2(3L) Integrative Neuroscience

Mechanisms of integration of neural signals. Examples will be used to show how different types of sensory input are integrated at various levels of the nervous system to evoke appropriate effector responses.
Formerly: PHSIO 750.
Note: Offered in alternate years. Students with credits for PHSI 349, 429, 750, 829 or HSC 350 may not take this course for credit.

PHSI 898.3 — 1/2(3R/P) Special Topics

Work in selected areas of physiology may be undertaken by advanced students with the consent of the department. This work may consist of essays, readings, and reports on assigned topics and/or a series of laboratory exercises.

PHSI 899.6 — 1&2(3R/P) Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

PHSI 990

Seminar

Throughout their program, graduate students in Physiology are required to attend department seminars and to participate in the presentation and discussion of papers in the journal club.

PHSI 994 Research

Students writing a Master's thesis must register for this course.

PHSI 996 Research

Students writing a Ph.D. thesis must register for this course.

PHYS — PHYSICS

Department of Physics & Engineering Physics, College of Graduate Studies and Research

PHYS 811.3 — 1/2(3L) Classical Mechanics

Lagrange's equation of Motion, Hamilton formulation, Phase-space considerations, Liouville theorem, Poisson brackets, Action-angle variables, Hamilton-Jacobi Equation, Integrable systems, Canonical Perturbation theory, KAM theorem, Phase-space mapping, Henon, Standard and tangent Maps, Local and Global Chaos, Dissipative systems.

PHYS 812.3 — 1/2(3L) Electromagnetic Theory

Topics include boundary-value problems of electrostatics and magnetostatics, time varying fields, radiation and multipole fields.

PHYS 821.3 — 1(3L) Introduction to Aeronomy

The structure and composition of the Earth's atmosphere; mean circulation, tides and wave motions; the major photochemical processes and their implications; the physical processes of the ionosphere and the magnetosphere; and experimental methods.
Note: Instruction is given jointly by members of the Institute of Space and Atmospheric Studies.

PHYS 822.3 — 2(3L) Radio Physics of Upper Atmosphere

Deals with the application of radio methods to studies of the upper atmosphere. Topics discussed include the magneto-ionic theory; scattering of radio waves by meteors and aurora, scattering, generation and absorption of radio waves in the solar and terrestrial atmospheres, solar-terrestrial-relations and the methods

of radio astronomy applied to upper atmospheric measurements.

PHYS 823.3 — 1/2(3L)
Advanced Aeronomy

Basic Photochemistry. Absorption of radiation on a rotating planet. Minor constituents, diurnal variations. Airglow. Mechanical and chemical models. Environmental studies.
Prerequisite(s): PHYS 821, or permission if taken concurrently.

PHYS 824.3 — 1/2(3L)
Ionospheric and Magnetospheric Physics

The Earth's ionosphere and magnetosphere, also for other planets. Techniques of investigation, physical processes, structure and models.
Prerequisite(s): PHYS 821, or permission if taken concurrently.

PHYS 826.3 — 1/2(3L)
Atmospheric Dynamics

Modern observational systems (radars, lidars and other optical systems) from ground and satellite platforms used for sounding the atmosphere up to the lower thermosphere (130km). Theoretical treatments for the mean winds, planetary waves, tides and gravity waves. Comparison of theory with observations, global reference atmospheres and global circulation models.
Prerequisite(s): PHYS 821, or permission if taken concurrently.

PHYS 827.3 — 1/2(3L)
Atmospheric Spectroscopy and Radiative Transfer

Solar and terrestrial radiation; absorption, emission and scattering in terrestrial and planetary atmospheres; radiative transfer; remote sensing of atmospheric properties; climate models (greenhouse effect, atmospheric evolution).
Prerequisite(s): PHYS 821 or permission of the instructor.

PHYS 831.3 — 1/2(3L)
Methods of Experimental Synchrotron Science

This is an interdisciplinary special topic course targeted for graduate students with interest in synchrotron radiation and synchrotron science. The following topics are normally covered: spectroscopy with microfocussed beams of soft x-rays and infrared; x-ray diffraction studies of the electron and molecular structure of crystallizable proteins; near edge

absorption spectroscopy; fine structure of extended x-ray absorption spectra.

PHYS 833.3 — 1/2(3L)
General Relativity and Gravitation

Development of the physical ideas and mathematical skills leading to general relativity as a theory of gravitation; solutions of the Einstein field equations and observational tests of general relativity; applications to black holes and cosmological models.

PHYS 841.3 — 1(3L)
Introduction to Atomic and Molecular Spectra

Introduction to the theory of spectroscopy. Topics include spectra and structure of hydrogen and complex atoms, multiplet spectral terms, Zeeman effect, intensities of atomic spectra, rotational and vibration energy levels and spectra of diatomic and polyatomic molecules, electronic energy levels and spectra of polyatomic molecules.

PHYS 851.3 — 1(3L)
Introductory Nuclear Physics

Introduction to electromagnetic and weak interactions as relevant to nuclear and particle physics. Symmetries in sub-atomic physics, weak decays, selection rules and electromagnetic processes.
Prerequisite(s): PHYS 482 and 452.

PHYS 852.3 — 2(3L)
Advanced Nuclear Physics

Advanced topics in nuclear and particle physics. Relativistic kinematics as it concerns experiments. Students will be required to write a review paper of a major research topic.
Prerequisite(s): PHYS 851.

PHYS 856.3 — 2(4L-2S)
Radiation Therapy Physics

Interaction of x- and gamma rays with matter, interaction of particulate radiations with matter; radiotherapy linear accelerators; radiation quality, exposure; absorbed dose; dosimetry of high energy x-ray and electron beams; x-ray dose distribution parameters; electron dose distribution parameters; brachytherapy.
Prerequisite(s): Permission of the instructor.

PHYS 857.3 — 1(4L-1S-1P)
Radiological Physics

Use of radioisotopes in medical imaging, devices and instrumentation for nuclear medicine imaging, principles of nuclear

tomography, radiation protection, risk vs. benefit, facility design for radiation protection, radiobiology.
Prerequisite(s): Permission of the instructor.

PHYS 858.3 — 1(4L-2P)
Diagnostic Imaging

The principals of x-ray, ultrasound and magnetic resonance imaging are presented. Each unit has a laboratory exercise designed to illustrate the didactic material. Students will give a short presentation on a topic from each unit demonstrating their grasp of the material.
Prerequisite(s): Permission of the instructor.

PHYS 861.3 — 2(3L)
Plasma Physics

Discusses the basic concepts of plasma physics. Reading of assigned literature in plasma physics is required.

PHYS 862.3 — 1/2(3L)
Plasma Waves I

Dispersion relations are derived for small amplitude waves in plasmas, both in the presence and in the absence of magnetic fields. The topics treated in this course include the kinetic model of the plasma, Landau damping, instabilities, the effect of inhomogeneities or wave propagation, and the effect of oscillating external fields on waves and instabilities.
Prerequisite(s): PHYS 861.

PHYS 863.3 — 1/2(3L)
Plasma Waves II

Deals with nonlinear wave phenomena in plasma physics. Quasilinear theory, the theory of a single plasma mode and the equation of Korteweg-de Vries are covered. Other topics to be chosen from the Dupree-Weinstock theory of plasma turbulence, fluctuations, wave scattering and applications to fusion plasmas.
Prerequisite(s): PHYS 861 and 862.

PHYS 864.3 — 1/2(3L)
Controlled Fusion

Plasma equilibria. Particle and thermal diffusion. MHD stability (concept of minimum B and average minimum B). Velocity space instabilities (loss-cone, trapped particle, and beam-driven instabilities). Plasma heating (ohmic, compression, neutral beam, wave). New concepts.
Prerequisite(s): PHYS 861.

PHYS 865.3 — 1/2(3L)
Plasma Transport Properties and Diagnostic Techniques

Provides a kinetic theory treatment of plasma transport phenomena - conductivity, diffusion, heat flow - and the relaxation times for particle deflection, momentum transfer, energy relaxation. Various plasma measurement techniques are then discussed, including the use of microwaves, probes, laser scattering and particle energy analyzers.
Prerequisite(s): PHYS 861.

PHYS 871.3 — 1/2(3L)
Condensed Matter Physics I

A graduate level introductory course in condensed matter physics, focusing on the properties of crystalline solids. The course will cover crystal structure and symmetries, electronic properties and bandstructure, semiconductors, binding of solids and lattice vibrations, and optical properties of solids. Modern computational and experimental methods will be introduced as appropriate.
Prerequisite(s): Permission of the instructor.

PHYS 872.3 — 1/2(3L)
Condensed Matter Physics II

A second graduate course in condensed matter physics, emphasizing concepts such as collective behaviour, correlation and long range order. The course will cover electron transport, magnetism, strongly correlated electron systems, superconductivity, and relevant experimental probes. Special topics such as nanoscale physics will be introduced as appropriate.
Prerequisite(s): Permission of the instructor.

PHYS 881.6 — 1&2(3L)
Quantum Mechanics

Designed to acquaint students with some of the concepts of quantum mechanics.

PHYS 883.3 — 1/2(3L)
Quantum Mechanics

Concepts in advanced quantum mechanics. Topics include perturbation theory, relativistic corrections, scattering theory, second quantization, non-relativistic QED, and selected applications to subatomic, atomic, molecular, or solid-state systems.

PHYS 884.3 — 1/2(3L)
Quantum Field Theory

Fundamental concepts in quantum field theory. Topics include relativistic field equations; canonical and path integral quantization; symmetries, conservation laws, and symmetry breaking; interacting field theories relevant to condensed matter and subatomic physics; tree-level processes.

PHYS 891.3
Selected Topics in Condensed Matter Physics

Advanced topics are selected to aid graduate students with their research. Depending on student interests the following subjects may be covered: electronic structure of advanced materials, high temperature superconductors, and biomaterials. Experimental methods in solid state physics and material science. Nanoscale physics, surface phenomena and soft condensed matter physics.
Prerequisite(s): Permission of instructor.

PHYS 893.3 — 1/2(3L)
Selected Topics in Physics and Engineering Physics

Advanced topics in Physics and Engineering Physics selected to aid graduate students with their research. Consists of assigned readings in texts and/or scientific journals, related discussions, and additional lectures.
Prerequisite(s): Permission of the instructor.

PHYS 894.3 — 1/2(3L)
Selected Topics in Theoretical Physics

Advanced topics in theoretical physics selected to aid graduate students with their research. Consists of assigned readings in texts and/or scientific journals, related discussions, and additional lectures.
Prerequisite(s): Permission of the instructor.

PHYS 895.3 — 1/2(3L)
Selected Topics in Subatomic Physics

Advanced topics in subatomic physics selected to aid graduate students with their research. Consists of assigned readings in texts and/or scientific journals, related discussions, and additional lectures.
Prerequisite(s): Permission of the instructor.

PHYS 896.3 — 1/2(3L)
Selected Topics in Plasma Physics

Advanced topics in plasma physics selected to aid graduate students with their research. Consists of assigned readings in

texts and/or scientific journals, related discussions, and additional lectures.
Prerequisite(s): Permission of the instructor.

PHYS 897.3 — 1/2(3L)
Selected Topics in Space and Atmospheric Physics

Advanced topics in space and atmospheric physics selected to aid graduate students with their research. Consists of assigned readings in texts and/or scientific journals, related discussions, and additional lectures.
Prerequisite(s): Permission of the instructor.

PHYS 898.3 — 1/2/1&2(3L)
Special Topics

Consists of assigned reading in texts and scientific journals on which the students report; additional lectures by the professor in charge are also given. Depending on the interests of the students, the topics are in the field of nuclear, or theoretical or upper atmospheric physics.

PHYS 899.6
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

PHYS 990
Seminar

Papers on recent developments in Physics and Engineering Physics are given. Candidates for the Master's degree and for the Ph.D. degree in this department are required to participate.

PHYS 994
Research

Students writing a Master's thesis in physics must register for this course.

PHYS 996
Research

Students writing a Ph.D. thesis in physics must register for this course.

PLSC — PLANT SCIENCE

Department of Plant Sciences, College of Graduate Studies and Research

PLSC 803.3 — 2(3L-2T)
Advanced Plant Breeding

Deals with important theoretical and applied issues related to crop improvement in both self-pollinated and cross-pollinated species. Theoretical aspects of artificial

selection, genetic variability and population structure will be considered along with the practical implications of field testing, cultivar increase and release, and plant breeding regulations.
Prerequisite(s): PLSC 411 or equivalent, PLSC 816 or equivalent, or permission of the instructor.

PLSC 804.3 — 2(2L-4P)
Processing and Analysis of Grain Crops

Grain and oilseed processing technologies and end-uses will be reviewed, as will the characteristics of grains and oilseeds which influence quality, utility and value. Laboratories will provide hands-on experience with current procedures for predicting grain quality.
Prerequisite(s): BIOC 220.

PLSC 811.3 — 2(3L)
Population and Conservation Genetics

Basic conditions for maintaining genetic variability in populations. Effects of environmental changes on genetic diversity. Effects of mating system and population size on genetic structures of populations. A study of the causes of loss of genetic diversity and strategies for preservation with emphasis on plant genetic resources.
Prerequisite(s): BIOL 211 and PLSC 405.

PLSC 812.3 — 1(3L-3P)
Physiological Plant Ecology

A study of the physiological basis for the interaction of the individual species with its environment. Included are discussions of the energy environment of the plant and how temperature, light, water status, soil conditions etc., affect plant function and distribution.
Prerequisite(s): Courses in plant ecology and plant physiology, or permission of the instructor.

PLSC 813.3 — 2(3L)
Statistical Methods in Life Sciences

Some parametric statistical methods commonly used in agriculture and experimental biology. Introduction to factorial experiments and analysis of covariance. Emphasizes the principles and procedures of experimental designs.
Prerequisite(s): PLSC 314.

PLSC 814.3 — 1(3L)
Physiology and Yield Formation

Physiological processes involved in plant growth and development, with emphasis on

yield formation in crops. Topics include growth stage systems, germination, phenology, seed set and seed growth, yield components, senescence and yield management.

PLSC 815.3 — 1(3L-3P)
Applied Plant Cytogenetics

The application of cytogenetics to plant breeding. Topics include chromosomal aberrations, crop evolution, interspecific hybridization, gene transfer, euploidy and aneuploidy.

PLSC 816.3 — 1(3L)
Quantitative Genetics

The genetical and statistical concepts of quantitative variation in crop plants. Emphasis will be on factors which affect direct and correlated response to artificial selection. Methods of quantitative genetic research will be considered.

PLSC 818.3 — 2(3L)
Physiology and Biochemistry of Herbicide Action

The physiology and biochemistry of herbicide action, from the point of entry into the plant to the events leading to plant death. The fate of the herbicide in plants (foliar and root absorption, translocation, and metabolism) is discussed first, followed by an examination of the various mechanisms of herbicide action. Topics such as selectivity, herbicide resistance and structure-activity relationships are also covered.

Prerequisite(s): PLSC 340 or equivalent.

PLSC 822.3 — 1(3L-2T)
Ecology and Management of Rangeland Resources

Emphasizes the principles of managing rangeland to ensure sustained productivity. Plant morphology, physiology, palatability, nutritional value, energy flow, and nutrient cycling are integrated and emphasized in relation to the impacts of grazing on soil-plant-animal interactions. Inventory, evaluation, and manipulation of rangeland resources are also studied. Field trips are required.
Prerequisite(s): Permission of the instructor.

PLSC 823.3 — 2(3L-2P)
Landscape Ecology and Vegetation Management

Current theories relating to structure, functioning and composition of landscapes and human impacts on natural ecosystems, landscape-level processes and patterns, and succession. Developing management plans for natural and remnant landscape elements, and inducing successional

changes, and monitoring impacts will be covered.
Prerequisite(s): BIOL 253, GEOG 270, PLSC 213 or permission of the instructor.

PLSC 825.3 — 1/2(3L-6P)
Applied Plant Biotechnology

Examines the application of tissue culture to plant and plant product development, the principles of plant genetic engineering, the development of molecular markers and associated technologies, application of genomic technologies to plant breeding, and the regulatory and social issues associated with transgenic plants. The laboratory consists of an independent research project.
Prerequisite(s): BIOL 211 and any 200-level BIOC, or permission of instructor or department

PLSC 827.3 — 2(3L)
Molecular Basis of Grain Quality

The physical and compositional qualities of cereal grains determine how they are processed and utilized. This course will present the biochemical and genetic basis of grain quality and the molecular strategies available to improve the quality characteristics of major grain crops.
Prerequisite(s): PLSC 416 or permission of the instructor.

PLSC 831.3 — 1(3L-3P)
Wildland Ecology

Ecological principles and problems pertaining to vegetated landscapes of non-agricultural areas, particularly Canada. Structure, composition and genesis of vegetated landscapes and their ecology, with emphasis on ecological methodology.
Prerequisite(s): Courses in plant ecology or animal ecology, and a course in plant taxonomy.

PLSC 841.3 — 2(3L-2P)
Advanced Fruit Growing

Fundamentals of commercial fruit production including environmental adaptation, breeding, site development, marketing, cultural management, tree fruits, small fruits, tropical fruits, harvesting, diseases and pests.
Note: Students with credit for PLSC 441 may not take this course for credit.

PLSC 850.3 — 1(3L-2P)
Advanced Vegetable Growing

Fundamentals of commercial vegetable production outdoors and under glass.

Breeding, planting, culture, harvesting, grading, diseases and pests are discussed.
Note: Students with credit for PLSC 450 may not take this course for credit.

PLSC 862.3 — 2(3L-3P)
Plants and Microclimate

A treatment of the physical basis for the interactions between plants and their atmospheric and edaphic environments. The main emphasis will be placed on the study of the exchange of radiation heat and matter between the environment and individual leaves, soil surfaces and, particularly, plant communities.
Prerequisite(s): Permission of the instructor.

PLSC 865.3 — 2(3L-1S)
Abiotic Stress in Plants

Students will be introduced to current concepts and recent advances in plant resistance mechanisms to freezing, moisture, salt and heat stress from the ecologic to molecular levels. Methods of stress application and viability testing will also be demonstrated. At the end of each stress section, guest scientists will be invited to present their research.
Prerequisite(s): PLSC 417 or PLSC 412 or equivalent, or permission of the instructor.

PLSC 870.3 — 1(3L)
Principles of Plant Propagation and Nursery Management

Principles and commercial procedures for the propagation and nursery management of horticultural plants. Term papers will also be required.

PLSC 880.3 — 1/2(2L-2S)
Introduction to Plant Disease Epidemiology

Principles and quantitative methods of plant disease epidemiology are presented. The role of host plants, the environment and the pathogen in the development of epidemics are discussed. The design of experiments, analysis of data generated from such experiments, as well as temporal and spatial development of disease are addressed. Disease forecasting and decision support systems are discussed.
Prerequisites: PLSC 813 or equivalent, or permission of instructor.

PLSC 881.3 — 1/2(2L-2S)
Host-pathogen Interactions and Breeding for Disease Resistance in Plants

Will provide students with an understanding of host-pathogen interactions in plants and with the genetic basis of breeding for disease resistance. Recent concepts in host-pathogen genetics and trends in disease resistance breeding will be considered.
Prerequisite(s): Introductory plant pathology and plant breeding courses or permission of the instructor.

PLSC 891.3 — 1/2/1&2(R)
Literature Survey

Reading will be assigned for the purpose of extending the student's knowledge of chosen subjects.

PLSC 898.3 — 1/2(1L-3P)
Special Topics

Assigned reading and tutorials in a specific field related to the student's major interest. Students will be required to prepare reviews or seminars on specific topics.

PLSC 899.6
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

PLSC 990
Seminar

Reviews of literature and recent investigations. Graduate students are required to attend and present papers during the period of their candidacy.

PLSC 992.6
Project

M.Agr. students must complete this course as part of the requirements for the degree.

PLSC 994
Research

Students writing a Master's thesis must register for this course.

PLSC 996
Research

Students writing a Ph.D. thesis must register for this course

POLS — POLITICAL STUDIES

Department of Political Studies, College of Graduate Studies and Research

POLS 801.3 — 1/2(3S)
Federalism

A seminar on theories of federalism with particular emphasis on the Canadian

experience. In addition to the Confederation Debates, some of the authors to be studied include K. C. Wheare, William Livingston, Alan Cairns, and D. V. Smiley.

POLS 802.3 — 1/2(3S)
Canadian Government and Politics

An examination of the structure and operation of Canadian political institutions.

POLS 805.3 — 1/2(3L)
Provincial Government and Politics

A comparative examination of the political process, political institutions and political cultures of Canada's provinces.

POLS 809.3 — 1/2(3S)
Canadian Constitution and Politics

Topics include the Constitutional Act, Canadian Charter of Rights and Freedoms, Canada Elections Act, and intergovernmental relations.

POLS 818.6 — 1/2(3L)
Readings in Contemporary Political Studies

Required of all graduate students. Issues and themes are drawn from the current scholarly literature in political studies. Conduct of the seminar is shared among department faculty, according to topic. Several meetings and assignments are devoted to thesis preparation.

POLS 820.3 — 1/2(3L)
Canadian Public Administration

The Canadian public service within the Canadian political system. The structure and operations of the civil service will be related to policy formulation and implementation. Several topics of concentration include: public accountability, representative bureaucracy, the ministry system, the budgetary process, public corporations and federal-provincial administrative relations.

POLS 832.3 — 1(3L)
Selected Topics in Political Thought I

Problems in the philosophy of social science are examined.

POLS 833.3 — 2(3L)
Selected Topics in Political Thought II

Selected topics in political philosophy are examined: natural rights, the public interest, justice, obligation, freedom and others.

POLS 835.6 — 1&2(3L)
Nationalism

The philosophical origins, the characteristics, and the implications of

nationalism; criticisms, and traditions of criticism, of nationalist doctrine; nationalism as a movement and its relations with other movements such as socialism. Also the manifestations of nationalism, and the characteristics of nationhood, in specific countries, notably Canada, and also France, Germany, other parts of Europe, the English-speaking world (including the two parts of Ireland), and some of the nation-states of Asia, Africa, and the Caribbean, emphasis depending on the interests of individual students.

**POLS 838.6 — 1&2(3S)
Rights and Community**

A survey of major theoretical issues underlying questions of rights in the context of contemporary politics, with special attention to Canada.

**POLS 839.3 — 1/2(3S)
Contemporary Political Philosophy**

Examines several of the approaches and thinkers of the rebirth of political philosophy in the last half of the 20th century. In particular, how some of these contemporary political theorists analyze central topics in political philosophy: justice, obligations, rights, public interests, power, state, society, history, etc.

**POLS 840.3 — 1/2(3S)
Comparative Government Bureaucracy**

An examination of the functioning and implications of bureaucracy in selected industrialized states.

**POLS 841.3 — 1/2(3S)
Comparative Public Policy**

An examination of public policy and policy making in selected industrialized states.

**POLS 849.3 — 1/2(3S)
Theory and Method in Comparative Government and Politics**

Investigates the range of theories that are being used in contemporary political science to examine political phenomena from a cross-national perspective. Also examines the methodological issues that arise in approaching the study of politics and government in this way.

**POLS 852.6 — 1&2(3L)
Selected Topics in Political Sociology**

A discussion of metaphors, models and systems within the context of modern ideologies, socio-political doctrines and political cultures.

**POLS 853.3 — 1/2(3L)
Political Leadership in Anglo Western Democracies**

A comparative analysis of political leadership in Great Britain, the United States, and Canada, with particular reference to the selection of party leaders and the characteristics of those who lead political parties.

**POLS 854.3 — 1(3L)
Political Parties and Voting Behaviour**

An examination of political parties, party systems and electoral behaviour.

**POLS 859.3 — 1/2(3S)
Political Sociology**

Intensive examination of the work of one or more contemporary sociologists or social theorists, or of the debate concerning one or more key concepts in the literature of political sociology.

Prerequisite(s): Should have completed previous coursework in political philosophy or social and political thought.

**POLS 865.3 — 1/2(3.5S)
Decision Making Theory and Canadian Foreign Policy**

Explores some of the more advanced theoretical literature in the area of foreign policy decision-making and adapts it for use in the study of Canadian foreign policy. Employs a variety of analytical models, e.g., rational actor, national interest, role analysis, operational codes, etc. to examine specific cases of Canadian foreign policy decision-making in the post World War II period.

**POLS 866.3 — 1/2(3.5L)
Canadian Foreign Policy Process**

Explores in depth various aspects of the Canadian foreign policy process. The focus will be on the executive (Prime Minister and Cabinet) the bureaucracy (The Department of External Affairs, and the relevant central agencies) and the legislature (Parliament and its committees) and the role played within the policy process of special interests, the media and the provinces.

**POLS 869.3 — 1/2(2.5S)
Graduate Seminar in International Relations**

Surveys and assesses major theories of international relations and examines the assumptions and methodological approaches which underlie them. Both classical and modern scientific theories are examined in terms of internal consistency, relationship to data, and over-all utility for the describing, explaining and predicting of international behaviour.

**POLS 898.3 — 1/2(3L)
Special Topics**

Reading, essays, and discussion in an approved special field.

**POLS 899.6 — 1/2(3L)
Special Topics**

Reading, essays, and discussion in an approved special field.

**POLS 990
Seminar**

Papers and discussions on topics in political studies. Graduate students are required to attend and take part in these meetings. Every graduate student is expected to present a seminar on their thesis topic before receiving the graduate degree.

**POLS 994
Research**

Students writing a Master's thesis must register for this course.

**PSIA —
PSYCHIATRY**

College of Graduate Studies and Research

**PSIA 851.3 — 1(2L)
Biological Psychiatry**

Offered annually and comprised of: (1) a series of basic lectures on neurochemistry, neurophysiology, neuropharmacology, neuroendocrinology, etc. especially as applied to psychiatry and neurology, and (2) a series of student presentations in a seminar/ discussion format on the biological theories of the mechanisms underlying selected psychiatric and neurological disorders.

Prerequisite(s): PCOL 350, BIOC 220 (or 203) or equivalents, or instructor approval.

**PSIA 852.3 — 2(2L)
Clinical Psychiatry**

Offered annually and comprised of: (1) a series of lectures on the diagnosis and treatment of a variety of psychiatric and neurological disorders combined with a case presentation, and (2) a series of student presentations in a seminar/ discussion format on the biological theories of the mechanisms underlying selected psychiatric and neurological disorders.

Prerequisite(s): PSIA 851.3, or instructor approval.

**PSIA 898.3 — 1/2(3R/T)
Special Topics**

Study in selected areas of neuroscience or neuropsychiatry may be undertaken by advanced students with the permission of the department head. Consists of supervised readings and discussion leading

to the preparation of a term paper by the student.

Prerequisite(s): PSIA 850.

**PSIA 899.6 — 1&2(3R/T)
Special Topics**

Study in selected areas of neuroscience or neuropsychiatry may be undertaken by advanced students with the permission of the department head. Consists of supervised readings and discussion leading to the preparation of a term paper by the student.

**PSIA 990
Seminar**

Students are required each year to attend the departmental seminar series and to present one formal seminar on an assigned topic and one informal seminar on their research activities.

**PSIA 994
Research**

Students registered in a Master's thesis program must register in this course.

**PSIA 996
Research**

Students registered in a Ph.D. thesis program must register in this course.

**PSY —
PSYCHOLOGY**

Department of Psychology, College of Graduate Studies and Research

**PSY 800.3 — 1/2(3S)
Graduate Seminar in Psychology**

An advanced survey of theory and research in basic areas of psychology: learning and motivation, perception and cognition, physiological and comparative, personality and social, and developmental psychology.

**PSY 801.3
Culture Mental Health and Illness**

This advanced seminar examines the role of culture in understanding mental health and illness. Adopting a critical perspective, the course explores the meaning of culture, how disorders are constructed within the culture of biomedicine, how mental health and illness is configured cross-culturally, and how issues of culture are handled in research and treatment.

**PSY 805.3 — 1/2(3L)
Statistics I Univariate General Linear Models**

A theoretical and practical examination of univariate statistical analyses. Topics will include: a review of basic concepts, hypothesis tests on means, power,

correlation and regression (simple and multiple), ANOVA (simple, factorial, and repeated measures), multiple comparisons, ANCOVA, overview of general linear models, and chi-square tests. Through several computer assignments, students will develop the necessary experience to be competent at conducting and interpreting univariate statistical analyses.

PSY 807.3 — 1/2(3L)
Statistics III Multivariate Statistics

The course objective is for graduate students to gain some knowledge of and experience with using multivariate statistics that are frequently used by psychologists dealing with non-experimental or quasi-experimental data. The course will cover multiple regression, factor analysis, multivariate analysis of variance, and structural equation modeling.

PSY 808.3 — 1/2(3L)
Advanced Psychometric Methods

Measurement theory and some of its applications, e.g., test construction, in-depth treatment of reliability and validity. Theoretical considerations involved in the measurement of abilities, intelligence and personality.

PSY 809.3 — 3L
Qualitative Research

This course is designed to introduce students to ways of doing research that are based in a constructionist epistemology and that focus on the generation and analysis of qualitative data. Coverage of specific methodologies (e.g., narrative research, grounded theory, discourse analysis) will be grounded in an understanding of their philosophical foundations.

Prerequisite(s): Undergraduate degree.

PSY 810.3 — 1&2(3S)
Methods of Applied Social Research

An advanced coverage of the theory and practice of social research in applied settings. A practicum component involving supervised field research projects will be the major focus of the course.

PSY 811.3 — 1&2(3S)
Program Evaluation

An intensive analysis of the processes of developing and evaluating human service programs. Major topics will include the articulation of program goals, the development of measures, evaluation designs, and statistical techniques.

PSY 815.6 — 1&2(2L-2S-3P)
Psychological Assessment

A basic course in techniques for assessment of ability and personality,

including interviewing skills, general intelligence testing, special ability testing, and personality appraisal.

PSY 816.3 — 1/2(3S)
Topics in Psychological Assessment

A brief but intensive seminar on selected topics in psychological assessment. Topics may include: neuropsychological assessment, forensic assessment, projective personality assessment, vocational assessment, assessment of psychological components of physical illnesses, behavioral assessment.

PSY 820.3 — 1/2(3S)
Organizational Psychology and Organizational Development

Advanced coverage of theoretical concepts and practical methodology relating to the study and change of human service organizations. Students participate in field experiences involving research and/or consultation with such organizations.

PSY 821.3 — 1/2(3S)
Community Psychology I

Current theory, research and methodology in the area of community psychology. Environmental determinants of behavioral change, preventative procedures, epidemiology and process research will be emphasized. Practicum experiences in community settings are incorporated into the course.

PSY 822.3 — 1&2(1.5S)
Pro-Seminar in Psychology

A required course for psychology graduate students in the Clinical and BBS streams. Students will attend a monthly seminar offered by a departmental or visiting faculty member. The seminars will offer students high-level exposure to the discipline of psychology, addressing current issues historical perspectives, and research methods in social, developmental, cognitive, cultural, physiological and neuropsychology.

Formerly: Replaces PSY 880.3 and 881.3. **Note:** This course will be offered 1.5 hours per month (4th Thursday) totalling 6 or 7 times per year.

PSY 830.3 — 1/2(3S)
Advanced Seminar in Personality

An intensive study of current theory and research in the area of personality.

PSY 831.3 — 1/2(3S)
Advanced Behavioral Pathology

An intensive study of current theory and research in the field of behavioral pathology. Behavioral disorders in children, adults and the aged will be covered in this seminar.

PSY 832.3 — 1/2(3S)
Advanced Seminar in Social Psychology

Presents historical and conceptual analysis of modern social psychology. Covers such topics as the history of social psychology, differences between psychological and sociological social psychologies, epistemological (post-positivism, social constructionism), and methodological foundations of various forms of social psychology. Evolutionary roots and the role of culture in social behavior are also discussed.

PSY 833.3 — 1/2(3S)
Advanced Seminar in Environmental Psychology

The consequences of environmental manipulation on human behaviour. Basic psychological processes in relation to the environment, current methods in environmental research, individual needs in the organization and planning of environments and cultural designs will be studied.

PSY 834.3 — 1/2(3S)
Advanced Seminar in Group Processes

A critical review of theory, research and practice related to group behaviour, including factors influencing communication, decision-making, group cohesiveness and productivity.

PSY 835.3 — 1/2(3S)
Advanced Seminar in Developmental Psychology

A critical review of theory, research and methodologies related to development psychology. The entire developmental sequence from the pre-natal period to infancy, childhood, adulthood, and senescence is reviewed.

PSY 836.3 — 1/2(3S)
Advanced Seminar in Motivation

A critical review of theories and research in the area of motivation. Data from human and infrahuman experiments are studied.

PSY 837.3 — 1/2(3S)
Advanced Seminar in Human Memory

Examines current issues in the field of human learning and memory. These will include 1) the cognitive architecture of human memory systems, 2) how information is represented and organized in memory, and 3) the role of consciousness in the storage, retrieval, and processing of information.

PSY 838.3 — 1/2(3S)
Advanced Seminar in Language Processing

Critical presentation and discussion of recent research and theory on the psychology of language, from a cognitive and neuroscience perspective. Topics may include normal and impaired word recognition, speech perception, reading, language acquisition, and localization of function (e.g., fMRI). Different modeling perspectives on these topics will also be discussed.

PSY 839.3 — 1/2(3S)
Thinking and Reasoning

Deals with cognitive approaches to issues of human rationality. We will address questions such as: When is a decision judged to be rational/irrational? How do we interpret evidence to suggest that reasoners frequently fail to make normatively appropriate decisions? How is our decision-making ability limited by our cognitive resources?

PSY 840.3 — 1/2(3S)
Advanced Seminar in Cognitive Skill

The course will examine empirical and theoretical analyses of cognitive skill and expertise. We will consider how expertise in variety of skill domains can be understood in terms of the acquisition of specialized perceptual and cognitive processes and structures.

PSY 842.3 — 1/2(3S)
Advanced Seminar in Physiological Psychology

A critical review of basic research in physiological psychology. Research in classical and current problems is studied with a focus on neural coding, sensory, motor, motivational, affective, reward systems as well as learning and memory.

PSY 843.3 — 1/2(3S)
Advanced Seminar in Comparative Psychology

An intensive study of the comparative method and its application to behaviour with an emphasis upon infrahuman organisms. Research on innate behaviour, early experience, learning, motivation and physiological processes is reviewed from a comparative viewpoint.

PSY 844.3 — 1/2(3S)
Advanced Seminar in Behavioral Pharmacology

A critical review of research in the field of behavioral pharmacology. Deals with the main principles of drug action, behaviourally active drugs, and behavioral mechanisms of drug action. The experimental analysis of problems associated with drug dependence, drug-induced changes in the electrical activity of the brain, behavioral toxicology and the psychopharmacology of affective disorders is emphasized.

PSY 846.3 — 1/2(1L-2S)
**Advanced Seminar in Human
Neuropsychology**

A critical review of theory, research and methodology in human neuropsychology. Using a combination of lectures and seminars, students will be exposed to the recent literature on topics such as brain localization and lateralization of functions, brain damage and recovery, and the neuropsychology of higher-order functions.

PSY 850.3 — 1/2(3S)
Topics in Psychological Therapy I

Principles and procedures of individual psychological therapy and counselling. One or two specific systems of psychotherapy are studied.

PSY 852.3 — 1/2(3S)
Topics in Psychological Therapy II

An intensive study of principles and procedures of individual psychological therapy and counselling. One or two specific systems of psychotherapy are studied.

PSY 853.3
Child Psychopathology and Intervention

Prepares students to recognize a wide range of disorders of infancy, childhood and adolescence, and to introduce particular child, parent, family, and community intervention techniques that have been found to be effective for those conditions. Videotape and role play of intervention techniques will be used.

PSY 858.3 — 1/2(1.5S)
**Ethical and Professional Issues in
Clinical Psychology**

Introduction to ethical principles, codes, and processes for ethical decision-making with a special focus on clinical psychology. Readings and discussion on confidentiality, informed consent, dual relationships, duties to clients, business practices, and other professional issues. Equips students to resolve ethical dilemmas in practice and in licensure examinations.

PSY 860.3 — 1&2(3S)
Seminar on Professional Skills

This seminar is designed to develop the professional competence of clinical-community Ph.D. students through the study and discussion of professional issues and problems in clinical and community practice. Both theoretical and practical issues will be considered as they arise from ongoing practicum activities. Required of all Clinical Ph.D. students.

PSY 862.3 — 1/2(3S)
**Seminar on Identity of Applied Social
Psychology**

An advanced seminar on the unique and evolving identity of the field of applied social psychology as an interdisciplinary effort by professional scholar-practitioners. Issues to be discussed include those of basic definition, relationship to experimental social psychology, graduate training, the requirements of professional practice including ethics and standards, and the future of the field.

PSY 864.3 — (3S)
**Theory and Applied Issues in Social
Psychology**

This course will introduce Ph.D. students to specialized research areas in social psychology, with a focus on relevant theory and applications. Advanced social psychological topics will be discussed along with their applications to a broad range of social issues.

PSY 865.3 — (3S)
Applied Research Designs

This course is an advanced seminar in applied research design from a post-positivist critical multiplism perspective. Students will examine the validity and the applicability of randomized experimental designs, quasi-experimental designs, and single case and time series designs. The use of qualitative methods to complement and enrich quantitative methods will be discussed.

Prerequisite(s): PSY 805; PSY 807.

PSY 880.3 — 1/2(3S)
**Seminar in Foundations of Psychology I
Biological and Cognitive**

This seminar provides an introduction to the biological and cognitive foundations of psychology, including attention to the history, theoretical systems, methodologies, and developmental aspects of each subdiscipline, and an overview of selected current research issues. Students' oral and written communication skills, and their skill in understanding and evaluating research, will be developed.

Note: Offered alternate years with PSY 881.

PSY 881.3 — 1/2(3S)
**Seminar in Foundations of Psychology II
Social and Cultural**

This seminar provides an introduction to the social and cultural foundations of psychology, including attention to the history, theoretical systems, methodologies, and developmental aspects of each subdiscipline, and an overview of selected current research issues. Students' oral and written communication skills, and their skill in understanding and evaluating research, will be developed.

Note: Offered alternate years with PSY 880.

PSY 882.6 — 1&2(3S)
Culture and Human Development

Introduces the philosophical bases of social and behavioral sciences and covers various theoretical and methodological approaches to understanding and studying culture and human development. It is taught by a multidisciplinary team of scholars.

PSY 890.6 — 1&2(3S)
Clinical Research Seminar

A seminar on contemporary issues in clinical and community research. Theoretical, methodological and ethical issues in the areas of assessment, therapy, personality, abnormal and community research will be emphasized. There is particular focus upon students' and faculty research interests. Required of all Clinical Ph.D. students.

PSY 898.3 — 1/2/1&2(R)
Special Topics

The student pursues a program of readings in selected research topics under the supervision of individual faculty members.

PSY 900
Directed Research in Psychology

Individualized research projects under the supervision of faculty members.

PSY 902 — 1&2(3P-2C)
Practicum in Professional Psychology

Consists of supervised field work in professional psychology under the direction of individual faculty members.

Note: Taken in conjunction with other courses in the clinical-community and applied social programs.

PSY 903
Clerkship in Professional Psychology

The student is engaged for one term as an intern in a clinical community setting. Supervision is provided by departmental faculty members and psychologists in field settings.

Note: Taken in conjunction with other courses in the clinical-community and applied social programs.

PSY 904 — 1&2&3(31C)
Internship in Professional Psychology

The student is engaged for one year as an intern in a clinical community setting. Supervision is provided by psychologists in field settings.

Note: Taken in conjunction with other courses in the clinical-community and applied social programs.

PSY 994
Research

Completion of original research and writing of Master's thesis.

PSY 996
Research

Completion of original research and writing of Ph.D. dissertation.

RLST — RELIGIOUS STUDIES

Department of Religious Studies & Anthropology, College of Graduate Studies and Research

RLST 898.3
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

RLST 994
Research

Students writing a Master's thesis must register for this course.

SCP — SCHOOL AND COUNSELLING PSYCH

Department of Educational Psychology & Special Education, College of Graduate Studies and Research

SCP 810.3 — (3L)
**Ethics in Counselling and School
Psychology**

Addresses ethical issues in school and counseling psychology as related to practice, research, and teaching. The course assists students in preparing to meet the requirements for licensure in psychology.

SCP 811.3 — (3L)
**Psychopathology Assessing
Developmental Risk**

Focuses on those variables that increase the vulnerability of children and youth to psychopathology and on the ways in which protective factors combine and interact to promote resilience.

SCP 812.3 — (3L-3P)
**Assessment of Intelligence and Cognitive
Abilities**

Focuses on an in-depth and critical study of intelligence, as well as the acquisition of assessment skills as they relate to both understanding and assessing psychopathology and wellness.

SCP 813.3 Academic Achievement and Language Assessment and Intervention

Designed to provide students with a basic knowledge of the assessment of academic achievement, language development and the psychological processes that enhance academic performance. Emphasis is placed on early identification, formal and informal assessment procedures, and intervention design.

Prerequisite(s): Completion of Term I of the Master's program in School and Counselling Psychology, including SCP 811 and 812.

SCP 814.3 — 1(3L-3P) Individual Interventions

Explores human change theories and the application of corresponding interventions within the practice of school and counseling psychology.

Prerequisite(s): EPSE 417 and enrolment in the School and Counselling Psychology program.

SCP 815.3 — (3L) Family Interventions

Based in a risk and resiliency perspective, this course will provide a balanced presentation of family systems theory, research, and practice for graduate students preparing to work with families in both school and community settings.

Prerequisite(s): SCP 812 and enrolment in the School and Counselling Psychology program.

SCP 816.3 — 1/2(2L/1P) Group Interventions in Schools and Communities

Provides students with the understanding of group dynamics and the development of group process and the competencies to facilitate both process and psychoeducational groups.

Prerequisite(s): SCP 812 and admission to the Master's program in School and Counselling Psychology.

SCP 817.3 — (3L) Career and Transition Planning

Explores the systemic nature of career within the context of demographic, labour market, and global economic trends. The primary objective is to develop the

understandings and competencies required to provide career services, from a resiliency/wellness perspective, to a wide range of clients.

Prerequisite(s): Enrolment in the Master's program in School and Counselling Psychology or permission of the instructor.

SCP 818.3 Practicum I

Under the supervision of faculty members working in coordinated teams, students provide integrated school and counseling psychology services to children and youth in a university clinic setting.

Prerequisite(s): Completion of year I of the Master's program in School and Counselling Psychology.

SCP 819.3 Practicum II

Under the direct and regular supervision of school and agency-based psychologists and therapists in consultation with faculty, students provide school and/or counselling psychology services to children and youth.

Prerequisite(s): Successful completion of SCP 818 and admission to the Master's program in School and Counselling.

SCP 820.0 Internship

This 1600 hour internship, completed at an approved site, provides students with advanced supervision practice in school and/or counseling psychology.

Prerequisite(s): Successful completion of SCP 819 and recommendation of SCP Faculty.

SCP 898.3 Special Topics

Topics for individual study are selected by the student in consultation with a faculty advisor. The study may take the form of an extensive report or a project which is evaluated by the faculty member. The area must be one which is not covered by an existing graduate course.

Prerequisite(s): Permission of instructor and head of department.

SCP 899 Special Topics

Offered occasionally by visiting faculty and in other special situations to cover, in depth, topics that are not thoroughly covered in regularly offered courses.

SCP 990 Professional Identity Seminar

This seminar, which occurs during the first three weeks of year I, Term 1 and involves a set of classroom and community experience, introduces each new cohort of students to the profession of Psychology and the practice of School and Counselling Psychology.

Prerequisite(s): Admission to the Master's program in School and Counselling Psychology.

SCP 991 Professional Practice Seminar

Provides a forum in which students are supported in their practicum placements through team collaboration and supervision and in which they benefit from the experiences of their colleagues in a variety of practicum settings.

Prerequisite(s): Completion of Year I of the Master's program in School and Counselling Psychology.

Corequisite(s): SCP 818 and 819.

SCP 994 Research

A student undertaking research leading to a Master's thesis must register in this course each year until the thesis is completed.

This applies to thesis work done extramurally as well as intramurally.

Prerequisite(s): Admission to the Master's program in School and Counselling Psychology.

SLSC — SOIL SCIENCE

Department of Soil Science, College of Graduate Studies and Research

SLSC 802 Experimental Topics in Soil Science

Allows tutorial, reading and research in a specific area of Soil Science other than the thesis project. The student working under faculty guidance will perform specific experiments and write their data in the format of a published paper. Enrolment permitted with the approval of the Chair and the instructor concerned.

SLSC 803.3 — 1&2(2L-4P) Instrumental Techniques in Soil Research

The theory and application of instrumental measurement techniques to the study of soil. Measurement of gases and water, elemental composition, and characterization of microbial, humic and mineral constituents using advanced instrumentation are covered in the form of modules given over two terms.

SLSC 808.3 — 1(2L-1S) Stable Isotope Applications in Soil Science

The use of stable isotopes of C, N, O and S to investigate a variety of environmental questions will be examined. Potential topics include: soil organic matter turnover, role of carbonates in C sequestration, greenhouse gas emissions, soil and fertilizer nitrogen usage, soil sulfur dynamics and soil/plant water dynamics.

Course objectives are to: introduce students to the use of stable isotopes to investigate a variety of environmental issues; provide students with hands-on experience with sample preparation for mass spectrometry analysis; analyse and interpret stable isotope data; enhance oral and written critical thinking skills through oral and written assignments.

Prerequisite(s): Permission of instructor.

SLSC 812.3 — 1(3L) Plant Root System and Nutrient Uptake

Principles of nutrient movement in soils and absorption by plant roots. Examines root sampling and measurement techniques, with possible afternoon field trip, weather permitting. Considers ways of expressing soil and plant factors and mechanisms of nutrient movement and uptake quantitatively, and identifies parameters needed to mathematically model nutrient uptake. Simulation models for nutrient uptake will be utilized.

SLSC 813.3 — 1(3L) Surface Chemistry of Soils

A general graduate course that discusses chemical reactions in the soil solution and at the soil/water interface. Fundamentals of surface charge, solution speciation, absorption, precipitation, and redox chemistry are covered. Case studies and current research projects are used to reinforce fundamental concepts and show their relevance to environmental issues.

Prerequisite(s): One of the following: an undergraduate degree in chemistry, an undergraduate course in soil chemistry, an undergraduate course in aqueous geochemistry, or permission of the instructor.

SLSC 821.3 — 2(3L) Soil Physics

The physical principles involved in water and solute/contaminant transport in soils. Examination of a variety of current methods for determination of soil hydraulic and transport properties. Influence of spatial variability in soil hydraulic properties on water and chemical transport in soils. Practical applications of these principles and measurement methods in agricultural, hydrological and environmental sciences.

**SLSC 832.3 — 1(2L-3P)
Soil Landscape Analysis**

Provides both practical training in the principles and techniques used to research soil landscapes and an examination of the theoretical basis for soil landscape analysis. A two to four-day field exercise is held early in the term, during which students become familiar with describing landscapes and appropriate sampling methods.

**SLSC 834.3 — 1(2L)
Field Studies of Saskatchewan Soils**

Provides students with in-depth training in the classification and interpretation of the major soils of Saskatchewan. The course involves extensive field work followed by coverage of key concepts in lecture and seminars.

Prerequisite(s): Soil genesis or surficial geology course or permission of Instructor.
Note: Costs associated with the field trips will be charged to the student.

**SLSC 841.3 — 2(3L)
Biochemistry of Soil**

Lectures and laboratory studies on recent advances in soil biochemistry. A discussion of the nature and activity of enzymes in soil and their influence on the cycling of organic matter and other nutrient elements. Of particular interest is the relationship between biochemical processes and soil quality and fertility

**SLSC 842.3 — 2(3L)
Soil Microbiology**

Lectures and reading on recent advances in soil microbiology. Discussions of transformations of plant nutrients and soil humic compounds by microorganisms in soil, microbial growth, and plant-microbe interactions.

**SLSC 843.3 — 1(3L-2P)
Soil Nitrogen in the Environment**

An advanced study of organic and inorganic nitrogen (N) in soils and the impact of soil N on the environment. The soil N-cycle will be examined and biological and chemical transformations will be studied with an emphasis on research techniques used to detect and monitor soil N and soil N transformations.
Prerequisite(s): Permission of Instructor.

**SLSC 862.3 — 2(3L)
Forest Soil Biogeochemistry**

The course looks at the various nutrient fluxes in forests and how they can influence soil fertility and tree productivity. Students will become familiar with acid deposition and soil acidification

as well as forest management operations and natural disturbances affecting soil resources. The use of simulation software is also emphasized.

**SLSC 871.3 — 1/2(2L-2T)
Research Design and Statistical Analysis in Soil Science**

Designed to give students training in practical aspects of research design and statistical analysis in soil science. The course will provide students with sufficient background to critically evaluate research designs and statistical analytical approaches commonly used in the soil science literature.

Prerequisite(s): Soil Science graduate student or permission of the instructor.

**SLSC 898.3 — 1&2(3S)
Special Topics**

Provides for a program of reading and discussion under faculty guidance. Students will prepare a series of essays in an area of concentration different from that of their thesis. Enrolment permitted with the approval of the Chair of the department and the instructor concerned.

**SLSC 899.6
Special Topics**

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

**SLSC 990
Seminar**

Soil Science graduate students must register and attend annually for the duration of their program. Postgraduate Diplomas and M.Agr. students are required to present one seminar on their SLSC 992 project. M.Sc. and Ph.D. students are required to present two and three seminars, respectively, during their program, with the student's final seminar given directly prior to their thesis defense.

**SLSC 992.6
Project**

Students undertaking the project Master's degree (M.Agr.) must complete this course as part of the requirements for the degree.

**SLSC 994
Research**

Students writing a M.Sc. thesis must register for this course.

**SLSC 996
Research**

Students writing a Ph.D. thesis must register for this course.

SOC — SOCIOLOGY

Department of Sociology, College of Graduate Studies and Research

**SOC 802.3 — 1/2(3S) or 1&2(1.5S)
Advanced Seminar in Sociology of Agriculture**

Theoretical and research approaches to the political and social economy of agriculture. Emphasis is given to contemporary works on agro-industrial reorganization, agro-food technology, sustainability, state intervention, international trade, aid, and agrarian reform.

**SOC 805.3 — 1/2(3S) or 1&2(1.5S)
Social Change**

The application of various social models to the analysis of social change. Consideration of selected theory and research on change and development.

**SOC 809.3 — 1/2(3S) or 1&2(1.5S)
Sociology of Development**

Review of present theories of development. Emphasis will be on the search for missing variables in theories of development produced by western social scientists. Considers development as a function of mobilization of resources and commitment of local people to the process of social change.

**SOC 811.3 — 1/2(3S) or 1&2(1.5S)
Family II Marriage**

Study and discussion of the recent developments in research and theory in selected aspects of the area of marriage and the family behaviour.

**SOC 812.3 — 1/2(3S) or 1&2(1.5S)
Advanced Seminar in Ethnic Relations**

Theoretical aspects of interethnic processes; comparative analysis of empirical research on ethnic minorities within Canada and selected other societies.

**SOC 813.3 — 1/2(3S) or 1&2(1.5S)
Seminar in Sociology of Religion**

Advanced Seminar in Sociological Theories of Religious Behaviour.
Prerequisite(s): SOC 217 or 321, or written permission of the department.

**SOC 814.3 — 1/2(3S) or 1&2(1.5S)
Social Conflict**

Current issues and special problems in the sociology of conflict.

**SOC 815.3 — 1/2(3S) or 1&2(1.5S)
Selected Problems in Social Control**

Classical and contemporary theoretical debates on issues of social control with a specific focus in judicial and therapeutic forms of control.

**SOC 816.3 — 1/2(3S) or 1&2(1.5S)
Industrialism and Social Welfare**

An advanced course examining various theoretical perspectives on industrialization and the institution of social welfare in the context of industrialism. Selected issues particularly relevant to Canada, such as resource development, social policy and the Native People will be included.
Prerequisite(s): One of SOC 220, 215, 315, 316 or permission of the instructor.

**SOC 817.3 — 1/2(3S)
Sociology of Industrial Relations**

Examines the need for articulated systems of industrial relations in contemporary societies. Issues covered include: the relationships between labour processes and industrial relations; variations in industrial relations regimes; specific systems including Canada, Sweden, USA, UK, and Japan as well as their historical-sociological determinants.
Prerequisite(s): SOC 215 or 316.

**SOC 818.3 — 1/2(3S) or 1&2(1.5S)
Advanced Seminar in Criminology**

An in-depth examination of historical developments leading to contemporary criminological discourse in Western societies. An analysis and critique of theory and method which characterizes different schools of criminological inquiry and their relationship to research in an international context.
Prerequisite(s): SOC 418.

**SOC 819.3 — 1/2(3S) or 1&2(1.5S)
Advanced Seminar in Victimology**

A critical analysis of recent development in victimology including an in-depth study of the methodological considerations necessary for studying processes and patterns of victimization. Students will be expected to participate in field research.
Prerequisite(s): SOC 332 and 418.

**SOC 820.3 — 1/2(3S) or 1&2(1.5S)
Medical Sociology**

Comparative study of Health-Care Systems, Medical Institutions, and the relationships between Medical and Allied Health Professions, Society, the State, and the delivery of health-care.
Prerequisite(s): Written permission of the instructor.

SOC 822.3 — 1/2(3S) or 1&2(1.5S)
Social Stratification and Social Mobility

Review of classical and modern theories of stratification and introduction to methods of studying social mobility. Emphasis on recent developments in models of stratification.

Prerequisite(s): 18 credit units SOC including SOC 226.

SOC 825.3 — 1/2(3S)
Political Sociology

Examines recent developments in theories of the state and different contemporary schools of thought, including structuralism, instrumentalism, and post-structuralism. The adequacy of emergence of social policy and the ability of theoretical models to account for historical/empirical developments.

SOC 826.3 — 1/2(3S)
Advanced Seminar in Social Policy

The formulation, development, management and impact of social policies. Includes analysis and evaluation of social policies in income security, social services, employment, housing and other areas concerned.

SOC 828.3 — 1/2(3S) or 1&2(1.5S)
Small Groups

The analysis of the small group with special reference to the problems of leadership, communication networks, deviance, and division of labour for specified group types. Review of the literature of small group experiments.

SOC 830.3 — 2(3S)
Sociology of Science and Knowledge

The social conditions and consequences of the production, distribution and consumption of scientific and other forms of knowledge are examined in this course. Deploying classical and contemporary theories, specific institutional settings and ongoing debates over concepts and issues such as knowledge society, indigenous knowledge, corporatization of the university, gendered knowledge etc. are critically examined.

SOC 831.3 — 2(3L)
Sociological Conceptions of Risk

Examines the emergence of what has been called the risk society. Topics covered include: risk issues; risk management; communication and perceptions research; the political processing of risk; role of the media; and risk regulation.

SOC 835.3 — 1/2(3S) or 1&2(1.5S)

New Directions in Sociology of Education

Understanding and application of significant recent developments in sociological theory and research on education.

Prerequisite(s): SOC 222 or permission of the instructor.

SOC 840.6 — 1&2(3S)
Advanced Theory

Recent developments, current trends, and future prospects in sociological theory. Also introduction to formalization of theory; survey of evaluative criteria in Theory Building and methodological problems involved in this process.

SOC 841.6 — 1&2(3S)
Advanced Methodology

An advanced review of the logic, concepts and components of scientific research designs and methods and to quantitative statistical methods for the analysis and interpretation of sociological data.

SOC 842.3 — 1/2(3S) or 1&2(1.5S)
Womens Studies

A review of established theories of gender stratification with an emphasis upon current problems in research and theory construction.

Prerequisite(s): SOC 342.

SOC 890.3 — 1/2(3S) or 1&2(1.5S)
Critical Perspectives on Social Analysis

An advanced seminar on conventional and alternative approaches to social analysis. The course contrasts positivist, rationalist orientations to social analysis with emergent critical alternatives such as critical sociology, postmodernism, feminist epistemologies, and minority discourses such as indigenous ways of knowing. Students will integrate critical understanding of social analysis with an applied examination of social policy and substantive areas of social change.

Prerequisite(s): Admission to the Ph.D. program or permission of the department.

SOC 891.3 — 1/2(3S) or 1&2(1.5S)
Theory and Method of Social Analysis

An advanced seminar which integrates theory and method in social analysis. Various types of social analysis will be discussed, including theory driven research, policy research, action oriented research and evaluation research. The focus is to develop sound analytical frameworks in conducting social analysis and in assessing research results. Students will develop a theoretically-grounded

research problem on the basis of an existing body of literature, design a method, and obtain and analyze data.
Prerequisite(s): Admission to the Ph.D. program or permission of the department.

SOC 898.3 — 1/2(3S) or 1&2(1.5S)
Special Topics

Concentrated reading in special areas of sociology culminating in a written report. Area of concentration must be different from regularly scheduled courses.
Prerequisite(s): Permission required.

SOC 899.6
Special Topics

Concentrated reading in special areas of sociology culminating in a written report. Area of concentration must be different from regularly scheduled courses.

SOC 910.0 — 1&2
Research Internship (China)

Full-time formal or practical contributions to a research program in an unfamiliar environment. Students in dual M.A. in Globalization and Development will register for this course in lieu of SOC 994 during required terms in China.
Prerequisite(s): Restricted to students registered in the Dual M.A. in Globalization and Development (University of Saskatchewan and Xi'an Jiaotong University).

SOC 990
Seminar

The seminar involves presentations of papers and discussion by graduate students, department and cognate faculty, and visiting scholars. Each graduate student must register in and attend the seminar on a continuous basis, receiving credit when they have successfully presented a seminar.

SOC 992.6
Project

A research paper on a topic approved by the candidate's Advisory Committee is required. The paper should be concerned with discussing a meaningful sociological question and may be empirical in nature, a critical review of the literature or a critical analysis of a substantive problem. The paper will be supervised and evaluated by the Advisory Committee.
Prerequisite(s): Restricted to students registered in the project option.

SOC 994
Research

Students writing a Master's thesis must register for this course.

SOC 996
Research

Students writing a Ph.D. thesis must register for this course.

SPAN — SPANISH

Department of Languages & Linguistics, College of Graduate Studies and Research

SPAN 898.3
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

SPAN 994
Research

Students writing a Master's thesis must register for this course.

STAT — STATISTICS

Department of Mathematics & Statistics, College of Graduate Studies and Research

STAT 841.3 — 1/2(3L)
Probability Theory

Probability spaces and random variables. Distribution functions. Convergence of random variables. Characteristic functions. Fundamental limit theorems. Conditional expectation.
Prerequisite(s): STAT 241 and MATH 371, or permission of the department.

STAT 842.3 — 1/2(3L)
Stochastic Processes

Stochastic processes and random functions. Random walks, Markov property, and Martingales. Stationary processes and ergodic theorems. Invariance principles and strong approximation.
Prerequisite(s): STAT 841.

STAT 843.6 — 1&2(3L)
Experimental Design and Analysis

Statistical analysis of the following experimental designs: completely randomized, randomized complete block, factorial, Latin square, incomplete block, fractional replications, confounded, lattice, split plot and nested designs. Development of the concepts of fixed, mixed and random experimental models, regression analysis, and optimality of designs.

STAT 844.6 — 1&2(3L)
Statistical Inference

Estimation: Problem of point estimation, unbiased estimation, lower bounds for the variance, complete and sufficient statistics, minimax estimation, admissibility, invariance, estimation by confidence sets. Testing Hypotheses: Neyman-Pearson fundamental lemma and uniformly most powerful tests, unbiased invariance, linear hypotheses, minimax principle.

STAT 845.3 — 1/2(3L)
Statistical Methods for Research

Statistical methods as they apply to scientific research, including: Experimental design, blocking and confounding, analysis of multifactor experiments, multiple regression and model building.
Prerequisite(s): STAT 242 or 245 or permission of the department.

STAT 846.3 — 1/2(3L)
Special Topics in Probability and Statistics

Topics will be related to recent developments in statistics and probability (multivariate statistics, time series, experimental design, non-parametric statistics, etc.) of interest to the instructor and students.

STAT 847.6 — 1&2(3L)
Special Topics in Probability and Statistics

Topics will be related to recent developments in statistics and probability (multivariate statistics, time series, experimental design, non-parametric statistics, etc.) of interest to the instructor and students.

STAT 848.3 — 1/2(3L)
Multivariate Data Analysis

A survey of methods for analyzing discrete and continuous multivariate data. Includes: Log-linear models, logistic regression, canonical correlation, discriminant analysis, cluster analysis, MANOVA, factor analysis.
Prerequisite(s): COMM 395, STAT 345, 845 or permission of the department.

STAT 849.3 — 1/2(3L)
Spectral Analysis of Time Series

Introduction to spectral analysis for graduate students with reasonable competence in Mathematics at the third year level and some exposure to probability and statistics. Topics include a description of Wiener and stochastic approaches to Spectral Analysis, spectral representation of univariate and multivariate time series, linear filters, spectral estimation, sampling theory for spectral estimators

STAT 898.3
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

STAT 899.6
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

SURG — SURGERY

Department of Surgery, College of Graduate Studies and Research

SURG 801.6 — 1&2(4S)
Surgery

Seminars deal with general surgery and principles of surgery, and Surgical Grand Rounds from September 1 to June 30 in order to provide a clinical orientation to the student's experimental work and study of the basic sciences. Written and oral examinations are held at the end of the course.

SURG 802.3 — 1/2(2L-1S)
Surgery

Each student is required to prepare work for this. A study of both basic science as applied to general surgery and the fundamentals of surgical disease processes is made.

SURG 803.6 — 1&2(3S)
Surgery

Seminars dealing with Orthopaedic Surgery. A study is made of basic sciences, including Anatomy, Physiology, and Biochemistry as applied to Orthopaedic Surgery. A study of both basic science and clinical aspects of musculoskeletal disease. A presentation of orthopaedic clinical material with discussion of the fundamental principles involved. Each student assists in the preparation of material for presentation.
Prerequisite(s): Permission of the Division of Orthopaedic Surgery.

SURG 804.3 — 1/2(3C)
Surgery

Designed to provide complete coverage of the field of plastic surgery.

SURG 898.3
Special Topics

Offered occasionally by visiting faculty and in other special situations to cover, in depth, topics that are not thoroughly covered in regularly offered courses.

SURG 899.6
Special Topics

Offered occasionally by visiting faculty and in other special situations to cover, in depth, topics that are not thoroughly covered in regularly offered courses.

SURG 990
Seminar

Reports and discussion of current research.

SURG 994
Research

Students writing a Master's thesis must register for this course.

SURG 996
Research

Students writing a Ph. D. thesis must register for this course.

TOX — TOXICOLOGY

Department of Toxicology Graduate Program, College of Graduate Studies and Research

TOX 810.3 — 1/2(3L)
Radiation and Radionuclide Toxicology

Describes the basic properties of ionizing radiation, the interaction of radiation with matter, radiation detection, units and dosimetry. Discusses the natural radiation environment, radioactivity and its distribution and accumulation by chemical and biological processes. Presents the biological effects of radiation, particularly carcinogenesis, both at the epidemiological and molecular level.
Prerequisite(s): Minimum of one university-level course in any four of physics, chemistry, microbiology, statistics, cell biology, or ecology.

TOX 840.3 — 2(3L)
Wildlife Toxicology

Intended to provide a broad exposure to general principles of terrestrial toxicology, with an emphasis on mammalian, avian and amphibian species. Topics to be covered include: effects of common environmental contaminants on wildlife populations; factors affecting soil toxicity, contaminant bioavailability, and fate; common in vitro and in vivo methods to assess toxicity and sublethal exposure (biomarkers); and ecological risk assessment.
Prerequisites: TOX 300 and TOX 301, or equivalent. This requirement may be waived at the discretion of the instructor.

TOX 860.3 — 1&2(1L-S/T)

Applied Toxicology

Provides students an opportunity to evaluate practical problems associated with various aspects of toxicology. Students will be presented with specific toxicological questions or concerns which will be examined using research information and library facilities.

Prerequisite(s): VBMS 836, 837 and permission of the instructor. Recommend additional credit units in TOX.

TOX 898.3
Special Topics

Offered occasionally by visiting faculty and in other special situations to cover, in depth, topics that are not thoroughly covered in regularly offered courses.

TOX 990
Seminar

Reviews of literature and recent investigations. Graduate students are required to attend and to present seminars.

TOX 994
Research

Students writing a Master's thesis must register for this course.

TOX 996
Research

Students writing a Ph.D. thesis must register for this course.

UKR — UKRAINIAN

Department of Languages & Linguistics, College of Graduate Studies and Research

UKR 899.6
Special Topics

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

VBMS — VETERINARY BIOMEDICAL SCIENCES

Department of Veterinary Biomedical Sciences, College of Graduate Studies and Research

VBMS 709.3 — 1(2L-4P)
Gross Anatomy of Domestic Animals

A comparative, topographical, functional study of the trunk of the domestic animals. There is therefore an emphasis on the respiratory, digestive and reproductive systems. A special project in anatomy designed by student and instructor is required.

Prerequisite(s): Permission of the instructor.

Note: Students with credit for VTAN 210 may not take this course for credit.

**VBMS 710.3 — 2(2L-4P)
Gross Anatomy of Domestic Animals**

A comparative and topographical study of the head and limbs of the domestic animals with an emphasis on functional aspects of the locomotor system. There is also a brief introduction to the anatomy of laboratory mammals and domestic birds.

Prerequisite(s): Permission of the instructor.

Note: Students with credit for VTAN 210 may not take this course for credit.

**VBMS 711.3 — 1(3L-4P)
Microscopic Anatomy of Domestic Animals**

A basic, intensive course in microscopic anatomy, covering cytology and the histology of the basic tissues and organs of domestic animals. Clinical and functional relationships of microscopic structure are emphasized. In addition to classroom work, there are out-of-class assignments. Students must furnish their own microscopes.

Prerequisite(s): Permission of the instructor.

Note: Students with credit for VTAN 211 may not take this course for credit.

**VBMS 712.3 — 2(3L-2P)
Neuroscience of Domestic Animals**

The structure and function of the nervous system of domestic animals including major neuronal pathways and their basic physiology. Clinical applications are emphasized. The basic reflexes used in neurological diagnosis are included. There are out-of-class assignments. A term paper is required.

Prerequisite(s): Permission of the instructor.

Note: Students with credit for VTAN 212 may not take this course for credit.

**VBMS 713.6 — 1&2(4L-4P)
Developmental Anatomy and Introductory Systemic Gross Anatomy of Domestic Animals**

A study of fetal development including congenital anomalies. Organogenesis is correlated with basic systemic gross anatomy. A special project in developmental anatomy designed by student and instructor is required. Students must supply their own microscope.

Prerequisite(s): Permission of the instructor.

Note: Students with credit for VTAN 213 may not take this course for credit.

**VBMS 802.3 — 2 weeks(80 hours)
Special Field Experiences**

**VBMS 803.6 — 4 weeks (160 hours)
Special Field Experiences**

Total immersion in the area of study pertinent to the graduate student. A complete report is required and should come from a daily log of activities. The report should be organized according to a protocol set up by the student's advisory committee prior to going out on this experience.

**VBMS 821.3 — 1/2(4T)
Ultrastructural Cytology**

A survey of cytoarchitecture drawing heavily on examples from mammalian species. Emphasis will be on interpretation of electron micrographs, but technical problems will also be considered. Students will be encouraged to present their own micrographs for discussion.

Prerequisite(s): Permission of the instructor.

**VBMS 824.6 — Q1(2L)2(3L-3P)3(4L-5P)4(3L-5P)
Advanced Mammalian Physiology**

The physiological systems of mammals are studied with emphasis on domesticated species. Hematology, general physiology and biophysics, the cardiovascular, respiratory, renal and nervous systems are covered. Laboratory experiments and observations are conducted on normal animals, emphasizing an understanding of physiological measuring techniques.

**VBMS 826.3 — 1(3L/T-3P)
Advanced Endocrinology**

Lectures deal with all hormones except those of the gastrointestinal tract. Emphasis is placed on protein and peptide hormones, particularly those which play a fundamental role in regulation of intermediary metabolism. Tutorials are designed to require students to develop a familiarity with current scientific literature. Laboratory sessions acquaint students with current endocrine research techniques. Students select a project, design, conduct and report the data in class.

**VBMS 827.3 — 2(2L-4P)
Advanced Neurophysiology**

An advanced lecture and laboratory course in neurophysiology with special emphasis on current methods of investigation utilized in this field.

**VBMS 828.3 — 1(3L)
Gastrointestinal Physiology**

Provides an in-depth coverage of monogastric gastrointestinal physiology, stressing those aspects related to the understanding of gastroenteric disease.

**VBMS 830.3 — 1(3L)
Physiology and Endocrinology of Reproduction in Mammals**

Topics will be hormones of reproduction, sexual differentiation and maturation, physiology and endocrinology of male reproductive system, reproductive cyclicality in the female, gestation and parturition, reproductive behaviour, and the seasonality of reproductive activity.

**VBMS 833.3 — 1/2(3L-1S)
Subclinical Toxicology**

Discusses subclinical manifestations to toxic agents. The emphasis will be on immunological and behavioral alterations produced by a variety of chemical agents. Animal models and testing methods used to evaluate the effects will be discussed, along with various public health considerations and significance.

Prerequisite(s): VBMS 836 and PSY 110 or permission of the instructor.

**VBMS 836.5 — 1(4.5L-1S)
General Toxicology I**

General principles of toxicology - including principles of toxicokinetics and toxicodynamics, factors influencing toxicity, mechanisms of actions of poisons and antidotes, methods of toxicity evaluation. Toxicology of common poisons e.g. pesticides, metals and metalloids, toxic gases, poisonous plants, zootoxins, etc. Aims at the basic science aspect of toxicology and not at clinical diagnosis or treatment of specific toxicoses.

Prerequisite(s): Permission of the instructor.

**VBMS 837.5 — 2(4.5L-1S)
General Toxicology II**

Four areas are emphasized: 1) systematic toxicology - types of injury produced in specific organs/systems by toxic agents and agents which produce these effects; 2) environmental toxicology - entry, persistence, amplification and effects of environmental pollutants; 3) subclinical toxicosis by environmental contaminants, carcinogenesis, teratogenesis, mutagenesis; 4) nutritional toxicology - methodology, national and international standards and consideration of natural and manmade toxic substances.

Prerequisite(s): VBMS 836 or permission of the instructor.

**VBMS 838.3 — 1/2(3P)
Research Techniques in Endocrinology and Reproduction I**

An advanced course in research techniques in the field of endocrinology and reproduction. Students will spend time in three different research laboratories learning techniques of value to their research work and future career. The course aims to diversify and strengthen the student's preparation in modern research approaches.

**VBMS 839.6 — 1&2(3P)
Research Techniques in Endocrinology and Reproduction II**

An advanced course in research techniques in the field of endocrinology and reproduction. Students will spend time in six different research laboratories learning techniques of value to their research work and future career. The course aims to diversify and strengthen the student's preparation in modern research approaches.

**VBMS 898.3 — 1/2(3S)
Special Problems in Veterinary Biomedical Sciences**

Study of a special topic in the biomedical sciences for which no formal course exists and pertinent to the candidate and their goals. This is general enough to cover the goals of the old courses from the two old departments.

**VBMS 899.6 — 1&2(3S)
Special Topics**

Study of a special topic in the biomedical sciences for which no formal course exists and pertinent to the candidate and their goals. This is general enough to cover the goals of the old courses from the two old departments.

**VBMS 990
Seminar**

Graduate students in the department are required to attend and participate. The staff and visiting scientists also contribute to the course. Interested undergraduates may be invited to attend and participate.

**VBMS 992.6
Project**

Students undertaking the project Master's degree (M.Vet.Sc.) must register in this course.

**VBMS 994
Research**

Students writing a Master's thesis must register for this course.

**VBMS 996
Research**

Students writing a Ph.D. thesis must register for this course.

**VLAC — LARGE
ANIMAL CLINICAL
SCIENCES**

Department of Large Animal Clinical Sciences, College of Graduate Studies and Research

**VLAC 801.3 — 1/2(1L-1S)&1&2&3(2P)
Principles of Embryo Transfer**

Covers background information on embryo transfer with special emphasis on bovine embryo transfer. Specialized techniques e.g. embryo freezing, sexing, and splitting will be reviewed and in some cases form parts of laboratory exercises. Laboratory exercises will be conducted primarily on cattle. These will include superovulation, artificial insemination, embryo collection and transfer, and embryo handling techniques. Designed to provide the student with sufficient knowledge and laboratory experience to conduct the entire procedure in one species.

Prerequisite(s): Permission of the instructor.

**VLAC 802.3 — 1/2(40P, 2 weeks)
Special Field Experiences**

Total immersion in the area of study pertinent to the graduate student. A complete report is required and should come from a daily log of activities and be organized from a protocol set up by the student's advisory committee prior to going out on this experience.

Note: Requires 40 hours of practicum over a period of 2 or 4 weeks.

**VLAC 803.6 — 1/2(40P, 4 weeks)
Special Field Experiences**

Total immersion in the area of study pertinent to the graduate student. A complete report is required and should come from a daily log of activities and be organized from a protocol set up by the student's advisory committee prior to going out on this experience.

**VLAC 851.6 — 1&2(2.5S)
Advanced Equine Surgery I**

The anatomy, pathophysiology and surgery of the equine species will be studied with respect to the basic principles of wound healing, tissue response to trauma and the related physiologic responses. Regular seminars based on current literature reviews of selected topics will be required of candidates. Weekly case-based discussions will be used to bridge from the classroom to the clinical patient.

Advanced equine surgery I will focus on general surgery in the horse.

**VLAC 852.6 — 1&2(2.5S)
Advanced Equine Surgery II**

The anatomy, pathophysiology and surgery of the equine species will be studied with respect to the basic principles of wound healing, tissue response to trauma and the related physiologic responses. Regular seminars based on current literature reviews of selected topics will be required of candidates. Weekly case-based discussions will be used to bridge from the classroom to the clinical patient. Advanced Equine Surgery II will focus on orthopedic conditions of the horse.

**VLAC 853.6 — 1&2(2.5S)
Advanced Equine Surgery III**

The anatomy, pathophysiology and surgery of the equine species will be studied with respect to the basic principles of wound healing, tissue response to trauma and the related physiologic responses. Regular seminars based on current literature reviews of selected topics will be required of candidates. Weekly case-based discussions will be used to bridge from the classroom to the clinical patient. Advanced equine surgery III will focus on orthopedic conditions of the horse.

**VLAC 860.3 — 1/2(L-P)
Advanced Equine Reproduction**

Consists of lectures, laboratories and seminars on equine reproduction. Candidates will attend lectures and present seminars on selected topics covering reproductive biology of the brood mare and stallion, reproductive diseases and management of brood mare farms. Laboratories include demonstrations of assisted reproductive procedures and practical techniques.
Prerequisite(s): VLAC 460 or equivalent and permission of the instructor.

**VLAC 861.3 — 1/2(R-P)
Advanced Bovine Reproduction**

Clinical aspects of male and female breeding soundness evaluation. Laboratory exercises in embryo transfer, and semenology.
Prerequisite(s): VLAC 460 or equivalent and permission of the instructor.

**VLAC 866.3 — 1/2(1S-1R)
Advanced Radiographic Diagnosis of
Large Animals**

A tutorial course covering the radiographic diagnosis of disease in large animals. Familiarizes the student with normal radiographic anatomy and the radiographic signs of disease in the skeleton, thorax and abdomen of these species.

**VLAC 871.3 — 2(3L-3P)
Exotic Animal Medicine**

Provides graduate training in several aspects of veterinary management of exotic animals including reproduction and game farming. Practical training is included, and is a major component of the course. Emphasis will be placed on capture, restraint, examination and treatment of wild animals commonly found in zoos and wildlife parks. Preventive medicine programs will be discussed for the major specie groups. Laboratories will consist of demonstrations and field trips.
Prerequisite(s): D.V.M. degree or equivalent.

**VLAC 872.6 — 1&2(1S-1R)
Advanced Bovine Medicine**

The clinical aspects of diseases of cattle in Canada. Reading and Study assignments of cattle diseases on a systems basis. Candidates required to critically discuss current literature on the subject and offer weekly seminars with emphasis given to clinical case presentations.

**VLAC 874.6 — 1&2(1L-1S)
Advanced Equine Medicine**

Lectures and seminars on equine medicine. Each candidate will prepare and present a critical review of the current literature on selected medical diseases of the horse. The emphasis will be on the common medical diseases of horses in North America plus those exotic diseases which pose a threat to the horse industry. Weekly seminars will be given by the candidates with emphasis on clinical case presentations.

**VLAC 878.3 — 1/2(2L-1S-2P)
Spermatology**

An advanced course in normal and abnormal spermatogenesis and spermatology with emphasis on the bovine species. It includes prenatal and postnatal development of the testis, pubertal changes, detailed study of the cycle of the seminiferous epithelium, semen collection, evaluation and cryopreservation.
Prerequisite(s): Permission of the instructor.

**VLAC 881.3 — 1/2(2L-1P)
Clinical Trial Design and Analysis**

A course for veterinary graduate students who need an understanding of clinical trial design, statistics and clinical epidemiology in order to carry out their research and to evaluate themselves as clinicians. The course will cover areas of clinical trial design, applied medical statistics, diagnostic test evaluation and writing research grants.
Prerequisite(s): Permission of instructor.

**VLAC 882.3 — 1/2(1P-1S)
Programmed Preventive Medicine**

Application of preventive measures to disease control in the herd. Epidemiological parameters specifically applied to a species with the goal of preventing disease in a herd thus increasing the herd productivity on an economically sound basis. Weekly seminars will be given by the candidates with emphasis on clinical case presentations.

**VLAC 883.6 — 1&2(20C)
Advanced Clinical Practice**

Enhances student clinical education and experience under guidance of supervisor or senior clinician. Emphasizes clinical practice in herd production medicine or theriogenology in student's field of specialization. Procedures in diagnostics, therapeutics and disease control are stressed. Involves student contribution to the veterinary teaching hospital routine practice and emergency work during normal hours and on the out-of-hours duty roster.

**VLAC 898.3 — 1/2(3R)
Special Topics**

To be defined and described each time it is offered. A thorough study of a special topic pertinent to the specific goals of the candidate and their program.

**VLAC 899.6 — 1&2(3R)
Special Topics**

To be defined and described each time it is offered. A thorough study of a special topic pertinent to the specific goals of the candidate and their program.

**VLAC 980.0
Clinical Practice**

Recognizes the many clinical activities of students in the program that may not be otherwise credited. Students are required to make satisfactory progress in this course to maintain full-time student status in the program.

**VLAC 990
Seminar**

Discussion on research plans, protocols, and results by graduate students and faculty. Graduate students are required to attend and participate. Faculty and visiting scientists may also contribute to the course.

**VLAC 992.6
Project**

Students undertaking the project Master's degree (M.Vet.Sc.) must register in this course.

**VLAC 994
Research**

Students writing a Master's thesis must register for this course.

**VLAC 996
Research**

Students writing a Ph.D. thesis must register for this course.

**VSAC — SMALL
ANIMAL CLINICAL
SCIENCES**

Department of Small Animal Clinical Sciences, College of Graduate Studies and Research

**VSAC 800.6 — 1/2(2L/2S)
Advanced Veterinary Internal Medicine I**

Deals with the pathophysiology of animal disease on a body system or organ basis. The mechanisms of disease and the rational approach to diagnosis and therapy are emphasized. Topics include an introduction to the pathophysiology, systemic states, cardiovascular system, blood and hemopoietic system, respiratory system and the gastrointestinal tract.

**VSAC 801.6 — 1/2(2L/2S)
Advanced Veterinary Internal Medicine II**

Deals with the pathophysiology of animal disease on a body system or organ basis. The mechanisms of disease and the rational approach to diagnosis and therapy are emphasized. Topics include the urinary system, nervous system and eyes, endocrine system, musculoskeletal system, skin and appendages, immune system, and genetics and reproduction.

**VSAC 802.3 — 1/2(40P, 2 weeks)
Special Field Experiences**

Total immersion in the area of study pertinent to the graduate student. A complete report is required and should come from a daily log of activities and be organized from a protocol set up by the student's advisory committee prior to going out on this experience.

Note: Requires 40 hours of practicum over a period of 2 or 4 weeks.

**VSAC 803.6 — 1/2(40P, 4 weeks)
Special Field Experiences**

Total immersion in the area of study pertinent to the graduate student. A complete report is required and should come from a daily log of activities and be organized from a protocol set up by the student's advisory committee prior to going out on this experience.

**VSAC 854.6 — 1&2(2T-1R)
Advanced Radiological Sciences**

A tutorial course covering those aspects of physics and radiobiology pertinent to the practice of veterinary radiology. Includes discussions of special radiodiagnostic procedures, radiation therapy, and other imaging modes including ultrasonography, CT, MRI, and nuclear medicine.

**VSAC 860.6 — 1&2(2R-2S)
Advanced Soft Tissue Surgery**

The anatomy, pathophysiology and surgery of the urinary, hemopoietic, endocrine and alimentary systems will be studied with respect to the basic principles of wound healing, shock, tissue response to trauma and biochemical parameters. Regular seminars based on current literature reviews will be required of the candidates.

**VSAC 865.3 — 1/2(1S-1R)
Advanced Medical Imaging of Small Animals**

A seminar course covering the medical imaging of disease in small animals. Incorporates discussion of veterinary radiology and ultrasonography with review of normal anatomy and typical abnormal conditions, plus exposure to more challenging case material. Additional discussions will focus on other imaging modes such as CT and MRI.

**VSAC 866.3 — 1/2(1S-1R)
Advanced Radiographic Diagnosis of Large Animals**

A tutorial course covering the radiographic diagnosis of disease in large animals. Familiarizes the student with normal radiographic anatomy and the radiographic signs of disease in the skeleton, thorax and abdomen of these species.

**VSAC 868.6 — 1&2(2L-S/C)
Advanced Veterinary Anesthesiology**

Advanced veterinary anesthesiology. Subjects include anesthetic equipment, pain control, pharmacology of anesthetic agents, mechanisms of anesthesia and the effects of anesthetic agents on the various body systems. Anesthetic techniques for specific body systems and disease conditions will also be discussed.

**VSAC 869.6 — 1/2(2L)
Veterinary Critical Care**

Designed to familiarize the student with intensive care of the veterinary patient. The course is multidisciplinary in nature and uses a body systems approach to discuss pathophysiology, pharmacology, diagnostics, supportive care, and treatment of the critically ill veterinary patient. The major focus is on small animals, but the principles discussed apply to all species.

**VSAC 870.6 — 1&2(2.5S)
Topics in Advanced Small Animal Internal Medicine**

A discussion course covering the pathophysiology, diagnosis and therapy of selected important medical diseases in small animals. The emphasis will be on critical review of the current literature and discussion of the implications for management of small animal patients. **Note:** This course will be offered every 3rd year. **Prerequisite(s):** D.V.M. degree.

**VSAC 873.6 — 1&2(20C)
Advanced Small Animal Clinical Sciences**

Procedures in diagnostic and therapeutics as applied to the daily clinical case load. **Prerequisite(s):** Completion of D.V.M. degree and registration in a M.Vet.Sc. program.

**VSAC 898.3 — 1/2(3R)
Special Topics**

To be defined and described each time it is offered. A thorough study of a special topic pertinent to the specific goals of the candidate and their program.

**VSAC 899.6 — 1&2(3R)
Special Topics**

To be defined and described each time it is offered. A thorough study of a special topic pertinent to the specific goals of the candidate and their program.

**VSAC 980.0
Clinical Practice**

Recognizes the many clinical activities of students in the program that may not be otherwise credited. Students are required to make satisfactory progress in this course to maintain full-time status in the program.

**VSAC 990
Seminar**

Discussion on research plans, protocols, and results by graduate students and faculty. Graduate students are required to attend and participate. Faculty and visiting scientists may also contribute to the course.

**VSAC 992.6
Project**

Students undertaking the project Master's degree (M.Vet.Sc.) must register in this course.

**VSAC 994
Research**

Students writing a Master's thesis must register for this course.

**VSAC 996
Research**

Students writing a Ph.D. thesis must register for this course.

**VTMC —
VETERINARY
MICROBIOLOGY**

Department of Veterinary Microbiology, College of Graduate Studies and Research

**VTMC 830.3 — 2(1S-2T)
Recent Advances in Microbiology**

A requisite for students in Veterinary Microbiology. Partly tutorial, consisting of assigned reviews of recent advances in selected areas of microbiology, including bacteriology, epidemiology, immunology, parasitology and virology. These discussions are student-driven and facilitated by individual faculty members with expertise in the areas of discussion. Training is also given in the writing of grant applications, such that a major part of the course comprises each student writing a full-scale, mock Canadian Institutes of Health Research (CIHR) application that addresses their proposed dissertation research.

**VTMC 831.3 — SP(5L-30P)
Techniques in Molecular Biology**

A hands-on laboratory course designed to familiarize students with a wide variety of techniques in molecular biology: manipulation of DNA for cloning and analysis, detection and quantitation of nucleic acids, sequencing of DNA, site directed mutagenesis, purification and detection of proteins, detection of rare nucleic acids by polymerase chain reaction, monitoring gene expression by cDNA microarrays and 2D-protein analysis, nucleic acid-based techniques for identifying organisms.

Prerequisite(s): BIOC 811 or equivalent. **Note:** 4-5 week course in May.

**VTMC 832.3 — 1/2(2L-1S)
Epizootiology of Infectious Diseases**

Lectures, seminars and exercises will be given on the epizootiology and control of infectious diseases of animal populations, with emphasis given to: techniques of collection of data and sampling; application of modern microbiological laboratory methods; analysis of data; and interpretation of results, as applied to epizootiological investigations.

**VTMC 833.3 — 1/2(2S-1T)
Advanced Virology**

Students, in discussion groups and seminars, explore current topics in

virology. Some areas discussed in previous years are: interferon response and viral strategies for evading it, viral oncogenesis, viruses and cancer therapy, antiviral agents and viral strategies for resistance, viruses as tools for nanotechnology. Reviews prepared by students will be considered for publication in Student Reviews in Current Virology, an on-line publication.

VTMC 835.3 — 2(3L-1.5P)
Diagnostic Veterinary Bacteriology

Devoted to the culture, biochemical reactions and identification of pathogenic, aerobic and anaerobic bacteria and fungi from domestic, exotic and alternate species including birds. Emphasis will be on interpretation of findings in agreement with information gathered from clinical history/lesion(s) provided in different cases. Other responsibilities include familiarization with culture media; some new diagnostic techniques; completion by each student of 20-30 cases.

VTMC 837.3 — 1/2(2L-4P)
Diagnostic Veterinary Parasitology

Lectures, laboratories and discussions on the principles underlying diagnostic testing in veterinary parasitology, the role and use of a veterinary diagnostic parasitology laboratory, key techniques used in parasitological diagnosis, and the interpretation of diagnostic results.

VTMC 838.6 — 1&2(L-S)
Applied Epizootiology

Students become familiar with the philosophy and principles of epizootiology and the practical application of epizootiologic techniques especially as they apply to control. Consists of lectures, field trips, epizootiologic exercises and syndicate sessions.

VTMC 839.3 — 1/2(3L-1T)
Topics in Advanced Parasitology

Lectures on current topics in parasitology focused on examples from domestic animal, wildlife and human parasitology that illustrate key principles of host-parasite-environment systems. Group discussions based on assigned reading in the scientific literature, with topics selected in part according to students' interests.

VTMC 841.6 — SP(5L-35P)
Research Methods in Cellular and Molecular Immunology

This is an intensive hands-on course designed to teach graduate students basic and advanced cellular and molecular methods commonly employed in studying the host's immunoinflammatory system: cell purification and characterization, T cell assays, ELISA, ELISPOT, bioassays, purification of cells using magnetically-labeled antibodies, immunohistochemistry, in situ hybridization, Northern blotting, and real-time RT-PCR, among others.

Prerequisite(s): MICR 421 or permission of instructor.

Note: 6 week course beginning in June.

VTMC 860.3 — 1&2(1S)
Seminar in Immunology

Current research in immunology and related areas will be presented and discussed by students and faculty, alternating weekly. Each term, each credit student will present a seminar on a recent publication from the literature and submit a term paper critically analyzing and comparing the presented data with other published information on the subject.
Prerequisite(s): 3 credit units senior undergraduate and/or graduate courses in Immunology.

VTMC 898.3 — 1/2(2L-1S-6P)
Special Problems in Veterinary Microbiology

A thorough study on a selected topic in veterinary microbiology will be undertaken for which no formal course exists and specific to the candidate and their goals. To be defined and described each time it is offered.

VTMC 899.6 — 1&2(2L-1S-6P)
Special Topics

A thorough study on a selected topic in veterinary microbiology will be undertaken for which no formal course exists and specific to the candidate and their goals. To be defined and described each time it is offered.

VTMC 990
Seminar

Graduate students are required to attend and take part in the seminar throughout their program. Faculty and visiting scientists may also contribute to the course.

VTMC 992.6
Project

Students undertaking the project Master's degree (M.Vet.Sc.) must register in this course.

VTMC 994
Research

Students writing a Master's thesis must register for this course.

VTMC 996
Research

Students writing a Ph.D. thesis must register for this course.

VTPA —
VETERINARY
PATHOLOGY

Department of Veterinary Pathology,
College of Graduate Studies and Research

VTPA 810.3 — 1/2(1L-2S)
Clinical Hematology

Presented biennially in lecture and seminar format and utilizing current literature. Assigned reading, and presentation of selected hematology topics are integral to this course. Case material may be used to emphasize pathophysiologic mechanisms.
Prerequisite(s): Permission of the instructor.

VTPA 811.3 — 1/2(1L-2S)
Clinical Chemistry

Presented biennially in lecture and seminar format and utilizing current literature. Assigned reading and presentation of selected clinical chemistry topics are integral to this course. Methodology and quality assurance are important components of this course. Case material may be used to emphasize pathophysiologic mechanisms.
Prerequisite(s): Permission of the instructor.

VTPA 820.3 — 1/2(2S-6C)
Mammalian Pathology I

Introduces students to the gross and microscopic postmortem examination of animals and tissues submitted for diagnosis. Pathogenesis and diagnostic procedures, including a variety of ancillary tests, are emphasized. A student will be required to complete a minimum number of cases, typically between 20 and 30, for 3 credit units. Selected cases are discussed at weekly conferences and students are expected to present seminars based on case material. Readings may be assigned.
Prerequisite(s): Permission of the instructor.
Note: Students take VTPA 820 to 823 as a series from I through IV.

VTPA 821.3 — 1/2(2S-6C)
Mammalian Pathology II

Prerequisite(s): Permission of the instructor.
Note: Students take VTPA 820 to 823 as a series from I through IV.

VTPA 822.3 — 1/2(1/2S-8/10P)
Mammalian Pathology III

Prerequisite(s): Permission of the instructor.
Note: Students take VTPA 820 to 823 as a series from I through IV.

VTPA 823.3 — 1/2(1/2S-8/10P)
Mammalian Pathology IV

Students will spend 4 months on the diagnostic service roster (and complete approx. 50 cases) for 3 credit units. Students are expected to present seminars based on case material.
Prerequisite(s): Permission of the instructor.
Note: Students take VTPA 820 to 823 as a series from I through IV.

VTPA 830.3 — 1/2(1S-6C)
Surgical Pathology I

Surgical Pathology I is an introductory course in examination of biopsy material through participation in the weekly surgical biopsy duty roster, weekly rounds, study of standard reference material and an autotutorial set presenting common pathological conditions. The student will learn to trim biopsy specimens, to write a final report and to use ancillary tests such as special stains and immunohistochemistry. The requirements for this course are completion of a minimum of 50 cases and participation in weekly rounds.
Prerequisite(s): Permission of the instructor.
Note: Students take VTPA 830 to 833 as a series from I through IV.

VTPA 831.3 — 1/2(1S-6C)
Surgical Pathology II

Prerequisite(s): Permission of the instructor.
Note: Students take VTPA 830 to 833 as a series from I through IV.

VTPA 832.3 — 1/2(1/2S-2/3P)
Surgical Pathology III

Prerequisite(s): Permission of the instructor.
Note: Students take VTPA 830 to 833 as a series from I through IV.

VTPA 833.3 — 1/2(1/2S-2/3P)
Surgical Pathology IV

Surgical Pathology II, III and IV are courses to acquire greater experience and knowledge through participation in the

weekly surgical pathology duty roster. The requirements for these courses are 4 months on the weekly duty roster, completion of a minimum of 75 to 100 cases and participation in weekly rounds.
Prerequisite(s): Permission of the instructor.
Note: Students take VTPA 830 to 833 as a series from I through IV.

**VTPA 841.3 — 2(1L-1S-1P)
Toxicologic Pathology**

Covers mechanisms of toxicology as well as basic pathology, focusing on several major organ systems. The students' understanding of how clinical, environmental or pharmacological toxicants damage specific organs will be supported through didactic instruction, case studies, web-based cases, directed readings and structured group discussion.
Prerequisite(s): VTPA 342 & 343 or equivalent, or TOX 402 & PATH 205, or permission of the instructor.
Note: Offered biennially.

**VTPA 850.3 — 1/2(2/3S-10/12P)
Diagnostic Clinical Pathology I**

Prerequisite(s): Permission of the instructor.
Note: Students take VTPA 850 to 853 as a series from I through IV. Diagnostic duty is carried out with increasing independence as students complete each course.

**VTPA 851.3 — 1/2(2/3S-10/12P)
Diagnostic Clinical Pathology II**

Prerequisite(s): VTPA 850.
Note: Students take VTPA 850 to 853 as a series from I through IV. Diagnostic duty is carried out with increasing independence as students complete each course.

**VTPA 852.3 — 1/2(2/3S-10/12P)
Diagnostic Clinical Pathology III**

Prerequisite(s): VTPA 851.
Note: Students take VTPA 850 to 853 as a series from I through IV. Diagnostic duty is carried out with increasing independence as students complete each course.

**VTPA 853.3 — 1/2(2/3S-10/12P)
Diagnostic Clinical Pathology IV**

Diagnostic medical interpretations in clinical biochemistry, hematology, urology and cytology. Interpretation of clinical

material is supplemented with formal case discussions and directed reading.
Prerequisite(s): VTPA 852.
Note: Students take VTPA 850 to 853 as a series from I through IV. Diagnostic duty is carried out with increasing independence as students complete each course.

**VTPA 869.3 — 1/2(1L-2P)
Avian Pathology I**

Reviews the pathology of the avian species by systems emphasizing histopathology. Lectures will be supplemented by slide study sets and selected reading material.
Prerequisite(s): Permission of the instructor.
Note: May be offered biennially.

**VTPA 871.3 — 1/2(4C)
Avian Necropsy I**

Prerequisite(s): Permission of the instructor.

**VTPA 872.3 — 1/2(4C)
Avian Necropsy II**

Necropsy technique of birds submitted for diagnosis of flock diseases. Suitable laboratory procedures following necropsy examination are emphasized. Treatment and control of flock diseases encountered are discussed. Selected cases are presented and discussed by students at the weekly necropsy conferences of the department. To obtain 3 credit units the student will be required to complete approximately 30 cases.
Prerequisite(s): VTPA 445 and 869, or equivalent.

**VTPA 873.3 — 1/2(2L-1S-1T)
Wildlife Diseases**

Deals with the ecology of infectious and non-infectious diseases of free-living mammals and birds. The etiology, epizootiology, pathogenesis and ecologic significance of the conditions are considered. Emphasizes diseases occurring in Western Canada.
Prerequisite(s): VTPA 343 or equivalent.

**VTPA 875.3 — 1/2(1S-3C)
Diagnosis of Wildlife Diseases I**

Necropsy and investigative techniques for the diagnosis of disease in wild mammals, birds and fish. Laboratory procedures following necropsy will be encouraged. Selected cases will be presented and discussed by students at the weekly necropsy conferences of the department.

Students will be required to satisfactorily complete approximately 30 cases.
Prerequisite(s): Permission of the instructor.

**VTPA 876.3 — 1/2(1S-3C)
Diagnosis of Wildlife Diseases II**

Necropsy and investigative techniques for the diagnosis of disease in wild mammals, birds and fish. Laboratory procedures following necropsy will be encouraged. Selected cases will be presented and discussed by students at the weekly necropsy conferences of the department. Students will be required to satisfactorily complete approximately 40 cases.
Prerequisite(s): Permission of the instructor.

**VTPA 898.3 — 1/2(2C-R)
Special Problems in Veterinary Pathology**

A thorough study on a selected topic in veterinary pathology will be undertaken. May include examination of pathological material, tutorial sessions, collateral reading and presentation of a seminar.

**VTPA 899.6 — 1&2(2C-R)
Special Problems in Veterinary Pathology**

A thorough study on a selected topic in veterinary pathology will be undertaken. May include examination of pathological material, tutorial sessions, collateral reading and presentation of a seminar.

**VTPA 980.0
Clinical Practice**

Recognizes the many clinical activities of students in the program that may not be otherwise credited. Students are required to make satisfactory progress in this course to maintain full-time student status in the program.

**VTPA 990
Seminar**

Weekly noon-hour seminars on interesting cases and aspects of anatomic and clinical pathology. All graduate students in the Department of Veterinary Pathology are required to register, attend, and participate. These seminars are open to all interested individuals.

**VTPA 991 — 1&2(1S-1R)
Seminar in Pathology**

A weekly mystery-case seminar that deals with laboratory methods of disease diagnosis, including histology, gross lesions, hematology, cytopathology and interpretation of laboratory data.

Note: All students in the Department of Veterinary Pathology are required to register and attend.

**VTPA 992.6
Project**

Students undertaking the M.Vet.Sc. must register in this course.

**VTPA 994
Research**

Students writing a M.Sc. thesis must register for this course.

**VTPA 996
Research**

Students writing a Ph.D. thesis must register for this course.

**WGST — WOMEN'S
AND GENDER
STUDIES**

Department of Women's & Gender Studies, College of Graduate Studies and Research

**WGST 898.3
Special Topics**

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

**WGST 899.6
Special Topics**

Offered occasionally in special situations. Students interested in these courses should contact the department for more information.

**WGST 990
Seminar**

Reports and discussion of current research.

**WGST 994
Research**

Students writing a Master's thesis must register for this course.