Course Listings

200 Details of Courses

Courses taught at the University of Alberta are listed alphabetically. All courses, except those taught by Faculté Saint-Jean, are described in English.

Each course is designated by its computer abbreviation and a number. Students should use this abbreviation and number when completing any form requiring this information.

Courses are numbered according to the following system:

000-099	Pre-University
100-199	Basic Undergraduate. Normally requires no university-level prerequisites. Designed typically for students in the first year of a program.
200-299	Undergraduate. Prerequisites, if any, are normally at the 100-level. Designed typically for students in the second year of a program.
300-399	Undergraduate. Prerequisites, if any, are normally at the 200-level. Designed typically for students in the third year of a program.
400-499	Advanced Undergraduate. Prerequisites, if any, are normally at the 300-level. Designed typically for students in the fourth year of a program.
500-599	Graduate. Designated for graduate students and certain advanced or honors undergraduate students in their final year.
600-799	Graduate Courses
800-899	Special Registrations
900-999	Graduate Thesis and Project Numbers

For the purposes of program descriptions and prerequisite designation, courses numbered 100-199 are designated as Junior Courses and courses numbered 200-499 are designated as Senior Courses.

Note: Some exceptions to the course number system described above have been granted to the Faculty of Law and the Faculty of Medicine and Dentistry.

Course Description Symbols and Figures

Several symbols and figures are used to indicate the type, duration, and weight of courses.

(1) ★—Indicates "units of course weight," and usually follows the course title. The accompanying number indicates the weight of the course as used in computing grade point averages and for meeting degree requirements.

A course which runs throughout the Fall/Winter (i.e., from September through April) is usually weighted ★6. A course that runs for only one term (i.e., Fall: from September to December, or Winter: from January through April) is usually weighted ★3. Certain courses are offered over Fall/Winter or Spring/Summer, or in one term, with weights of ★1, ★2, and ★4. These are considered as one-sixth, one-third, and two-thirds of a Fall/Winter or Spring/Summer course, respectively. Some honors and graduate courses involving research may vary in weight according to the length and difficulty of the project. Some clinical courses may vary in weight according to the length of clinical experience. Some courses, not included in the computation of grade point averages, are offered for credit only and either carry a weight of ★0, or are marked as "Credit."

Undergraduate students who take courses offered by the Faculty of Engineering but are not registered in Engineering will have a course weight assigned for these courses according to the protocol of their home faculty.

(2) *fi*—Denotes: "fee index," the value used to calculate the instructional fees for each course. The fee index is multiplied by the fee index value (given in the appropriate subsection of §22.2) to give the dollar value of instructional fees for the course.

For normal courses, the fee index is twice the value of the units of course weight; for example, a course with ★3 normally has *fi 6*. In cases where exceptional fees considerations need to be made, the fee index is set differently by the Board of Governors.

Note that certain programs (e.g. MD, DDS, etc.) are assessed on a program fee basis for all or certain years. In these cases, the fee index calculation does not apply.

(3) **(*x* term, a-b-c)**—These figures in parentheses give information on when the course is offered and the hours of instruction required by the course in a week, or in some cases the total time in a term.

In the case of a single-term course, the term in which the course is given is mentioned (item *x*). The designation "either term" means that the course may be offered either in the first term or in the second term or in each term, at the discretion of the department concerned. The designation "variable" means that the course may be taught either as a single-term or as a full-session course.

Item **a** indicates lecture hours. Item **b** indicates seminar hour(s), demonstration hours (d), clinic hours (c), or lecture-laboratory hours (L). Item **c** indicates laboratory hours. For two-term courses, the hours of instruction are the same in both terms unless otherwise indicated. The expression 3/2 means 3 hours of instruction every second week; 2s/2 means 2 seminar hours every second week.

Examples:

(first term, 3-0-3): a course taught in first term with 3 hours lecture, no seminar, and 3 hours lab per week.

(second term, 0-1s-2): a course taught in second term with no lectures, 1 seminar hour, and 2 hours of lab per week.

(either term, 3-0-0): a course taught in either first or second term, or each term, with 3 lecture hours per week, no seminar, and no lab.

(two-term, 3-0-3): a course taught over both first and second term with three lecture hours, no seminar, and three hours lab per week.

(variable, 3-0-0): a course which may be taught in either first or second term or over two terms with three lecture hours per week, no seminar, and no lab.

(4) **Prerequisite**—This provides information on courses which must be successfully completed before registering in the more advanced course.
Corequisite—This provides information on courses which must be taken before or at the same time as the course described in the listing.

Note: Departments are authorized to cancel the registration of those students registered in a course offered by the department if they do not meet the prerequisite and/or corequisite requirements stated in the course description in this Calendar.

(5) **[Department]**—This indicates the department responsible for registration for interdepartmental courses. Normally, courses will be credited to the discipline listed in the square brackets.

(6) **Open Studies Courses**— O indicates a course available to students of Open Studies. L indicates that a course is available to Open Studies students on a delayed registration basis only (see §190.2.2).

Important: Registration Procedures for Two-Term Courses

Students are strongly advised to refer to the *Registration Procedures* manual for details. Two-term courses are normally offered over two terms (either Fall/Winter or Spring/Summer). In a few instances, two-term courses are offered within a single term. In all cases these are identifiable in the Timetable Listing because they consist of part A and part B (e.g., English 101A and 101B).

To successfully register in a two-term course, students, must do the following:

- register in both the part A and part B for all types of sections offered (Lectures, Labs, Seminars, etc.);
- register in the same section numbers for part A and part B of a course (e.g. Lecture A1 for both part A and part B, and Lab E3 for both part A and part B);
- register in all the appropriate sections on the same day.

All of the above must be done or the course registration is invalid and will be deleted. Invalid registrations will be deleted nightly. It is the student's responsibility to attempt the course registration again, subject to availability.

Example: A student wishes to register in ABCD 101, a two-term course. It has a lecture and a lab section. Based on the student's timetable planning, decides to take Lecture C3 and Lab C8. The student must add

In Fall Term	ABCD 101A Lec C3 and ABCD 101A Lab C8,
and	
In Winter Term	ABCD 101B Lec C3 and ABCD 101B Lab C8.

All these sections must be added on the same day to successfully register. Otherwise the registration in ABCD 101 will be deleted overnight and the student's place in the course will be lost.

Course Renumbering

Over the years many courses have been renumbered. Old numbers can be found within individual course listings of previous Calendar editions.

Course Availability

The appearance of a course description in the following list does not guarantee that the course will actually be offered in the forthcoming session. Information about courses to be offered, names of instructors, and all further details must be sought from the appropriate department.

Alternative Delivery Courses

Sections of certain approved courses may be offered in an Alternative Delivery format at an increased rate of fee assessment.

Cost Recovery Courses

Sections of certain approved courses may be offered in a Cost Recovery format at an increased rate of fee assessment.

Courses on Reserve

Courses not offered in the past four years are removed from this Calendar and placed on Reserve. These courses may be taught again in the future, in which case they would be brought back into the active Course Listings and placed in the Calendar. Information about Reserve Courses is available through the Registrar's Office, the University Secretariat, and Faculty Offices.

Faculty Specific Regulations Regarding Courses

For specific Faculty regulations relating to courses and for a complete list of subjects taught by a Faculty, please consult the Undergraduate Programs section of the Calendar at the end of each Faculty section.

Physical Requirements for University Courses

The University has a commitment to the education of all academically qualified students and special services are frequently provided on campus to assist disabled students.

Nevertheless, some courses make certain unavoidable demands on students with respect to the possession of a certain level of physical skill or ability if the academic objectives of the course are to be realized. In case of doubt, students are advised to contact the Department concerned and the Disabled Student Services Coordinator, Office of the Dean of Student Services.

Because support services cannot be guaranteed for all off-campus courses, instructors may be obliged to refuse registration in such courses.

201.112 Human Resource Management, HRM

Department of Strategic Management and Organization
Faculty of Business

Note: Enrolment in all HRM courses is restricted to students registered in the Faculty of Business, or to students registered in specified programs that require Business courses to meet degree requirements and who have obtained prior approval of their Faculty.

Students who have completed IND R courses are not allowed to register in a HRM course with the same number.

Graduate Courses

HRM 703 Seminar in Human Resource Management Foundations
★3 *(fi 6)* (either term, 3-0-0). A readings seminar that covers related core theories, research and best-practices applications. Topics cover the primary content areas of planning, job design/redesign, recruitment and selection, training and development, performance management, compensation, and various contemporary topics (e.g., international issues).

201.113 Humanités, HUME

Faculté Saint-Jean

Cours de 1er cycle

O HUME 420 Les grands écrits
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Étude interdisciplinaire et approfondie de textes importants relatifs à la pensée humaniste et qui proviennent de plusieurs milieux à différents stades du développement de l'humanité, comme le Yi-king-Le Livre des mutations, Bhagavad-Gità, la Bible, l'Odyssée (Homère), La République (Platon), Géorgiques (Virgile), La Divine Comédie (Dante), Micromégas (Voltaire), The Wealth of Nations (Smith), The Origin of Species (Darwin), L'Homme et ses symboles (Jung).

201.114 Humanities Computing, HUCO

Department of Modern Languages and Cultural Studies: Germanic, Romance, Slavic
Faculty of Arts

Graduate Courses

HUCO 500 Survey of Humanities Computing
★3 *(fi 6)* (either term, 0-3s-0).

HUCO 510 Theoretical Issues in Humanities Computing
★3 *(fi 6)* (either term, 0-3s-0). Relationship of computing methods to humanities research from several theoretical perspectives.

HUCO 520 Technical Concepts and Approaches in Humanities Computing
★3 *(fi 6)* (either term, 0-3s-0).

HUCO 530 Project Design and Management in Humanities Computing
★3 *(fi 6)* (either term, 0-3s-0). Design, implementation, management and maintenance of Humanities Computing research projects.

HUCO 611 Computers and Culture
★3 *(fi 6)* (either term, 0-3s-0). Cultural implications of telecommunications and computing technology. Note: Not open to students with credit in ANTHR 531.

HUCO 612 Electronic Texts
★3 *(fi 6)* (either term, 0-3s-0). Creation, encoding, analysis and management of electronic texts.

HUCO 613 Cyberspace and Networked Culture
★3 *(fi 6)* (either term, 0-3s-0).

HUCO 614 Knowledge Management and Analysis in the Humanities
★3 *(fi 6)* (either term, 0-3s-0). Databases, textbases, graphical and statistical analysis.

HUCO 615 Computer Tools for Humanities Teaching and Learning
★3 *(fi 6)* (either term, 0-3s-0). Theory and practice of computer pedagogy in the Humanities.

HUCO 616 Multimedia for the Humanities
★3 *(fi 6)* (either term, 0-3s-0). Exploration of the nature and cultural significance of multimedia.

HUCO 617 Topics in Humanities Computing
★3 *(fi 6)* (either term, 0-3s-0).

HUCO 618 Directed Reading in Humanities Computing
★3 *(fi 6)* (either term, 0-3s-0).

201.115 Industrial Relations, IND R

Department of Strategic Management and Organization
Faculty of Business

Undergraduate Courses

Note: Refer to Organizational Analysis (ORG A) listings.

Graduate Courses

IND R 701 Seminar in Industrial Relations Foundations
★3 *(fi 6)* (either term, 3-0-0). Readings topics will include industrial relations systems theory, historical development and theories of the labor movement, comparative industrial relations systems, labor market theory (including neoclassical theory and recent challenges to neoclassical theory), and collective bargaining theory.

IND R 702 Seminar in Contemporary HRM/IR Issues
★3 *(fi 6)* (two term, 3-0-0). An examination of issues and research trends in the field of industrial relations and/or human resources management. Participants will present their own research and actively engage in the analysis and discussion of the work of others. This is a single term course taught over two terms.

IND R 704 Individual Research
★3 *(fi 6)* (either term, 3-0-0).

201.116 Informatique, INFOR

Faculté Saint-Jean

Cours de 1er cycle

INFOR 100 Programmation pour ingénieurs
★3 *(fi 6)* (deuxième semestre, 3-0-3/2). Programmation informatique pour la solution de problèmes de génie. Langage Pascal. Librairies de sous-routines. Utilisation d'une station de travail avec un système d'opération UNIX.

201.117 Interdisciplinary Undergraduate and Graduate Courses, INT D

Undergraduate Courses

201.117.1 Faculty of Agriculture, Forestry, and Home Economics Courses

O INT D 208 Introduction to Applied Biotechnology
★3 *(fi 6)* (first term, 3-0-0). A lecture course highlighting the improvements made in crops, livestock and forest trees through the application of biotechnology. Topics include ethics, and regulation of biotechnology, gene mapping, plant and animal tissue culture, recombinant DNA technologies and molecular farming. Prerequisite: BIOL 107 or consent of Instructor. [Agricultural Food and Nutritional Science]

O INT D 303 Economics of World Agriculture
★3 *(fi 6)* (either term, 3-0-0). Economic issues in international agriculture including world food security, farming systems, agricultural trade and aid. The role of agriculture in development and means of improving the performance of agriculture worldwide. Foreign domestic agricultural policies and international trade protection measures, and potential reforms in relation to Canadian agricultural interests. Prerequisite: ECON 101/102. (Offered jointly by the Departments of Economics and Rural Economy). [Rural Economy]

O INT D 365 Natural Resource Economics
★3 *(fi 6)* (either term, 3-0-0). Economics of natural resources with emphasis on renewable resources; resource scarcity, conservation, sustainability, water resource issues, fisheries, forestry, agriculture, recycling, property and tenure institutions, and public resource policy. Prerequisite: ECON 101; ECON 102 recommended. (Offered jointly by the Departments of Rural Economy and Renewable Resources). [Rural Economy]

INT D 410 Interdisciplinary Health Team Development
★3 *(fi 6)* (second term, 0-6.5s-0 in 5 weeks). A process learning course intended to provide experience in building a team of health care professionals from different disciplines. Emphasis is placed on team building, recognizing the unique contributions of different professions, patients and families. (Offered jointly by the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation Medicine.) (Priority will be given to students in all undergraduate health professions where this is a required course.)

INT D 411 Interprofessional Health Team Placements
★1-6 *(variable)* (either term, 5 weeks). Clinical practicum designed to provide an orientation to interprofessional teamwork. May be taken in addition to or in conjunction with discipline-specific courses. Students from various health sciences disciplines are simultaneously placed within a health care organization with an established health team. The student team is responsible to develop either a community-driven project or provide intervention for patients. (Offered jointly by the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation Medicine.) Priority will be given to students in professional entry-level programs in health science disciplines. Prerequisite: INT D 410. [Rehabilitation Medicine]

INT D 415 International Health Care Systems and Delivery
★3 *(fi 6)* (either term, 0-3s-0). Health and social policies of Canada and Europe are explored using interdisciplinary and participatory learning experiences. Issues affecting health services, education, research, delivery models, workforce, finance, service recipients and complementary therapies will be discussed from an international perspective. (Offered jointly by the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation Medicine.) Priority will be given to students in professional entry-level health science programs. [Rehabilitation Medicine]

L INT D 421 Peatlands
★3 *(fi 6)* (first term, 3-0-3). Climatic, geologic and hydrologic factors of peatland development; ecosystem dynamics of peat formation including flora and fauna, biogeochemical cycles, and energy fluxes; stratigraphy and evolution; classification; use in forestry, agriculture, horticulture and as fuel. Two one-day field trips on Saturdays. Offered in alternate years. Prerequisites: A 100-level or higher Ecology course and a 300-level SOILS course. Course requires payment of additional miscellaneous fees (see §22.2.3). (Offered jointly by the Departments of Biological Sciences and Renewable Resources.) [Renewable Resources]

O INT D 465 Natural Resource Utilization
★3 *(fi 6)* (either term, 3-0-0). Economics of utilizing and conserving land, water and energy resources in Agriculture and Forestry. Prerequisite: INT D 365. [Rural Economy]

201.117.2 Faculty of Arts Courses

Notes

(1) Courses listed below are the joint concern of the departments stated in the course descriptions. Instructions will be offered by members of one or more of the departments or Faculties listed. Responsibility for registration is with the department shown in square brackets at the end of the description.

(2) Unless otherwise indicated in the course description, an INT D course may be applied toward either the major or the minor or as an option if it appears under the department's course listings.

(3) Note that ★6 at the 400-level in INT D cannot constitute a minor in the BA program. Normally, a maximum of ★3 at the 400-level in INT D may be applied toward the minor requirement, unless otherwise approved by the minor department.

L INT D 100 Employability, Citizenship, and the Liberal Arts
★3 *(fi 6)* (either term, 3-0-0). Introduces students to the variety of intellectual skills inherent in a liberal arts education, which equips students for employment and citizenship in a changing world. Explores the implicit intellectual skills, modes of thinking, and disciplinary diversity within the Faculty of Arts.

INT D 125 Topics in Interdisciplinary Studies
★3-6 *(variable)* (variable, variable). Offered by various departments depending upon the content of the course in a given year. [Faculty of Arts]

L INT D 200 Introduction to Studies in Science, Technology and Society
★3 *(fi 6)* (either term, 3-0-0). An examination of the interrelations of science, technology, society and environment, emphasizing an interdisciplinary humanities and social sciences perspective. Both theoretical and practical issues are addressed, using historical and contemporary case studies. [Department of History and Classics]

O INT D 201 The Slavic World I
★3 *(fi 6)* (either term, 3-0-0). Cultural developments in Slavic lands from the early Middle Ages through Romanticism, with emphasis on literature and the fine arts. Note: Not to be taken by students with credit in INT D 101.

O INT D 202 The Slavic World II
★3 *(fi 6)* (either term, 3-0-0). Cultural developments in the Slavic lands from the mid-19th century to the present, with emphasis on literature and the fine arts. Note: Not to be taken by students with credit in INT D 102.

INT D 225 Topics in Interdisciplinary Studies
★3-6 *(variable)* (variable, variable). Offered by various departments depending upon the content of the course in a given year. [Faculty of Arts]

INT D 257 Health Care Economics
★3 *(fi 6)* (either term, 3-0-0). Resource allocation in the health care industry; production and cost relationships within various types of institutional settings (hospital, medical firm) the role of the price mechanism in allocating resources. Manpower planning; the role of the Government and professional groups in allocating resources in the non-price sector of the health industry. (Offered jointly by the Departments of Economics and Public Health Sciences.) [Economics]

O INT D 303 Economics of World Agriculture
★3 *(fi 6)* (either term, 3-0-0). Economic issues in international agriculture including world food security, farming systems, agricultural trade and aid. The role of agriculture in development and means of improving the performance of agriculture worldwide. Foreign domestic agricultural policies and international trade protection measures, and potential reforms in relation to Canadian agricultural interests. Prerequisite: ECON 101/102. (Offered jointly by the Departments of Economics and Rural Economy). [Rural Economy]

INT D 304 Sport and Popular Culture in Canada
★3 *(fi 6)* (either term, 0-3s-0). An interdisciplinary examination of the place of Sport in English and French Canadian popular culture, historically and in the present. Topics include the continental dimension of professional sport, and its effects on how Canadians see themselves; contemporary issues in community level sport and nationalism; and Canadian governments' use of sport. Not open to students with credit in INT D 405. (Offered jointly by the Canadian Studies Program, Department of Political Science, and the Faculty of Physical Education and Recreation.) [Political Science]

INT D 350 Contemporary Germany: Political and Economic Aspects
★3 *(fi 6)* (either term, 3-0-0). To be given in three four-week segments each by the Departments of History and Classics, Political Science, and Economics. [Modern Languages and Cultural Studies: Germanic, Romance, Slavic] Note: This course will not fulfil the Language other than English requirement of the BA degree.

INT D 369 Economics of the Environment
★3 *(fi 6)* (either term, 3-0-0). Economic growth and the deterioration of the environment; types and causes of environmental deterioration; theory, policy, and measurement relating to environmental deterioration; recreation economics; and current Canadian environmental topics. Prerequisite: ECON 101 or equivalent. (Offered jointly by the Departments of Economics and Rural Economy.) [Economics]

INT D 393 Political Sociology
★3 *(fi 6)* (either term, 3-0-0). A study of how society affects politics and politics affects society. Discussion of the political consequences of economic developments, ideological debates, class conflicts, social movements, elites, gender, nationalisms and state structures. Focus on Canada from a comparative perspective. Prerequisite: POL S 100 or one of SOC 100, 202 or 300. (Offered jointly by the Departments of Political Science and Sociology.) [Political Science]

O INT D 394 Introduction to Criminal Law
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: SOC 225. Note: Primarily for BA (Criminology) students. [Sociology]

INT D 425 Topics in Interdisciplinary Studies
★3-6 *(variable)* (variable, variable). Offered by various departments depending upon the content of the course in a given year. [Faculty of Arts]

O INT D 439 Ukrainian Dance
★3 *(fi 6)* (either term, 3-0-0). A theoretical and experiential investigation of the forms and history of Ukrainian dance. Course content is focused on the relationships of this dance to Ukrainian as well as Canadian culture, with consideration to its artistic and educational aspects. Offered jointly by the Faculty of Physical Education and Recreation and the Department of Modern Languages and Cultural Studies: Germanic, Romance, Slavic. [Faculty of Physical Education and Recreation]

O INT D 444 Ukraine
★3 *(fi 6)* (either term, 3-0-0). Major social, economic, political, and cultural trends in Ukraine in the post-World War II period. Prerequisite or corequisite: An area-related three-weight course in one of geography, history, political science, or Ukrainian, or consent of Department of Modern Languages and Cultural Studies. (Other participating units normally include the Canadian Institute of Ukrainian Studies and the Department of History and Classics.) [Modern Languages and Cultural Studies: Germanic, Romance, Slavic] Note: This course will not fulfil the Language other than English requirement of the BA degree.

O INT D 445 Poland
★3 *(fi 6)* (either term, 3-0-0). The political, social, economic, and cultural developments in post World War II Poland. Prerequisite: INT D 346, or POLSH 202, or equivalent, or demonstration to the Department of Modern Languages and Cultural Studies: Germanic, Romance, Slavic of sufficient background in the area.

(Other participating units normally include the Department of Economics.) [Modern Languages and Cultural Studies: Germanic, Romance, Slavic] Note: This course will not fulfil the Language other than English requirement of the BA degree.

O INT D 448 Russia
★3 *(fi 6)* (either term, 3-0-0). Major political, social, economic, and cultural developments in Russia since 1945. Prerequisite: a course in the history, geography or political science of Russia, or consent of Department. [Modern Languages and Cultural Studies: Germanic, Romance, Slavic]. The course will not fulfil the language other than English requirement of the BA degree.

O INT D 475 The Family in Socio-Historical Perspective
★3 *(fi 6)* (either term, 3-0-0). Comparative study of the family in socio-historical context with emphasis on North American and European family systems. Critical examination of contemporary sociological family theory in relation to historical data. Issues in socio-historical research methods of family study. Prerequisite: SOC 271 or equivalent. (Offered jointly by the Departments of History and Classics and Sociology.) [Sociology]

O INT D 487 Topics in East European Studies
★3 *(fi 6)* (either term, 3-0-0). Specific topics in the history of the countries of the former USSR taught by the Stuart Ramsay Tompkins Visiting Historian from Russia or another country of the former Soviet Union. Prerequisite: consent of Department. [Modern Languages and Cultural Studies: Germanic, Romance, Slavic]

L INT D 498 Historiography of Science and Technology: Problems and Methods
★3 *(fi 6)* (either term, 0-3s-0). (Offered jointly by the Departments of History and Classics and Philosophy.) [History and Classics]

O INT D 499 Special Topics
★3 *(fi 6)* (either term, 3-0-0).

201.117.3 Faculty of Medicine and Dentistry Courses

L INT D 224 Basic Virology
★3 *(fi 6)* (first term, 3-0-0). An introduction to the structure, replication, and taxonomy of bacteriophages, plant, insect, and animal viruses. Their role in disease and methods of control and detection is also discussed. Prerequisite: BIOL 107. Corequisite: BIOL 201 or 207. Credit may be obtained in one of MICRB 224 or MMI 224 or INT D 224. May not be taken for credit if credit already obtained in BIOCH 450. (Offered jointly by the Departments of Biological Sciences and of Medical Microbiology and Immunology.) [Biological Sciences]

INT D 257 Health Care Economics
★3 *(fi 6)* (either term, 3-0-0). Resource allocation in the health care industry; production and cost relationships within various types of institutional settings (hospital, medical firm) the role of the price mechanism in allocating resources. Manpower planning; the role of the Government and professional groups in allocating resources in the non-price sector of the health industry. (Offered jointly by the Departments of Economics and Public Health Sciences.) [Economics]

INT D 370 Survey on International Health
★3 *(fi 6)* (second term, 3-0-0). Overview of health issues and organization in a cross-cultural context with emphasis on developing and newly industrialized countries. Prerequisite: Completion of 10 full courses in any program or consent of Instructor. (Nursing, Dentistry, Medicine, Pharmacy and Pharmaceutical Sciences, Rehabilitation Medicine, and Social Sciences.) [Nursing]

L INT D 371 Introduction to Immunology
★3 *(fi 6)* (first term, 3-0-0). Survey course introducing the student to immunological concepts. Topics include the clonal selection theory, antibody structure and specificity, genetic basis of immune diversity, antibody-antigen reactions, cell interactions in immune responses, the molecular basis of non-self recognition, MHC molecules and transplantation, tolerance, effector mechanism of immunity, hypersensitivity and immunodeficiency. Prerequisites: BIOCH 203 and 205, and BIOL 207. Credit may be obtained in only one of IMMUN 370 or MICRB 370 or INT D 371. (Offered jointly by the Department of Biological Sciences and the Department of Medical Microbiology and Immunology.) [Biological Sciences]

L INT D 372 Research Techniques in Immunology
★3 *(fi 6)* (second term, 1-0-3). A lecture and laboratory course covering theory and practice behind selected immunological techniques. Techniques covered may include: lymphocyte isolation, flow cytometry, mixed lymphocyte reactions, immunocytochemistry, immunoprecipitation, ELISA, western blotting, expression cloning and monoclonal antibody technology. Lectures and labs are on alternate weeks, and labs will sometimes require students to return the next day to check on plates or cultures. Prerequisite: INT D 371. (Offered jointly by the Departments of Biological Sciences and Medical Microbiology and Immunology). (Biological Sciences)

INT D 409 Research Project
★3 *(fi 6)* (second term, 0-0-6). Directed research in a medical laboratory science. Supervisor and research project to be chosen by student. Requires writing a project proposal, keeping an accurate laboratory notebook, conducting adequate experimental research, writing a research paper and presenting a short seminar based on the research. Restricted to fourth-year Medical Laboratory Science students. (Offered jointly by the Department of Medical Microbiology and Immunology, and the Division of Medical Laboratory Science.)

INT D 410 Interdisciplinary Health Team Development
★3 *(fi 6)* (second term, 0-6.5s-0 in 5 weeks). A process learning course intended to provide experience in building a team of health care professionals from different disciplines. Emphasis is placed on team building, recognizing the unique contributions of different professions, patients and families. (Offered jointly by the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation Medicine.) (Priority will be given to students in all undergraduate health professions where this is a required course.)

INT D 411 Interprofessional Health Team Placements
★1-6 *(variable)* (either term, 5 weeks). Clinical practicum designed to provide an orientation to interprofessional teamwork. May be taken in addition to or in conjunction with discipline-specific courses. Students from various health sciences disciplines are simultaneously placed within a health care organization with an established health team. The student team is responsible to develop either a community-driven project or provide intervention for patients. (Offered jointly by the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation Medicine.) Priority will be given to students in professional entry-level programs in health science disciplines. Prerequisite: INT D 410. [Rehabilitation Medicine]

INT D 415 International Health Care Systems and Delivery
★3 *(fi 6)* (either term, 0-3s-0). Health and social policies of Canada and Europe are explored using interdisciplinary and participatory learning experiences. Issues affecting health services, education, research, delivery models, workforce, finance, service recipients and complementary therapies will be discussed from an international perspective. (Offered jointly by the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation Medicine.) Priority will be given to students in professional entry-level health science programs. [Rehabilitation Medicine]

L INT D 452 Advanced Immunology
★3 *(fi 6)* (second term, 3-1s-0). A lecture course on the detailed mechanisms of the immune system, describing recent discoveries in cellular and molecular immunology. Topics include mechanisms of T-cell receptor selection, antigen processing, activation of B and T lymphocytes, cellular collaboration, negative and positive regulatory mechanisms in immunity, transplantation, cytokine actions and interactions, autoimmunity. Interaction between immune systems and pathogens, and immunogenetics. Prerequisites: BIOCH 203 and 205 and IMMUN 370 or MICRB 370 or INT D 371. Credit may be obtained in only one of IMMUN 451 or MICRB 451 or INT D 452. (Offered jointly by the Department of Biological Sciences, the Department of Medical Microbiology and Immunology and the Department of Oncology) [Biological Sciences].

INT D 491 Research Project
★6 *(fi 12)* (two term, 0-0-6). Directed research in a medical laboratory science. Supervisor and research project to be chosen by student. Requires writing a project proposal, keeping an accurate laboratory notebook, conducting adequate experimental research, writing a research paper and presenting a short seminar based on the research. Restricted to fourth-year Medical Laboratory Science students. (Offered jointly by the Department of Medical Microbiology and Immunology, and the Division of Medical Laboratory Science.)

201.117.4 Faculty of Nursing Courses

INT D 370 Survey on International Health
★3 *(fi 6)* (second term, 3-0-0). Overview of health issues and organization in a cross-cultural context with emphasis on developing and newly industrialized countries. Prerequisite: Completion of 10 full courses in any program or consent of Instructor. (Nursing, Dentistry, Medicine, Pharmacy and Pharmaceutical Sciences, Rehabilitation Medicine, and Social Sciences.) [Nursing]

INT D 410 Interdisciplinary Health Team Development
★3 *(fi 6)* (second term, 0-6.5s-0 in 5 weeks). A process learning course intended to provide experience in building a team of health care professionals from different disciplines. Emphasis is placed on team building, recognizing the unique contributions of different professions, patients and families. (Offered jointly by the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation Medicine.) (Priority will be given to students in all undergraduate health professions where this is a required course.)

INT D 411 Interprofessional Health Team Placements
★1-6 *(variable)* (either term, 5 weeks). Clinical practicum designed to provide an orientation to interprofessional teamwork. May be taken in addition to or in conjunction with discipline-specific courses. Students from various health sciences disciplines are simultaneously placed within a health care organization with an established health team. The student team is responsible to develop either a community-driven project or provide intervention for patients. (Offered jointly by

the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation Medicine.) Priority will be given to students in professional entry-level programs in health science disciplines. Prerequisite: INT D 410. [Rehabilitation Medicine]

INT D 415 International Health Care Systems and Delivery
★3 *(fi 6)* (either term, 0-3s-0). Health and social policies of Canada and Europe are explored using interdisciplinary and participatory learning experiences. Issues affecting health services, education, research, delivery models, workforce, finance, service recipients and complementary therapies will be discussed from an international perspective. (Offered jointly by the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation Medicine.) Priority will be given to students in professional entry-level health science programs. [Rehabilitation Medicine]

201.117.5 Faculty of Pharmacy and Pharmaceutical Sciences Courses

INT D 370 Survey on International Health
★3 *(fi 6)* (second term, 3-0-0). Overview of health issues and organization in a cross-cultural context with emphasis on developing and newly industrialized countries. Prerequisite: Completion of 10 full courses in any program or consent of Instructor. (Nursing, Dentistry, Medicine, Pharmacy and Pharmaceutical Sciences, Rehabilitation Medicine, and Social Sciences.) [Nursing]

INT D 410 Interdisciplinary Health Team Development
★3 *(fi 6)* (second term, 0-6.5s-0 in 5 weeks). A process learning course intended to provide experience in building a team of health care professionals from different disciplines. Emphasis is placed on team building, recognizing the unique contributions of different professions, patients and families. (Offered jointly by the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation Medicine.) (Priority will be given to students in all undergraduate health professions where this is a required course.)

INT D 411 Interprofessional Health Team Placements
★1-6 *(variable)* (either term, 5 weeks). Clinical practicum designed to provide an orientation to interprofessional teamwork. May be taken in addition to or in conjunction with discipline-specific courses. Students from various health sciences disciplines are simultaneously placed within a health care organization with an established health team. The student team is responsible to develop either a community-driven project or provide intervention for patients. (Offered jointly by the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation Medicine.) Priority will be given to students in professional entry-level programs in health science disciplines. Prerequisite: INT D 410. [Rehabilitation Medicine]

INT D 415 International Health Care Systems and Delivery
★3 *(fi 6)* (either term, 0-3s-0). Health and social policies of Canada and Europe are explored using interdisciplinary and participatory learning experiences. Issues affecting health services, education, research, delivery models, workforce, finance, service recipients and complementary therapies will be discussed from an international perspective. (Offered jointly by the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation Medicine.) Priority will be given to students in professional entry-level health science programs. [Rehabilitation Medicine]

201.117.6 Faculty of Physical Education and Recreation Courses

INT D 304 Sport and Popular Culture in Canada
★3 *(fi 6)* (either term, 0-3s-0). An interdisciplinary examination of the place of Sport in English and French Canadian popular culture, historically and in the present. Topics include the continental dimension of professional sport, and its effects on how Canadians see themselves; contemporary issues in community level sport and nationalism; and Canadian governments' use of sport. Not open to students with credit in INT D 405. (Offered jointly by the Canadian Studies Program, Department of Political Science, and the Faculty of Physical Education and Recreation.) [Political Science]

INT D 410 Interdisciplinary Health Team Development
★3 *(fi 6)* (second term, 0-6.5s-0 in 5 weeks). A process learning course intended to provide experience in building a team of health care professionals from different disciplines. Emphasis is placed on team building, recognizing the unique contributions of different professions, patients and families. (Offered jointly by the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation Medicine.) (Priority will be given to students in all undergraduate health professions where this is a required course.)

INT D 411 Interprofessional Health Team Placements
★1-6 *(variable)* (either term, 5 weeks). Clinical practicum designed to provide an orientation to interprofessional teamwork. May be taken in addition to or in conjunction with discipline-specific courses. Students from various health sciences disciplines are simultaneously placed within a health care organization with an established health team. The student team is responsible to develop either a community-driven project or provide intervention for patients. (Offered jointly by the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation Medicine.) Priority will be given to students in professional entry-level programs in health science disciplines. Prerequisite: INT D 410. [Rehabilitation Medicine]

INT D 415 International Health Care Systems and Delivery
★3 *(fi 6)* (either term, 0-3s-0). Health and social policies of Canada and Europe are explored using interdisciplinary and participatory learning experiences. Issues affecting health services, education, research, delivery models, workforce, finance, service recipients and complementary therapies will be discussed from an international perspective. (Offered jointly by the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation Medicine.) Priority will be given to students in professional entry-level health science programs. [Rehabilitation Medicine]

O INT D 439 Ukrainian Dance
★3 *(fi 6)* (either term, 3-0-0). A theoretical and experiential investigation of the forms and history of Ukrainian dance. Course content is focused on the relationships of this dance to Ukrainian as well as Canadian culture, with consideration to its artistic and educational aspects. Offered jointly by the Faculty of Physical Education and Recreation and the Department of Modern Languages and Cultural Studies: Germanic, Romance, Slavic. [Faculty of Physical Education and Recreation]

O INT D 451 Geography of Recreation and Leisure
★3 *(fi 6)* (either term, 3-0-0). Geographic research on outdoor recreation; behavioral-spatial approaches to participation and conflict in resource use, social and ecological carrying capacity, recreation space management. Prerequisite: consent of Instructor. (Offered jointly by the Department of Earth and Atmospheric Sciences and the Faculty of Physical Education and Recreation.) [Earth and Atmospheric Sciences]

201.117.7 Faculty of Rehabilitation Medicine Courses

INT D 370 Survey on International Health
★3 *(fi 6)* (second term, 3-0-0). Overview of health issues and organization in a cross-cultural context with emphasis on developing and newly industrialized countries. Prerequisite: Completion of 10 full courses in any program or consent of Instructor. (Nursing, Dentistry, Medicine, Pharmacy and Pharmaceutical Sciences, Rehabilitation Medicine, and Social Sciences.) [Nursing]

INT D 410 Interdisciplinary Health Team Development
★3 *(fi 6)* (second term, 0-6.5s-0 in 5 weeks). A process learning course intended to provide experience in building a team of health care professionals from different disciplines. Emphasis is placed on team building, recognizing the unique contributions of different professions, patients and families. (Offered jointly by the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation Medicine.) (Priority will be given to students in all undergraduate health professions where this is a required course.)

INT D 411 Interprofessional Health Team Placements
★1-6 *(variable)* (either term, 5 weeks). Clinical practicum designed to provide an orientation to interprofessional teamwork. May be taken in addition to or in conjunction with discipline-specific courses. Students from various health sciences disciplines are simultaneously placed within a health care organization with an established health team. The student team is responsible to develop either a community-driven project or provide intervention for patients. (Offered jointly by the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation Medicine.) Priority will be given to students in professional entry-level programs in health science disciplines. Prerequisite: INT D 410. [Rehabilitation Medicine]

INT D 415 International Health Care Systems and Delivery
★3 *(fi 6)* (either term, 0-3s-0). Health and social policies of Canada and Europe are explored using interdisciplinary and participatory learning experiences. Issues affecting health services, education, research, delivery models, workforce, finance, service recipients and complementary therapies will be discussed from an international perspective. (Offered jointly by the following faculties: Agriculture, Forestry, and Home Economics; Medicine and Dentistry; Nursing; Pharmacy and Pharmaceutical Sciences; Physical Education and Recreation; and Rehabilitation

Medicine.) Priority will be given to students in professional entry-level health science programs. [Rehabilitation Medicine]

201.117.8 Faculty of Science Courses

Note: Any Interdisciplinary Studies courses below will be counted as a science course in a program of study in the Faculty of Science.

L INT D 224 Basic Virology
★3 *(fi 6)* (first term, 3-0-0). An introduction to the structure, replication, and taxonomy of bacteriophages, plant, insect, and animal viruses. Their role in disease and methods of control and detection is also discussed. Prerequisite: BIOL 107. Corequisite: BIOL 201 or 207. Credit may be obtained in one of MICRB 224 or MMI 224 or INT D 224. May not be taken for credit if credit already obtained in BIOCH 450. (Offered jointly by the Departments of Biological Sciences and of Medical Microbiology and Immunology.) [Biological Sciences]

L INT D 371 Introduction to Immunology
★3 *(fi 6)* (first term, 3-0-0). Survey course introducing the student to immunological concepts. Topics include the clonal selection theory, antibody structure and specificity, genetic basis of immune diversity, antibody-antigen reactions, cell interactions in immune responses, the molecular basis of non-self recognition, MHC molecules and transplantation, tolerance, effector mechanism of immunity, hypersensitivity and immunodeficiency. Prerequisites: BIOCH 203 and 205, and BIOL 207. Credit may be obtained in only one of IMMUN 370 or MICRB 370 or INT D 371. (Offered jointly by the Department of Biological Sciences and the Department of Medical Microbiology and Immunology.) [Biological Sciences]

L INT D 372 Research Techniques in Immunology
★3 *(fi 6)* (second term, 1-0-3). A lecture and laboratory course covering theory and practice behind selected immunological techniques. Techniques covered may include: lymphocyte isolation, flow cytometry, mixed lymphocyte reactions, immunocytochemistry, immunoprecipitation, ELISA, western blotting, expression cloning and monoclonal antibody technology. Lectures and labs are on alternate weeks, and labs will sometimes require students to return the next day to check on plates or cultures. Prerequisite: INT D 371. (Offered jointly by the Departments of Biological Sciences and Medical Microbiology and Immunology). (Biological Sciences)

L INT D 421 Peatlands
★3 *(fi 6)* (first term, 3-0-3). Climatic, geologic and hydrologic factors of peatland development; ecosystem dynamics of peat formation including flora and fauna, biogeochemical cycles, and energy fluxes; stratigraphy and evolution; classification; use in forestry, agriculture, horticulture and as fuel. Two one-day field trips on Saturdays. Offered in alternate years. Prerequisites: A 100-level or higher Ecology course and a 300-level SOILS course. Course requires payment of additional miscellaneous fees (see §22.2.3). (Offered jointly by the Departments of Biological Sciences and Renewable Resources.) [Renewable Resources]

O INT D 451 Geography of Recreation and Leisure
★3 *(fi 6)* (either term, 3-0-0). Geographic research on outdoor recreation; behavioral-spatial approaches to participation and conflict in resource use, social and ecological carrying capacity, recreation space management. Prerequisite: consent of Instructor. (Offered jointly by the Department of Earth and Atmospheric Sciences and the Faculty of Physical Education and Recreation.) [Earth and Atmospheric Sciences]

L INT D 452 Advanced Immunology
★3 *(fi 6)* (second term, 3-1s-0). A lecture course on the detailed mechanisms of the immune system, describing recent discoveries in cellular and molecular immunology. Topics include mechanisms of T-cell receptor selection, antigen processing, activation of B and T lymphocytes, cellular collaboration, negative and positive regulatory mechanisms in immunity, transplantation, cytokine actions and interactions, autoimmunity. Interaction between immune systems and pathogens, and immunogenetics. Prerequisites: BIOCH 203 and 205 and IMMUN 370 or MICRB 370 or INT D 371. Credit may be obtained in only one of IMMUN 451 or MICRB 451 or INT D 452. (Offered jointly by the Department of Biological Sciences, the Department of Medical Microbiology and Immunology and the Department of Oncology) [Biological Sciences].

Graduate Courses

201.117.9 Faculty of Agriculture, Forestry, and Home Economics Courses

O INT D 565 Natural Resource and Environmental Economics
★3 *(fi 6)* (either term, 3-0-0). Economic analysis of renewable resource and environmental issues. Renewable resource theory with applications to the fishery, forestry, soils and wildlife. Economic analysis of environmental protection and policy. Topics in applied benefit-cost analysis including the valuation of non-market goods and services. Prerequisite: consent of Instructor; AG EC 502 and 416 recommended. Offered jointly by the Departments of Rural Economy and Economics. [Rural Economy]

INT D 665 Natural Resource Utilization
★3 *(fi 6)* (either term, 3-0-0). Economics of utilizing and conserving land, water and energy resources in Agriculture and Forestry. Prerequisite: INT D 365. Not available for students with credit in INT D 465. Available only to students in MBA/MAg, MBA/MF, MBA in Natural Resource and Energy Programs, or by consent of Department. [Rural Economy]

201.117.10 Faculty of Arts Courses

INT D 505 East European Soviet and Post-Soviet Studies I
★3 *(fi 6)* (either term, 3-0-0). [Modern Languages and Cultural Studies: Germanic, Romance, Slavic]. Not to be taken for credit by students with credit in INT D 546. Prerequisite: consent of Department.

INT D 506 East European Soviet and Post-Soviet Studies II
★3 *(fi 6)* (either term, 3-0-0). [Modern Languages and Cultural Studies: Germanic, Romance, Slavic]. Not to be taken by students with credit in INT D 546. Prerequisite: consent of Department.

INT D 520 Combined Honors Essay
★3-6 *(variable)* (variable, unassigned). For students in Combined Honors programs. Permission of both Departments is required.

INT D 554 Research in Cognitive Science
★3 *(fi 6)* (either term, 3-0-0). A multidisciplinary survey of theoretical issues and research practices in Cognitive Science to be taught by various members of such Departments as Psychology, Computing Science, Linguistics, and Philosophy. Prerequisites: consent of course coordinator and consent of student's home department. [Psychology]

INT D 593 Seminar in Political Sociology
★3 *(fi 6)* (either term, 0-3s-0).

INT D 594 Quaternary Environments
★6 *(fi 12)* (two term, 3-0-0). A comprehensive survey of the Quaternary period; dating methods, paleoclimates, vertebrates, case studies in stratigraphy and paleoecology. Prerequisite: a related 400-level course in Anthropology, Biological Sciences, Earth and Atmospheric Sciences, Renewable Resources, or consent of Department. (Offered jointly by the Departments of Anthropology and Earth and Atmospheric Sciences.).

INT D 654 Advanced Topics in Cognitive Science
★3 *(fi 6)* (either term, 3-0-0). An intensive investigation of selected issues in Cognitive Science, such as mind/body relations, symbolic vs connectionist approaches, intentionality, and computational vs empirical research strategies. Prerequisites: INT D 554, consent of course instructor, and consent of student's home department. [Psychology]

201.117.11 Faculty of Medicine and Dentistry Courses

INT D 570 Healthcare Ethics
★3 *(fi 6)* (either term, 0-3s-0). An interdisciplinary course exploring selected topics in bioethics. Includes examination of ethical theories and principles within the context of clinical practice (nursing, medicine, rehabilitation medicine, dentistry, pharmacy) and learning experiences to improve moral reasoning and ethical decision making. Prerequisite: consent of Instructors. [Faculty of Nursing, Faculty of Medicine and Dentistry, John Dossetor Health Ethics Centre]

INT D 670 Research Ethics
★3 *(fi 6)* (either term, 0-3s-0). Examines the ethical issues which arise in research involving human subjects. Research methods studied may include clinical trials, surveys, secondary analysis of stored data, and the observation of public behavior. Problems encountered in studying particular populations, such as children or persons with dementia, will also be studied. Prerequisite: consent of Instructor. [Faculty of Nursing, Faculty of Medicine and Dentistry, John Dossetor Health Ethics Centre].

201.117.12 Faculty of Nursing Courses

INT D 560 Principles of Qualitative Inquiry
★3 *(fi 6)* (either term, 0-3s-0). An introduction to the assumptions, principles, and techniques of qualitative inquiry. This course also provides a theoretical and practical introduction to the major methods of qualitative inquiry.

INT D 570 Healthcare Ethics
★3 *(fi 6)* (either term, 0-3s-0). An interdisciplinary course exploring selected topics in bioethics. Includes examination of ethical theories and principles within the context of clinical practice (nursing, medicine, rehabilitation medicine, dentistry, pharmacy) and learning experiences to improve moral reasoning and ethical decision making. Prerequisite: consent of Instructors. [Faculty of Nursing, Faculty of Medicine and Dentistry, John Dossetor Health Ethics Centre]

INT D 670 Research Ethics
★3 *(fi 6)* (either term, 0-3s-0). Examines the ethical issues which arise in research involving human subjects. Research methods studied may include clinical trials, surveys, secondary analysis of stored data, and the observation of public behavior.

Problems encountered in studying particular populations, such as children or persons with dementia, will also be studied. Prerequisite: consent of Instructor. [Faculty of Nursing, Faculty of Medicine and Dentistry, John Dossetor Health Ethics Centre].

INT D 690 Topics in Knowledge Utilization
★3 *(fi 6)* (either term, 0-3s-0). Examines the scientific, theoretical, and historical underpinnings of the field of knowledge utilization. Covers contemporary manifestations of knowledge utilization in Canadian society such as evidence based decision-making, and in health care such as evidence-based practice and evidence-based medicine. It addresses the challenges of knowledge use in health care organizations and will focus on the central conceptual and methodological challenges facing investigators undertaking knowledge utilization research. Prerequisite: consent of Instructor.

201.117.13 Faculty of Science Courses

INT D 554 Research in Cognitive Science
★3 *(fi 6)* (either term, 3-0-0). A multidisciplinary survey of theoretical issues and research practices in Cognitive Science to be taught by various members of such Departments as Psychology, Computing Science, Linguistics, and Philosophy. Prerequisites: consent of course coordinator and consent of student's home department. [Psychology]

INT D 594 Quaternary Environments
★6 *(fi 12)* (two term, 3-0-0). A comprehensive survey of the Quaternary period; dating methods, paleoclimates, vertebrates, case studies in stratigraphy and paleoecology. Prerequisite: a related 400-level course in Anthropology, Biological Sciences, Earth and Atmospheric Sciences, Renewable Resources, or consent of Department. (Offered jointly by the Departments of Anthropology and Earth and Atmospheric Sciences.).

201.118 Italian, ITAL

Department of Modern Languages and Cultural Studies:
Germanic, Romance, Slavic
Faculty of Arts

Undergraduate Courses

Notes
(1) The Department reserves the right to place students in the language course appropriate to their level of language skill.
(2) Placement tests may be administered in order to assess prior background. Students with an Italian language background should consult a Department advisor. Such students may be granted advanced placement and directed to register in an advanced course more suitable to their level of ability, or they may be encouraged to seek "Credit by Special Assessment" (see §44.5) where appropriate.
(3) The Department will withhold credit from students completing courses for which prior background is deemed to make them ineligible. For example, 100-level courses are normally restricted to students with little or no prior knowledge in that language. Should a student with matriculation standing, or those possessing prior background (such as native speakers or those for whom it is their first language) register in the 100-level course, credit may be withheld.

O ITAL 100 Beginners' Italian
★6 *(fi 12)* (two term, 5-0-0). Italian grammar and pronunciation. Readings of easy texts dealing with different aspects of Italian culture. Note: Not open to students with native or near native proficiency or to students with Italian 30 or its equivalents in Canada and other countries.

ITAL 101 First-Year University Italian for Speakers of Italian
★6 *(fi 12)* (two term, 3-0-0). Designed for students having some previous knowledge of Italian. Note: Not open to students with credit in Italian 30 or ITAL 100, or equivalent. Formerly ITAL 200 and 150.

O ITAL 205 Topics in Italian Studies
★3 *(fi 6)* (either term, 3-0-0). Modern Italy studied through its cultural context and forms of expression. The course will be taught in English.

O ITAL 250 Second-Year Italian
★6 *(fi 12)* (two term, 3-0-0). Selected contemporary prose and poetry. Advanced grammar and phonetics. Prerequisite: Italian 30, ITAL 100, 101 or equivalent. Formerly ITAL 300.

O ITAL 331 Contemporary Italian Short Stories, Before 1945
★3 *(fi 6)* (either term, 3-0-0). Selection of representative major writers. Prerequisite: ITAL 250 or consent of Department.

O ITAL 332 Contemporary Italian Short Stories, Post-Second World War
★3 *(fi 6)* (either term, 3-0-0). Selection of representative major writers. Prerequisite: ITAL 250 or consent of Department.

O ITAL 350 Italian Literature in English Translation
★3 *(fi 6)* (either term, 3-0-0). Major literary works from Dante to the Modern Period. Language of instruction is English. Note: This course will not fulfil the Language other than English requirement of the BA degree.

O ITAL 363 Studies in Italian Literary Genres
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: ITAL 250 or consent of Department.

O ITAL 375 Studies in Modern Italian Literature
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: ITAL 250 or consent of Department.

O ITAL 394 Composition I
★3 *(fi 6)* (either term, 3-0-0). This course is designed to improve students' command of Italian through intensive practice. Prerequisite: ITAL 250 or consent of Department.

O ITAL 395 Composition II
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: ITAL 250, or consent of Department.

O ITAL 415 Studies in Italian Renaissance Literature
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: A 300-level course in Italian literature or consent of Department.

O ITAL 419 Selected Topics in Italian Literature
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: A 300-level course in Italian literature or consent of Department.

O ITAL 425 Translation
★3 *(fi 6)* (either term, 3-0-0). Literary and technical translation from English to Italian. Prerequisite: ITAL 250, or 394, or 395, or consent of Department.

ITAL 499 Special Topics
★3 *(fi 6)* (either term, 3-0-0).

ITAL 520 Honors Thesis
★3 *(fi 6)* (two term, variable). For fourth-year Honors students. Prerequisite: Consent of Department.

Graduate Courses

ITAL 545 Topics in Italian Literature of the 17th and 18th Centuries
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: consent of Department.

ITAL 565 Topics in 19th-Century Italian Literature
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: consent of Department.

ITAL 599 Directed Reading
★3 *(fi 6)* (either term, 3-0-0).

ITAL 698 Topics in Italian Linguistics
★3 *(fi 6)* (either term, 3-0-0).

ITAL 699 Topics in Italian Literature
★3 *(fi 6)* (either term, 3-0-0).

ITAL 900 Directed Research Project
★6 *(fi 12)* (variable, unassigned).

201.119 Japanese, JAPAN

Department of East Asian Studies
Faculty of Arts

Notes
(1) The Department reserves the right to place students in the language course appropriate to their level of language skill.
(2) Placement tests may be administered in order to assess prior background. Students with an Asian (Chinese, Japanese, Korean) language background should consult a Department advisor. Such students may be granted advanced placement and directed to register in a more advanced course suitable to their level of ability or they may be encouraged to seek "Credit by Special Assessment" (see §44.5) when appropriate.
(3) The Department will withhold credit from students completing courses for which prior background is deemed to make them ineligible. For example, 100-level courses are normally restricted to students with little or no prior knowledge in that language. Should a student with matriculation standing, or those possessing prior background (such as native speakers or those for whom it is their first language) register in the 100-level courses, credit may be withheld.

Undergraduate Courses

L JAPAN 101 Basic Japanese I
★3 *(fi 6)* (either term, 5-0-0). A non-intensive course designed to develop basic skills in spoken and written Japanese. Note: Only one of JAPAN 100 and 101 may be taken for credit. Not open to students with credit in Japanese 30, 35 or equivalent.

O JAPAN 102 Basic Japanese II
★3 *(fi 6)* (either term, 0-5L-0). A continuation of JAPAN 101. Prerequisite: JAPAN 101 or equivalent. Note: Only one of JAPAN 100 and 102 may be taken for credit. Not open to students with credit in Japanese 30, 35 or equivalent.

L JAPAN 150 First-Year University Japanese
★3 *(fi 6)* (either term, 5-0-0). A non-intensive course designed for students who have some previous knowledge of spoken and written Japanese but need further training in grammar. Prerequisite: Japanese 30, 35 or equivalent or consent of Department. Note: After JAPAN 150, students may proceed to JAPAN 200 or 201.

O JAPAN 201 Basic Japanese III
★3 *(fi 6)* (either term, 5-0-0). A non-intensive course designed to develop further basic skills in spoken and written Japanese. Prerequisite: One of JAPAN 100, 102, 208 or equivalent. Note: JAPAN 200 and 201 may not both be taken for credit. JAPAN 201 and 202 together are roughly equivalent to JAPAN 200.

O JAPAN 202 Basic Japanese IV
★3 *(fi 6)* (either term, 0-5L-0). A continuation of JAPAN 201. Prerequisite: JAPAN 201. Note: JAPAN 200 and 202 may not both be taken for credit. JAPAN 201 and 202 are roughly equivalent to JAPAN 200.

O JAPAN 240 Japanese Literature and the Arts
★3 *(fi 6)* (either term, 3-0-0). The relationship between modern and pre-modern literature and visual arts: painting, prints, calligraphy, tea ceremony. Taught in English. No prerequisite. Note: Not open to students with credit in JAPAN 340. This course will not fulfill the language other than English Requirement of the BA.

JAPAN 250 The Japanese Language in Its Cultural Setting I
★6 *(fi 12)* (Spring/Summer, 15-0-0). A language/culture immersion course to be studied in Japan. Designed for improvement of oral/aural skills and for increased understanding of Japanese people and culture. Note: Offered in alternate years. Prerequisite: JAPAN 200 or 202 or consent of Department. Note: JAPAN 250 and 350 may not both be taken for credit.

O JAPAN 301 Intermediate Japanese I
★3 *(fi 6)* (either term, 5-0-0). Designed to develop basic reading skills of modern Japanese prose with special emphasis on grammar and usage. Prerequisite: JAPAN 200 or equivalent.

O JAPAN 302 Intermediate Japanese II
★3 *(fi 6)* (either term, 5-0-0). A continuation of JAPAN 301. Prerequisite: JAPAN 301 or equivalent.

O JAPAN 305 Intermediate Conversation and Composition I
★3 *(fi 6)* (either term, 3-0-0). Designed to be taken in conjunction with JAPAN 301 to develop speaking and writing skills of Japanese. Prerequisite: JAPAN 200, or 202, or consent of Department.

O JAPAN 306 Intermediate Conversation and Composition II
★3 *(fi 6)* (either term, 3-0-0). A continuation of JAPAN 305. Designed to be taken in conjunction with JAPAN 302. Prerequisite: JAPAN 305.

O JAPAN 318 Business Japanese I
★3 *(fi 6)* (first term, 3-0-0). Modern standard Japanese with emphasis on vocabulary and communication style of the Japanese business world. Prerequisite: JAPAN 202 or equivalent.

O JAPAN 319 Business Japanese II
★3 *(fi 6)* (second term, 3-0-0). Prerequisite: JAPAN 318 or equivalent.

O JAPAN 321 Pre-Modern Japanese Literature in Translation
★3 *(fi 6)* (either term, 3-0-0). Exploration of traditional Japanese culture through lived experience of Japanese people preserved in literary texts spanning more than a millennium. Note: This course will not fulfill the Language other than English requirement of the BA degree.

O JAPAN 322 Modern Japanese Literature in Translation
★3 *(fi 6)* (either term, 3-0-0). Selected works by prominent writers from 1868 to the present. Note: This course will not fulfill the Language other than English requirement of the BA degree.

O JAPAN 330 Japanese Literature and Film
★3 *(fi 6)* (either term, 3-0-0). Sub-titled film and animation adaptations of literary works from the modern and pre-modern eras. Note: Not open to students with credit in JAPAN 430. This course will not fulfill the language other than English requirement of the BA.

O JAPAN 341 Classical Japanese I
★3 *(fi 6)* (first term, 3-0-0). Prerequisite: JAPAN 202 or equivalent.

O JAPAN 342 Classical Japanese II
★3 *(fi 6)* (second term, 3-0-0). Prerequisite: JAPAN 341 or equivalent.

JAPAN 350 The Japanese Language in Its Cultural Setting II
★6 *(fi 12)* (Spring/Summer, 0-15L-0). A language/culture immersion course to be studied in Japan. Designed to improve oral/aural skills and increase understanding of Japanese people and culture. Note: Offered in alternate years. Prerequisite: JAPAN 302, or 306, or consent of Department. Note: JAPAN 250 and 350 may not both be taken for credit.

O JAPAN 401 Advanced Japanese I
★3 *(fi 6)* (either term, 3-0-0). An advanced course designed to develop skills in spoken and written Japanese with special emphasis on the acquisition of an extensive vocabulary. Prerequisite: JAPAN 302.

O JAPAN 402 Advanced Japanese II
★3 *(fi 6)* (either term, 3-0-0). A continuation of JAPAN 401. Prerequisite: JAPAN 401 or equivalent.

O JAPAN 415 Haiku and the Japanese Poetic Tradition
★3 *(fi 6)* (either term, 3-0-0). The course will discuss in English the evolution of haiku, the work of the great masters of the 17th and 18th centuries and modern haiku. Prerequisite: JAPAN 321 or any 300-level literature course. Note: This course will not fulfil the Language other than English requirement of the BA degree.

O JAPAN 416 Japanese Theatre from the Noh to the Avant-garde
★3 *(fi 6)* (either term, 3-0-0). The course will discuss, in English, forms of Japanese drama from the Noh to modern theatre. Prerequisite: JAPAN 321 or any 300-level literature or drama course. Note: This course will not fulfil the Language other than English requirement of the BA degree.

O JAPAN 418 Women in Pre-Modern Japanese Literary Culture
★3 *(fi 6)* (either term, 3-0-0). Taught in English translation. The role of women, gender construction, female subjectivity, the meaning of romance within the context of traditional society. Prerequisite: JAPAN 321 or any other 300-level literature course. This course will not fulfill the language other than English requirement of the BA. Note: Not open to students with credit in JAPAN 417.

O JAPAN 419 Women in Modern Japanese Literary Culture
★3 *(fi 6)* (either term, 3-0-0). Major works in English translation. The role of the female writer, formation of the modern Japanese literary canon, female subjectivity, gender and gender relations, the meaning of family and motherhood. Prerequisite: JAPAN 322 or any 300-level literature course. Note: This course will not fulfill the language other than English requirement of the BA. Not open to students with credit in JAPAN 417.

O JAPAN 420 Twentieth-Century Japanese Fiction
★3 *(fi 6)* (either term, 3-0-0). The major works in English translation of important Japanese writers in their cultural, social and historical contexts. Prerequisite: JAPAN 322 or any 300-level literature course. Note: This course will not fulfill the language other than English requirement of the BA.

O JAPAN 425 The Structure of the Japanese Language
★3 *(fi 6)* (either term, 3-0-0). Discussion of the major linguistic features of the Japanese language. Lectures in English. Prerequisite: JAPAN 302 or consent of Department.

O JAPAN 426 The History of the Japanese Language
★3 *(fi 6)* (either term, 3-0-0). The development of the Japanese language from its origin to the present. Lectures in English. Prerequisite: JAPAN 302 or consent of Department.

O JAPAN 451 Advanced Readings in Japanese
★3 *(fi 6)* (either term, 3-0-0). Advanced readings from newspapers, magazines, social commentary and literary prose. Prerequisite: JAPAN 402 or consent of Department.

O JAPAN 460 Topics in Japanese Studies
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: ★6 of senior courses in Japanese or consent of Department.

O JAPAN 481 Supervised Reading in Japanese
★3 *(fi 6)* (either term, 3-0-0). Accelerated reading course primarily for senior and graduate students in special areas of need or interest. Prerequisite: consent of Department.

JAPAN 490 Honors Thesis
★3 *(fi 6)* (either term, 3-0-0).

Graduate Courses

JAPAN 502 Methods of Research
★3 *(fi 6)* (either term, 3-0-0). Theory and practice of historical and critical approaches to premodern and modern Japanese literature. A reading knowledge of Japanese is required.

JAPAN 515 Topics in Japanese Poetry
★3 *(fi 6)* (either term, 3-0-0). A reading knowledge of Japanese is required. Note: Not open to students with credit in JAPAN 554.

JAPAN 516 Topics in Japanese Pre-modern and Modern Theatre
★3 *(fi 6)* (either term, 3-0-0). A reading knowledge of Japanese is required. Note: Not open to students with credit in JAPAN 551.

JAPAN 518 Topics in Japanese Women's Literature (Pre-Modern)
★3 *(fi 6)* (either term, 3-0-0). A reading knowledge of Japanese is required. Note: Not open to students with credit in JAPAN 552

JAPAN 519 Topics in Japanese Women's Literature (Modern)
★3 *(fi 6)* (either term, 3-0-0). A reading knowledge of Japanese is required. Note: Not open to students with credit in JAPAN 553.

JAPAN 556 Topics in Modern Japanese Fiction
★3 *(fi 6)* (either term, 3-0-0). This course will examine selected prose fiction by modern writers. Emphasis will be on critical interpretation and analysis of texts. A reading knowledge of Japanese is required.

JAPAN 557 Japanese Women Writers: Theory and Criticism
★3 *(fi 6)* (either term, 3-0-0). A reading knowledge of Japanese is required.

JAPAN 599 Topics in Japanese Literature, Premodern and Modern
★3 *(fi 6)* (either term, 3-0-0). JAPAN 599 must be taken at least once and may be repeated for credit when course content differs. A reading knowledge of Japanese is required.

201.120 Korean, KOREA

Department of East Asian Studies
Faculty of Arts

Notes
(1) The Department reserves the right to place students in the language course appropriate to their level of language skill.
(2) Placement tests may be administered in order to assess prior background. Students with an Asian (Chinese, Japanese, Korean) language background should consult a Department advisor. Such students may be granted advanced placement and directed to register in a more advanced course suitable to their level of ability or they may be encouraged to seek "Credit by Special Assessment" (see §44.5) when appropriate.
(3) The Department will withhold credit from students completing courses for which prior background is deemed to make them ineligible. For example, 100-level courses are normally restricted to students with little or no prior knowledge in that language. Should a student with matriculation standing, or those possessing prior background (such as native speakers or those for whom it is their first language) register in the 100-level courses, credit may be withheld.

Undergraduate Courses

L KOREA 101 Introductory Korean I
★3 *(fi 6)* (first term, 3-0-2). Designed to develop basic skills in spoken and written Korean. Note: Only one of KOREA 101 and 121 may be taken for credit.

L KOREA 102 Introductory Korean II
★3 *(fi 6)* (second term, 3-0-2). A continuation of KOREA 101. Prerequisite: KOREA 101 or equivalent. Note: Only one of KOREA 102 and 122 may be taken for credit.

O KOREA 121 Conversational Korean I
★3 *(fi 6)* (first term, 3-0-2). Designed to acquire basic phrases and a knowledge of Korean customs and culture. Note: Only one of KOREA 101 and 121 may be taken for credit.

O KOREA 122 Introductory Korean II
★3 *(fi 6)* (second term, 3-0-2). A continuation of KOREA 121. Prerequisite: KOREA 121 or equivalent. Note: Only one of KOREA 102 and 122 may be taken for credit.

L KOREA 201 Intermediate Korean I
★3 *(fi 6)* (first term, 3-0-2). A course designed to improve reading, speaking and writing. Prerequisite: KOREA 102, 122, or equivalent.

L KOREA 202 Intermediate Korean II
★3 *(fi 6)* (second term, 3-0-2). A continuation of Korea 201. Prerequisite: KOREA 201, or equivalent.

L KOREA 301 Intermediate Korean III
★3 *(fi 6)* (first term, 3-0-2). A course designed to enhance communication, comprehension, and composition through various reading materials and activities. Some Sino-Korean characters (Hahnja) will also be studied. Prerequisite: KOREA 202, or equivalent.

L KOREA 302 Intermediate Korean IV
★3 *(fi 6)* (second term, 3-0-2). A continuation of Korea 301. Prerequisite: KOREA 301, or equivalent.

L KOREA 321 Premodern Korean Literature in English
★3 *(fi 6)* (either term, 3-0-0). An introduction to premodern Korean literature. All readings and lectures in English. No prerequisites. Note: This course will not fulfil the Language other than English requirement of the BA degree.

L KOREA 322 Modern Korean Literature in English
★3 *(fi 6)* (either term, 3-0-0). An introduction to modern Korean literature. All readings and lectures in English. No prerequisites. Note: This course will not fulfil the Language other than English requirement of the BA degree.

O KOREA 401 Advanced Korean I
★3 *(fi 6)* (first term, 3-0-0). Studies in Korean language, culture and customs through readings and activities. Emphasis on sound patterns, grammatical structure, communication, comprehension, and composition. Prerequisite: KOREA 302 or equivalent.

O KOREA 402 Advanced Korean II
★3 *(fi 6)* (second term, 3-0-0). A continuation of KOREA 401. Prerequisite: KOREA 401 or equivalent.

201.121 Latin, LATIN

Department of History and Classics
Faculty of Arts

Notes
(1) Prerequisite for all 400-level Latin courses: LATIN 300, or 302, or consent of Department.
(2) For additional related courses see Classics (CLASS) and Greek (GREEK) listings.

Undergraduate Courses

L LATIN 101 Beginners' Latin I
★3 *(fi 6)* (either term, 3-0-1). An introduction to Latin which includes the study of the elements of Latin grammar and the reading of simple texts. Note: Students who have taken Latin 30 or equivalent should consult the Department advisor. Not open to students with credit in LATIN 100.

L LATIN 102 Beginners' Latin II
★3 *(fi 6)* (either term, 3-0-1). A continuation of LATIN 101. Prerequisite: LATIN 101, or consent of Department. Not open to students with credit in LATIN 100.

O LATIN 103 Intensive Beginning Latin
★6 *(fi 12)* (two term, 3-0-2). An introduction to Latin, including the elements of Latin grammar and the reading of simple texts. Not open to students who have successfully completed Latin 30, LATIN 100, 101, or 102. Normally offered during Spring/Summer.

O LATIN 301 Intermediate Latin I
★3 *(fi 6)* (either term, 3-0-1). Review of grammar; reading of Latin texts; translation of simple sentences from English into Latin. Prerequisite: LATIN 100, or 102, or consent of Department. Not open to students with credit in LATIN 300.

O LATIN 302 Intermediate Latin II
★3 *(fi 6)* (either term, 3-0-0). Selections from Latin poetry and prose. Prerequisite: LATIN 301 or consent of Department. Not open to students with credit in LATIN 300.

O LATIN 399 Readings in Latin Authors
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: LATIN 300 or 301 or consent of Department.

L LATIN 433 Medieval Latin
★3 *(fi 6)* (either term, 0-3s-0). Prerequisite: Latin 300, 302, or consent of Department.

L LATIN 470 Roman Historians
★3 *(fi 6)* (either term, 3-0-0).

L LATIN 475 Roman Elegiac and Lyric Poetry
★3 *(fi 6)* (either term, 3-0-0).

L LATIN 477 Roman Oratory
★3 *(fi 6)* (either term, 3-0-0).

L LATIN 481 Roman Epic and Didactic Poetry
★3 *(fi 6)* (either term, 3-0-0).

L LATIN 488 Latin Authors I
★3 *(fi 6)* (either term, 3-0-0).

L LATIN 489 Latin Authors II
★3 *(fi 6)* (either term, 3-0-0).

L LATIN 499 Individual Study in Latin Authors
★3 *(fi 6)* (either term, 3-0-0).

LATIN 500 Fourth-Year Honors Tutorial
★3 *(fi 6)* (either term, 0-3s-0). Prerequisite: consent of Department.

Graduate Courses

LATIN 502 Latin Epic and Didactic Poetry
★3 *(fi 6)* (either term, 3-0-0).

LATIN 506 Latin Poetry
★3 *(fi 6)* (either term, 3-0-0).

LATIN 508 Latin Historiography
★3 *(fi 6)* (either term, 3-0-0).

LATIN 510 Latin Prose Writers
★3 *(fi 6)* (either term, 3-0-0).

LATIN 699 Conference Course
★3 *(fi 6)* (either term, 3-0-0).

201.122 Latin American Studies, LA ST

Department of Modern Languages and Cultural Studies: Germanic, Romance, Slavic
Faculty of Arts

Undergraduate Courses

O LA ST 205 Central America and the Caribbean
★3 *(fi 6)* (either term, 3-0-0). Regional similarities and national differences. An introduction to Central America and the Caribbean today, including Spanish, French, and Creole speaking countries through study of their cultural contexts and forms of expression. Taught in English by the Department of Modern Languages and Cultural Studies in collaboration with the Departments of Art and Design, Anthropology, History and Classics, and Political Science.

O LA ST 210 South America
★3 *(fi 6)* (either term, 3-0-0). Regional similarities and national differences. An introduction to South America today, including Brazil and the Spanish speaking countries of the continent, through study of their cultural contexts and forms of expression. Taught in English by the Department of Modern Languages and Cultural Studies in collaboration with the Departments of Anthropology, Art and Design, History and Classics, and Political Science.

O LA ST 305 Topics in Latin America
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: ★3 in Latin American Studies at the 200-level.

O LA ST 310 Latin America at the Movies
★3 *(fi 6)* (either term, 3-0-3). The representation of Latin American people, places and events in the cinemas of Latin America, North America and Europe. Prerequisite: LA ST 205 or 210 or consent of Department.

O LA ST 311 Latin America and the Cultures of Popular Music
★3 *(fi 6)* (either term, 3-0-0). Popular music and its role in the formation of regional and national identities, with a focus on concepts such as high and low cultures, mass culture and mass media, cultural hybridity, diaspora, and creativity. Prerequisite: LA ST 205 or 210 or consent of Department.

O LA ST 312 Latin America in Art, Architecture and Urban Space
★3 *(fi 6)* (either term, 3-0-0). Art, architecture and urban spaces as texts through which regional and national cultures are expressed and defined. Prerequisite: LA ST 205 or 210 or consent of Department.

O LA ST 313 Women in Latin America
★3 *(fi 6)* (either term, 3-0-0). Women as creators, consumers, transformers, and guardians of culture. Forms of female representation through stereotypes, cliches, archetypes, and mythologies. Prerequisite: LA ST 205 or 210 or consent of Department.

201.123 Law, LAW

Faculty of Law

Undergraduate Courses

LAW 401 Foundations to Law
★3 *(fi 6)* (first term, 3-0-0). An introduction to the institutions and processes of the Canadian legal system, and its underlying values and systems of thought. Also introduced are the history, structure and function of the modern system, and the role of law and the legal profession in society.

LAW 405 Legal Research and Writing
★4 *(fi 8)* (two term, 2-0-0). Instruction in the fundamentals of legal research tools and techniques, including the impact of modern technology. Through a variety of written assignments, students will develop their analytical, research, communication and drafting skills, as well as becoming familiar with proper citation methods. Exercises in oral communications, advocacy skills and/or a moot court presentation may also be included.

LAW 410 Contracts
★5 *(fi 10)* (two term, 2-0-0; 3-0-0). A discussion of the prerequisites to the creation of contractual obligation: offer and acceptance, intention and certainty, consideration, the requirements of writing and capacity. The effect of misrepresentations and terms of the contract, together with the problems of exclusion clauses and of standard form contracts. Questions of discharge from contractual obligation on the grounds of mistake, undue influence, duress, unconscionable transactions and frustration. Remedies for breach of contract.

LAW 420 Criminal Law and Procedure
★5 *(fi 10)* (two term, 2-0-0; 3-0-0). A general introduction to the criminal law including pretrial procedures and practices; general substantive principles; criminal law and morality; trial procedure; double jeopardy; and sentencing.

LAW 430 Torts
★5 *(fi 10)* (two term, 2-0-0; 3-0-0). The law of negligence, damages, intentional interferences with persons, property and chattels, the law of strict liability, occupiers' liability, nuisance, defamation, the economic torts, the future of tort law.

LAW 435 Constitutional Law and History
★5 *(fi 10)* (two term, 2-0-0; 3-0-0). An introduction to the legal and constitutional framework of the legislative, executive, and judicial branches of Canadian government and their interrelationships. The development of Canada's constitution from early colonial days to the present is examined as are the basic principles of Constitutional interpretation, the division of legislative jurisdiction between Parliament and provincial legislatures, and the Charter of Rights and Freedoms. Some emphasis is placed upon the court structure in Canada and the role of the judiciary.

LAW 440 Property Law
★5 *(fi 10)* (two term, 2-0-0; 3-0-0). This course involves the study of basic principles which govern the institution of real and personal property. Included in this analysis will be the history of property law and issues of social and political context. Other topics include right incident to the ownership and possession of land, tenures and estates, concurrent ownership, dower, leases and tenancies, easements, restrictive covenants, finders law, bailment, and gifts. Other special issues may be explored.

LAW 450 Administrative Law
★4 *(fi 8)* (variable, 4-0-0). Designed to provide an understanding of the legal constraints courts have placed on the behavior of administrative tribunals and government departments. Topics to be discussed: What is Administrative Law? How the courts supervise the acts and decisions of administrative bodies. Pitfalls to be avoided by administrative officers: errors of fact and law; excesses of discretion; breach of natural justice. How administrative acts and decisions may be attacked by an aggrieved citizen: remedies. Appeal and review, time limits, locus standi, choice of remedy, procedure. How to avoid attacks by aggrieved citizens. The practical outcome; strength of review. Recent trends in Administrative Law in Canada.

LAW 459 Introduction to Environmental Law
★3 *(fi 6)* (second term, 3-0-0). Introduces students to the basic structure and function of the legal system. It will then focus on the way in which law is used to control environmental problems, focussing on major federal and provincial pollution licencing legislation, and the legal duties of persons working within industry. Regimes for environmental impact assessment and the use of criminal and civil enforcement mechanisms will also be included. The relationship between legal rules and non-legal industry standards and voluntary initiatives may also be explored. Note: Open to students in the Civil Engineering (Environmental Option) degree program only.

LAW 460 Taxation
★4 *(fi 8)* (variable, 4-0-0). The scope and purpose of taxation. The taxing power; tax appeal procedures; constitutional problem. Personal jurisdiction. Property jurisdiction. Income from a business; capital gains and losses; statutory interpretation, deductions, expenses. Gift tax.

LAW 465 International Law
★3 *(fi 6)* (either term, 3-0-0). The major objective of the course is to provide an overview of the basic machinery through which international law operates together with a review of principles which regulate the conduct of nations in their connections with one another. Topics to be covered include definition, nature and sources of international law and their application in Canadian courts; international personality; state jurisdiction; nationality and individuals; the law of treaties; state responsibility and international claims; and pacific settlement of international disputes.

LAW 470 Advocacy
★2 *(fi 4)* (either term, 2-0-0). The conduct of civil litigation including: interviewing and counselling, drafting pleadings, examinations for discovery, settlement attempts, preparation for court and participation in a mock trial. Emphasis on ethics and techniques of persuasion. Advocacy before tribunals and boards. Prerequisites: Completion of LAW 570 and 575. However, LAW 570 may be a corequisite in both the Fall and Winter Terms.

LAW 472 Techniques in Negotiation
★2 *(fi 4)* (either term, 2-0-0). An indepth analysis of the nature, purpose, and methodology of negotiation. Mock negotiations will be undertaken by the class. Mediation and arbitration will be discussed.

LAW 474 Alternative Dispute Resolution
★2 *(fi 4)* (either term, 2-0-0). This course will provide students with an understanding of the breadth and scope of dispute resolution alternatives with a focus on how those alternative processes are being utilized in Alberta. The student will learn various forms of dispute resolution including client interviewing,

negotiation, mediation, arbitration, med-arb, the mini-trial and litigation risk analysis. The course will also look at how alternate dispute resolution fits within the adversarial system, the benefits and drawbacks of each process and how to choose the most appropriate form.

LAW 485 Family Law
★3 *(fi 6)* (either term, 3-0-0). The formation and annulment of marriage; various matrimonial remedies; judicial separation; alimony; loss of consortium; divorce; ground and procedure; custody of children; financial obligations and property rights between spouses.

LAW 495 Research Paper
★2 *(fi 4)* (either term, 2-0-0). This program will give selected second year students an opportunity to engage in original research. The research topic is subject to prior approval of a Faculty member, who shall direct the students, and of the Associate Dean.

LAW 498 Moot Court Competition
★2 *(fi 4)* (either term, 2-0-0). Selection to the Alberta Court of Appeal Moot, Client Counselling Competition, Clinton J Ford Moot, or other designated moot court competition team through a preliminary round competition, participation in training sessions in advocacy or interviewing and counselling, preparation of a factum, memorial or other written work, participation in final round competition.

LAW 499 Seminars on Specialized Legal Topics
★2 *(fi 4)* (either term, 0-2s-0). These seminars will cover a specialized topic of emerging importance in the law. The particular topic covered would vary dependent on the availability of Faculty with necessary teaching competence, student interest, and the needs of the legal profession.

LAW 500 Jurisprudence
★3 *(fi 6)* (either term, 3-0-0). An enquiry into the nature of law and legal obligation. The first part of the course is a survey of the major schools of jurisprudence with particular emphasis upon positivism, natural law and legal realism. The second part consists of an examination of the modern applications of these theories, especially in relation to the process of judicial decision making and the question of whether there is an obligation to obey the law.

LAW 505 Legal History
★3 *(fi 6)* (either term, 3-0-0). An introduction to the historical development of law, from early times to the present day.

LAW 510 Company Law
★4 *(fi 8)* (variable, 4-0-0). The law of partnerships, unincorporated associations, and limited liability companies. The incorporation of companies; relationships between the company and outsiders; and relationships of the members of the company within the corporate structure.

LAW 514 Judgment Enforcement Law
★2 *(fi 4)* (either term, 2-0-0). A general view of unsecured creditor's rights and remedies, including prejudgment remedies, execution and attachment of debts; priorities among creditors.

LAW 515 Sale of Goods
★2 *(fi 4)* (either term, 2-0-0). The law of the sale of goods; nature of contract of sale, conditions and warranties implied by the Sale of Goods Act, passing of property and risk, documentary sales transactions, remedies of the buyer and the seller, circumstances under which a seller can pass a better title than he/she has.

LAW 518 Intellectual Property
★3 *(fi 6)* (either term, 3-0-0). A study of the law with respect to patents, trade marks, trade secrets, copyrights and intangible property generally.

LAW 519 Insurance Law
★3 *(fi 6)* (either term, 3-0-0). General principles affecting insurance contracts including good faith, indemnity, subrogation, and insurable interest; particular problems arising out of the Alberta Insurance Act in relation to automobile, life and fire insurance.

LAW 520 Criminal Trial Procedure and Advocacy
★3 *(fi 6)* (either term, 3-0-0). Practical aspects of criminal trial procedure and advocacy. Topics include: legal ethics; information and indictments; arrest and detention; judicial interim release; election and pleas; preliminary hearings; summary conviction appeals, jury trials; extraordinary remedies; miscellaneous problems in advocacy.

LAW 522 The Law and Practice of Sentencing in Canada
★3 *(fi 6)* (either term, 3-0-0). This course critically examines definitions of crime and criminality as well as social and legal responses to criminal behavior. Topics to be covered in this course include: the scope and methods of criminological and pennological studies; definitions of crime; victims and victimology; gatekeepers in the judicial system (police discretion); the law and practice of sentencing; deterrence; incapacitation and dangerousness; alternatives to imprisonment; the prison system in Canada; parole; native offenders; female and young offenders. Note: Open to second and third year Law students.

LAW 531 Law and Medicine
★2 *(fi 4)* (either term, 2-0-0). Selected topics pertinent to law and medicine with an emphasis on the practical implications of the law for the medical profession and the effect of changes in medical practice and institutions on the law. Problems will be examined with assistance from professionals working in the relevant areas and recommendations for law reform will be sought.

LAW 536 Civil Liberties
★3 *(fi 6)* (either term, 3-0-0). An in-depth analysis and discussion of the Charter of Rights and Freedoms and the cases decided thereunder; the role of the judiciary and the legitimacy and scope of judicial review under the Charter; the protection afforded under the Constitution Act, 1867 (e.g. implied Bill of Rights, provisions regarding denominational guarantees), Canadian Bill of Rights, 1960, anti-discrimination laws (e.g. Canadian Human Rights Act, Individual Rights Protection Act), the Office of the Ombudsman, Freedom of Information legislation. All or some of the above will be discussed. Comparative materials will be studied where appropriate.

LAW 540 Land Titles
★3 *(fi 6)* (either term, 3-0-0). A detailed study of the Alberta Land Titles Act consisting of an analysis of the Common Law and Registry Systems of Conveyancing; Introduction to the Torrens System of Land Titles; The Principles of Indefeasibility; Exceptions to Indefeasibility; Boundary Problems; Caveats; Registrable Instruments; Miscellaneous Title Problems; The Assurance Fund; Limitations of Actions.

LAW 543 Basic Oil and Gas Law
★3 *(fi 6)* (either term, 3-0-0). The origin, occurrence, and production of oil and gas; the nature of interests in oil and gas; the acquisition and disposition of interests in oil and gas; the rights and duties of parties under oil and gas leases; pooling of oil and gas interests; acquisition of surface leases and pipeline easements.

LAW 551 Municipal and Planning Law
★3 *(fi 6)* (either term, 3-0-0). The first part of the course will consist of an examination of the theory, structure, organization and operation of local government units in Alberta. The powers and duties of local governments to make laws, to tax, to expropriate, to enter into contracts and to provide and maintain municipal servicing infrastructure will be explored as will the role of the courts, both procedurally and substantively, in respect of supervising the judicial review proceedings and actions in contract and tort. The second part of the course will focus on municipal duties and powers relative to land use planning and regulation as well as the nature and role of non-municipal planning authorities. The objective is to leave the student with an appreciation of how a subdivision or development project is processed through the maze of regulations and agencies that are typically confronted and the role of the lawyer in that process.

LAW 552 Natural Resources Law
★2 *(fi 4)* (either term, 2-0-0). The judicial, legislative, administrative and policy problems related to the regulation and management of natural resources, including problems of allocation, development, use, pollution control, and conservation. Particular emphasis is placed on water resources.

LAW 555 Labor Law
★3 *(fi 6)* (either term, 3-0-0). Legal problems concerning the establishment of collective bargaining; negotiation and enforcement of the collective agreement; the activities of unions and employers in industrial disputes; and the internal affairs of labor organizations.

LAW 556 Labor Arbitration
★2 *(fi 4)* (either term, 2-0-0). The law and practice relating to interest and rights arbitrations in Alberta. The course will be taught partly as a seminar and partly through a series of mock arbitrations in which students will act as counsel.

LAW 558 Poverty Law
★3 *(fi 6)* (either term, 3-0-0). The culture of poverty and its implications for anti-poverty planning will be examined with emphasis on psychological, sociological and economic theory. Organizational models for the delivery of legal services will be considered together with a treatment of the theory of equality, the problem of accessibility to the claims process and alternative methods of dispute settlement. The character of the law concerning the poor will be analyzed as reflected in selected case studies in welfare law, public housing policy, workmen's compensation and unemployment insurance.

LAW 559 Environmental Law and Policy
★3 *(fi 6)* (either term, 3-0-0). The focus of this course will be the Canadian laws and policies designed to control air, land, and water pollution. The course will introduce basic environmental concepts and examine Canadian regulatory legislation; including licensing systems, the use of quasi-criminal sanctions, and environmental impact assessment processes. The course will also review relevant constitutional issues and evaluate the usefulness of the common law as a means to achieve and maintain environmental quality. Other topics may include alternative legal approaches to the resolution of environmental problems, such as the economic incentives, wildlife protection, an environmental Bill of Rights, wilderness preservation, the public trust doctrine of environmental mediation. Note: Open to second and third year Law students.

LAW 560 Corporate Taxation
★3 *(fi 6)* (either term, 3-0-0). The tax consequences of corporation financing;

amalgamations, mergers, international business transactions; tax planning from a corporation and personal standpoint; and trends in taxation. Prerequisite: LAW 460.

LAW 565 International Business Transactions
★3 *(fi 6)* (either term, 3-0-0). This is a survey course on the international and domestic law involved in international trade/investment activities of Canadian and foreign business entities. In the international law sphere, the law of the World Trade Organization (WTO) and regional economic integration agreements such as the North American Free Trade Agreement (NAFTA) will be studied. In the area of private law, the legal aspects of international business transactions will be considered, including contract types and drafting, financing of transactions, and dispute settlement by international commercial arbitration.

LAW 567 Pacific Rim Law
★2 *(fi 4)* (either term, 2-0-0). This course will give students the opportunity to understand the Japanese, their society and their law in the context of international society. The exact contents of the course will depend on the speciality area of the visiting professor.

LAW 570 Civil Procedure
★4 *(fi 8)* (variable, 4-0-0). The fundamentals of judicial procedure; the jurisdiction of courts, and the process of the courts. Clinical sessions. Rules of Court.

LAW 575 Evidence
★4 *(fi 8)* (variable, 4-0-0). The adversary system in trial and appellate courts; relevance and admissibility; character evidence including similar facts; opinion evidence; the hearsay rule and its exceptions; illegally obtained evidence; judicial notice; burdens of proof and presumptions; quantum of proof; corroboration; competence, compellability and privilege; parole evidence of rule; oaths and affirmations.

LAW 580 Trusts
★3 *(fi 6)* (either term, 3-0-0). A brief survey of the historical development of the trust. Definition and classification of trusts. Creation of express trust; the three certainties. Completely and incompletely constituted trusts. Secret, protective, discretionary and illusory trusts. Charitable trust and the rule against perpetuities. Cy-pres doctrine. Non-charitable purpose trusts. Implied or resulting trusts. Constructive trusts. Revocation, termination and variation of trusts. The appointment, retirement and removal of trustees. Duties, discretion and powers of trustees. Breach of trust.

LAW 582 Wills and Administration
★3 *(fi 6)* (either term, 3-0-0). Principles of the Wills Act, including formalities of execution, revocation, revival, republication, types of legacies, and principles of construction. Testamentary capacity, fraud, and undue influence. Drafting of wills. Appointment of executors and administrators, their powers and duties; probate practice.

LAW 585 Women and the Law
★3 *(fi 6)* (either term, 3-0-0). This course examines women's relationship to the law in a number of different contexts. Topics covered in the course include: sexual assault, new reproductive technologies, pornography, sexual harassment, the intersection of race and gender, domestic violence, the battered women's syndrome defence, child sexual abuse, fetal protection law, surrogate motherhood, lesbian women and the law, aboriginal women and the law, the feminization of poverty, women in the legal profession, equality litigation and the work of the Women's Legal Education and Action Fund. The course seeks to introduce gender analysis in a legal context. The focus of the course is on debates within feminist legal scholarship about how the law and legal institutions could respond to the concerns of women more effectively.

LAW 588 Immigration Law
★2 *(fi 4)* (either term, 2-0-0). An indepth analysis of Immigration Law in Canada. Will review the Immigration Act and Regulations and look at various tribunals involved in the immigration process including the Immigration and Refugee Board and the Federal Court. Will provide a brief historical review and discuss new developments in the law and important policy areas.

LAW 590 Aboriginal Peoples and the Law
★3 *(fi 6)* (either term, 3-0-0). This is a survey course on Aboriginal Peoples in Canadian Law. Subjects covered include issues of race and legal reasoning, legal and historical foundations of claims to Aboriginal rights, treaty rights, Metis rights, Aboriginal peoples and the Constitution, Aboriginal claims negotiation and litigation, the Indian Act, and contemporary legal and political developments including an introduction to Aboriginal government. The course is organized as a seminar in which a great deal of learning arises from discussion and class participation.

LAW 595 Research Paper
★2 *(fi 4)* (either term, 2-0-0). This program will give selected third year students an opportunity to engage in original research. The research topic is subject to prior approval of the Associate Dean and the Faculty Supervisor. The research topic shall be different from that used in LAW 495 and have a different Faculty Supervisor.

LAW 598 Moot Court Competition
★3 *(fi 6)* (either term, 3-0-0). Selection to the Gale Cup, Jessup Moot, Laskin Moot, Kawaskimhon Aboriginal Moot, Western Canada/Sopinka Trial Cup Trial Moot, Canadian Corporate/Securities Moot, Labour Arbitration Moot or other designated moot competition team through a preliminary round competition, preparation of a memorandum, factum or memorial, training in oral advocacy or criminal trail practice through practice rounds, and participation as a representative of the law school at the moot court competition.

LAW 599 Seminars on Specialized Legal Topics
★3 *(fi 6)* (either term, 0-3s-0). These seminars will cover specialized topics of emerging importance in the law at a senior level. The particular topic covered would vary dependent on the availability of Faculty with necessary teaching competence, student interest, and the needs of the legal profession.

LAW 600 Conflict of Laws
★3 *(fi 6)* (either term, 3-0-0). Theoretical basis of conflict of laws. Preliminary topics: characterization, renvoi, time element domicile. Choice of Law: domestic relations, contract, torts. Jurisdiction and the recognition of foreign judgments.

LAW 613 Corporate Securities and Finance
★3 *(fi 6)* (either term, 3-0-0). The course will cover methods of small business financing including equity, borrowing, government assistance; special structures such as partnerships, joint ventures, farmouts and leases. A second major part of the course will deal with sale of securities to the public, the various parties in public financing, preparation of a prospectus, continuous disclosure and stock exchange requirements; evaluation of and issues involved in takeovers. Prerequisite: LAW 510.

LAW 614 Personal Property Security Law
★3 *(fi 6)* (either term, 3-0-0). The course will provide an in-depth analysis of the law of secured transactions in personal property. The salient features of the Alberta Personal Property Security Act will be examined, including topics on scope, attachment, perfection, priority rules, proceeds, and remedies including receivership. The federal Bank Act security will be introduced. The course will also provide an overview of insolvency law. Topics will include fraudulent conveyances and preferences, statutory liens and deemed trusts, bankruptcy and alternatives to bankruptcy.

LAW 620 Advanced Criminal Law
★2 *(fi 4)* (either term, 2-0-0). The course comprises an examination of substantive criminal law particularly: offences against the person and rights of property; the jury system; juvenile justice and quasi-criminal proceedings; and, the extraordinary remedies.

LAW 637 Advanced Problems in Constitutional Law
★3 *(fi 6)* (either term, 3-0-0). This course entails an examination of various current problems in constitutional law. Topics covered in past years include Criminal Justice and the Charter, Comparative Constitutional Law, and Federal/Provincial Relations.

LAW 639 Constitutional Litigation
★3 *(fi 6)* (either term, 3-0-0). The course will address current issues in constitutional litigation particularly those involving the Charter. The emphasis will be on both substantive knowledge of constitutional litigation issues and development of skills within that framework. Issues such as pleadings, interventions and class actions, examination of lay and expert witnesses, the use of extrinsic aids, statistical and other forms of ordinary and expert evidence, forms of remedies, form and role of written briefs, and other related matters will be addressed.

LAW 640 Real Estate Transactions
★3 *(fi 6)* (either term, 3-0-0). The law governing agreements for sale of land; the open contract of sale, implied terms, special covenants in agreements for sale. Remedies of vendors and purchasers; election of remedies; cancellation and determination clauses. Deposits and instalments. Mortgages: legal, equitable and statutory. Foreclosure; sales; redemption; possession and attornment. Prerequisite: LAW 540.

LAW 650 Alberta Law Review
★2 *(fi 4)* (either term, 2-0-0). Students enrolled in this course will be involved in all facets of the production of the Alberta Law Review, including the assessment, selection and substantive and stylistic editing of manuscripts submitted for publication. Students enrolled in this course must normally participate as a member of the Law Review for two academic years to be eligible for credit. Students may be admitted only on application.

LAW 655 Alberta Law Review Research Paper
★2 *(fi 4)* (either term, 2-0-0). This course will provide members of the Alberta Law Review with an opportunity to engage in original research and to prepare a paper of publishable quality. The research topic is subject to the prior approval of the Faculty Advisor and the Assistant or Associate Dean. The paper must be presented at a seminar of Law Review members.

LAW 659 International Environmental Law
★3 *(fi 6)* (either term, 3-0-0). This course will examine the development of international law principles in the environmental area. Topics to be covered include: customary principles of state responsibility; transboundary pollution of international waterways; marine pollution control (oil pollution, dumping, and land-based sources); international air pollution control (ozone, climate change, acid rain); transboundary movement of hazardous materials; disarmament and

environment; endangered species conservation; and sustainable resource development. The various models for environmental regulation in internationally-shared areas will also be discussed. It is recommended, but not required, that students enrolled in this course take International Law.

LAW 660 Estate Planning
★2 *(fi 4)* (either term, 2-0-0). A review of the objectives of estate planning; study of various estate planning techniques with the use of hypothetical problems; an examination of provisions found in the Income Tax Act which affect estate planning, estate tax, and gift tax. Prerequisite: LAW 460.

LAW 670 Professional Responsibility
★2 *(fi 4)* (either term, 0-2s-0). A consideration of the responsibilities of the lawyer to the profession and the profession to the public. Ethics and organization of the profession.

LAW 675 Advanced Evidence
★2 *(fi 4)* (either term, 2-0-0). This course is designed to offer an in-depth analysis of several areas of current practical value for lawyers. The course will discuss recent developments and future possibilities relating to hearsay evidence, technology and opinion evidence, children as witnesses, and privileges. The course will track developments as to Charter-connected matters of the law of evidence, relating to burden of proof, discovery and disclosure, and principles of law touching on exclusion of evidence such as the 'discoverability' rule. The course may also examine special evidentiary rules applicable to special tribunals and boards.

LAW 680 Restitution
★3 *(fi 6)* (either term, 3-0-0). A study of restitution of unjust enrichment and restitution of the profits of wrong doing. This includes the nature and forms of unjust enrichment and its place in private law, methods of restitution, and defences to claims for restitution.

LAW 687 Family at Risk
★3 *(fi 6)* (either term, 3-0-0). This course focuses on the human dimension behind family law. A panorama of subjects will be discussed which may include new family structures, adoption, troubled children, young offenders, and the causes and effects of marriage breakdown.

Graduate Courses

LAW 695 Research Paper
★2 *(fi 4)* (either term, 2-0-0). This program will give selected graduate students an opportunity to engage in original research. The research topic is subject to prior approval of the Faculty supervisor and the Chair of the Graduate Studies Committee. The research topic shall be different from the thesis topic.

LAW 699 Seminars on Specialized Legal Topics
★2 *(fi 4)* (either term, 0-2s-0). Graduate Level. These seminars will cover a specialized topic of emerging importance in the law. The particular topic covered would vary depending on the availability of Faculty with necessary teaching competence, student interest, and the needs of the legal profession.

201.123.1 Non-LLB Spring/Summer

Note: The following courses, normally offered in Spring/Summer, are available to students in other faculties. They will not be considered for credit in the LLB program.

LAW 300 Law for Non-LLB Students I
★3 *(fi 6)* (first term, 30 hours). The nature, functions, and sources of law; an outline and components of the Canadian legal system. Note: Not available for credit in the LLB Program.

201.124 Library and Information Studies, LIS

School of Library and Information Studies
Faculty of Education

Undergraduate Courses

LIS 210 Critical Strategies for the Information Universe
★3 *(fi 6)* (either term, 2-0-1). This course explores the challenges of acquiring, evaluating and communication information. Students will examine information theory and practical techniques relating to the Internet, databases, and other electronic sources, to develop a critical understanding of the information universe. Open to second, third and fourth year undergraduate students.

LIS 401 Survey of Children's Literature
★3 *(fi 6)* (either term, 3-0-0). Literature for children from infancy through the elementary school years. The emphasis is on books currently read by children. Principles of evaluation, children's reading needs and interests, and current issues and trends will be examined. This course is not open to MLIS students.

LIS 402 Storytelling
★3 *(fi 6)* (either term, 3-0-0). The past and present forms of storytelling, including the oral tradition, the function of the storyteller, the selection of material and the techniques of telling stories and listening to stories. This course is not open to MLIS students.

LIS 403 Survey of Young Adult Materials
★3 *(fi 6)* (either term, 3-0-0). A survey of fiction in all media forms for upper elementary and secondary school-ages readers. Adolescents' reading and media needs and interests, and current issues and trends will be examined. This course is not open to MLIS students.

LIS 404 Comic Books and Graphic Novels in School and Public Libraries
★3 *(fi 6)* (either term, 3-0-0). Examines the history and contemporary reality of comic book publishing and readership in Canada, Great Britain, Japan and the United States, and issues related to perception of the format of educators, librarians, and readers. Focus on collection development, censorship concerns and challenges, gender issues in both readership and content, genres, and impact of the Internet. Not open to MLIS students.

LIS 405 Canadian Children's Literature for Young People in Schools and Libraries
★3 *(fi 6)* (second term, 3-0-0). A survey of Canadian children's materials from books for babies to those aimed at the young adult market. Focus on contemporary works, trends in both publishing and content, and issues such as censorship, multimedia forms and the Internet.

Graduate Courses

Note: All the following courses are restricted to MLIS students and may not be offered each year. Interested students should contact the School of Library and Information Studies for scheduling information. The following courses are required for both the thesis and course-based routes of the MLIS program and are normally prerequisites to the rest of the program: LIS 501, 502, 503, 504, 505, and 506.

The following courses are also available as part of the MLIS program: EDES 540, 541, 543, 546, 547, and 548; EDAL 547; EDIT 535, 537, 547, and 568.

LIS 501 Foundations of Library and Information Studies
★3 *(fi 6)* (first term, 3-0-0). Introduction to the historical, current, and potential roles of libraries and of library and information professionals in western society. Required course.

LIS 502 Organization of Knowledge and Information
★3 *(fi 6)* (first term, 3-0-0). An introduction to the organization of knowledge and information focusing on theory and principles for application in a variety of settings. Required course.

LIS 503 Reference and Information Services
★3 *(fi 6)* (first term, 3-0-0). An introduction to reference and information services and resources. Includes history and varieties of reference services, user populations, instruction, ethics, access issues, the reference interview, search strategies, evaluation of services, and the organization, selection, evaluation, and use of major information resources. Required course.

LIS 504 Management Principles for Library and Information Services
★3 *(fi 6)* (either term, 3-0-0). An introduction to principles of management applicable to the organization of library and information services. Required course.

LIS 505 Research Methods for Library and Information Studies
★3 *(fi 6)* (second term, 3-0-0). An introduction to the nature of research and to the methodologies and techniques used in library and information studies. Required course.

LIS 506 Information Technology
★3 *(fi 6)* (either term, 3-0-0). An introduction to information technology and its implications for libraries and information services. Required course.

LIS 510 Storytelling
★3 *(fi 6)* (either term, 3-0-0). The past and present forms of storytelling, including the oral tradition, the function of the storyteller, the selection of material and the techniques of telling stories and listening to stories.

LIS 515 Materials for Young Adults
★3 *(fi 6)* (either term, 3-0-0). Materials for young adults of junior and senior high school age, young adults' reading interests, and current trends and issues in young adults literature.

LIS 516 Canadian Children's Literature for Young People in Schools and Libraries
★3 *(fi 6)* (second term, 3-0-0). A survey of Canadian children's materials from books for babies to those aimed at the young adult market. Focus on contemporary works, trends in both publishing and content, and issues such as censorship, multimedia forms and the Internet.

LIS 517 Government Publications
★3 *(fi 6)* (either term, 3-0-0). The control and dissemination of government publications, using the Canadian system as a model applicable to other political jurisdictions.

LIS 518 Comic Books and Graphic Novels in Schools and Public Libraries
★3 *(fi 6)* (either term, 3-0-0). Examines the history and contemporary reality of comic book publishing and readership in Canada, Great Britain, Japan and the United States, and issues related to perception of the format of educators, librarians, and readers. Focus on collection development, censorship concerns and challenges, gender issues in both readership and content, genres, and impact of the Internet. Open to MLIS students and other graduate students.

LIS 519 Introduction to Children's Literature
★3 *(fi 6)* (either term, 3-0-0). Literature for children from infancy through the elementary school years, principles of evaluation and selection, and current issues and trends.

LIS 520 Information Resources in Specialized Fields
★3 *(fi 6)* (either term, 3-0-0). Information resources and their administration in a specialized field and for a specialized clientele. The emphasis is on the nature of the field, problems of collection development, bibliographic access, retrieval and use by the clientele, and administrative issues in solving these problems. Specialized fields regularly examined are law, business, and health sciences.

LIS 526 Instructional Practices in Library and Information Services
★3 *(fi 6)* (either term, 3-0-0). Comprehensive examination of theory and practice related to the teaching roles of the librarian or information worker. Consideration of models of bibliographic instruction and of in-service and staff development. Planning, administration, and evaluation of instructional and in-service programs.

LIS 531 Collection Management
★3 *(fi 6)* (either term, 3-0-0). An analytical approach to collection management including the acquisition, review and evaluation of collections.

LIS 532 Cataloguing and Classification
★3 *(fi 6)* (either term, 3-0-0). Prepares students to develop cataloguing policy, to construct a catalogue and to create catalogue records for various forms of materials in diverse library situations.

LIS 535 Indexing and Abstracting
★3 *(fi 6)* (either term, 3-0-0). The principles and practice of indexing and abstracting in a traditional or computerized centre.

LIS 536 Digital Reference and Information Retrieval
★3 *(fi 6)* (either term, 3-0-0). Online information storage and retrieval services, including their development, maintenance, and use. This course may require payment of additional miscellaneous fees. See §22.2.3 for details.

LIS 537 Management of Information Technology
★3 *(fi 6)* (either term, 3-0-0). The selection, installation and management of integrated library systems and local area networks. The principal model is the integrated library system, with considerable emphasis on strategic factors, including negotiations and contracts.

LIS 538 Digital Librarianship
★3 *(fi 6)* (either term, 3-0-0). An examination of topics of current interest related to the application of computers and communications technology in libraries and information centres.

LIS 540 School Media Centres
★3 *(fi 6)* (either term, 3-0-0). The concept and organization of media resource centres in elementary and secondary schools.

LIS 545 Management of Resources in Library and Information Services
★3 *(fi 6)* (either term, 3-0-0). The field of resource management and its application in library and information services.

LIS 546 Marketing Library and Information Services
★3 *(fi 6)* (either term, 3-0-0). The principles of marketing and public relations for nonprofit organizations, with an emphasis on library and information services.

LIS 548 Library Services to Children and Young Adults
★3 *(fi 6)* (either term, 3-0-0). The principles and practices of library service to children and young adults. Prerequisite: LIS 515 or 519.

LIS 580 Contemporary Theories and Practices of Reading
★3 *(fi 6)* (either term, 3-0-0). A study of different theories of reading (e.g. social, psychological, literary) and of sites and practices of literacy in an era of rapid cultural and technological change.

LIS 582 Contemporary Issues in Library and Information Studies
★3 *(fi 6)* (either term, 0-3s-0). New and continuing topics of concern or debate in the library and information professions, and how they influence information attitudes and programs.

LIS 583 Globalization, Diversity and Information
★3 *(fi 6)* (either term, 3-0-0). Explores global and local interactions as they affect information access within and outside of libraries, including cultural, ethical, political and institutional discourses.

LIS 586 History of the Book
★3 *(fi 6)* (either term, 3-0-0). The historical, aesthetic, and economic bases of the 'book' and its role in the recording and preservation of information and ideas.

LIS 587 Facilities Planning for Libraries and Information Centres
★3 *(fi 6)* (either term, 3-0-0). The examination of the building needs of various types of libraries and information centres, the involvement of information professionals and architects in the planning process, and various contemporary building styles.

LIS 589 Feminism and Library and Information Studies
★3 *(fi 6)* (either term, 3-0-0). Examines the nature of librarianship as a profession, issues related to information, and practices of information management from gendered perspectives using applicable feminist theoretical interpretations.

LIS 590 Practicum
★3 *(fi 6)* (either term, 100 hours). The application of course work learning through experiential learning in a library and information centre setting. Prerequisite: completion of 8 courses in the MLIS program.

LIS 591 Publishing
★3 *(fi 6)* (either term, 3-0-0). The organized business of writing, manufacturing and marketing of books and other media.

LIS 593 Archives Administration
★3 *(fi 6)* (either term, 3-0-0). Theories, standards and methods used in management of modern archives, with an historical overview and an emphasis on contemporary theory and practice.

LIS 594 Records Management
★3 *(fi 6)* (either term, 3-0-0). The theory and techniques of records management.

LIS 597 Seminar in Advanced Research Methods for Library and Information Studies
★3 *(fi 6)* (first term, 0-3s-0). In-depth examination of research methodologies relevant to the field of library and information studies, and to the research interests of students pursuing doctoral programs, thesis-route master's programs, and other advanced projects.

LIS 598 Special Topics
★3 *(fi 6)* (either term, 3-0-0). A current topic of significance to, or a special aspect of, library and information studies may be examined as demand and resources permit.

LIS 599 Directed Study
★3 *(fi 6)* (either term, 0-3s-0). Further study of special topics and issues, based on knowledge acquired in previous courses or on significant prior experience. Topic to be approved by the School.

LIS 600 Capping Exercise
★0 *(fi 1)* (either term, 12 hours). The required capping exercise will be a World Wide Web version of the students best work in the MLIS program, and a reflective paper on the significance of the work. The capping exercise paper is to be submitted during the final term of course work.

LIS 699 Directed Study
★3 *(fi 6)* (either term, 0-3s-0). Further study at the doctoral level of special topics and issues, based on knowledge acquired in previous courses or on significant prior experience. Topics must be approved by the School.

201.125 Linguistics, LING

Department of Linguistics
Faculty of Arts

Undergraduate Courses

O LING 101 Introduction to Linguistics I
★3 *(fi 6)* (either term, 3-0-0). Central concepts of linguistics: linguistic categories and structure (phonetics, phonology, morphology, syntax, semantics).

O LING 102 Introduction to Linguistics II
★3 *(fi 6)* (either term, 3-0-0). An introduction to cross-disciplinary and applied areas in linguistics (e.g., language change, language acquisition, language in society). Pre- or corequisite: LING 101.

O LING 204 English Syntax
★3 *(fi 6)* (either term, 3-0-0). Linguistic analysis of the syntax of modern English. Prerequisite: LING 101.

O LING 205 Practical Phonetics
★3 *(fi 6)* (either term, 3-0-0). Recognizing, transcribing, and producing speech sounds using the International Phonetic Alphabet; problems in phonetic analysis; techniques for describing the sound system of an unfamiliar language. Prerequisite: LING 101.

O LING 308 Morphology and the Lexicon
★3 *(fi 6)* (either term, 3-0-0). Basic principles of word formation and structure: the organization of the lexicon and representation of words. Prerequisite: LING 101. Note: Not to be taken by students with credit in LING 208.

O LING 309 Syntax and Semantics
★3 *(fi 6)* (either term, 3-0-0). Basic principles in syntax (constituent structure, sentence relatedness, grammatical relations) and semantics. Prerequisites: LING 101 and LING 204. Note: Not to be taken by students with credit in LING 209.

O LING 310 Phonology
★3 *(fi 6)* (either term, 3-0-0). Basic principles of phonological analysis. Prerequisites: LING 101 and 205. Note: Not to be taken by students with credit in LING 210.

O LING 314 Discourse Analysis
★3 *(fi 6)* (either term, 3-0-0). Analysis of selected approaches to the study of discourse including conversational analysis, narrative structure, text analysis. Prerequisite: LING 101. Not offered every year.

O LING 316 Sociolinguistics
★3 *(fi 6)* (either term, 3-0-0). An examination of phonological, syntactic, lexical, and semantic variation in language systems in connection with extra-linguistic factors such as individual, social, or demographic differences. Prerequisite: LING 101. Not offered every year.

O LING 319 Child Language Acquisition
★3 *(fi 6)* (either term, 3-0-0). Basic issues in first language acquisition: theories, research methods, and major findings. Prerequisite: LING 101.

O LING 320 Second Language Acquisition
★3 *(fi 6)* (either term, 3-0-0). Application of linguistics to theoretical issues in second-language acquisition: properties of language, problems of languages in contact, psycholinguistic aspects of bilingualism. Prerequisite: LING 101.

O LING 321 Neurolinguistics
★3 *(fi 6)* (either term, 3-0-0). A neurolinguistic approach to the representation and processing of linguistic structures in the brain; patterns of language breakdown resulting from damage to the brain. Prerequisite: LING 101 or consent of Department. Not offered every year.

O LING 322 Language and Gender
★3 *(fi 6)* (either term, 3-0-0). An examination of gender-related differences in the structure of language, discourse, communication, and how those differences relate to language processing, acquisition, and loss. Prerequisite: LING 101 or consent of Department. Not offered every year.

O LING 323 Linguistics and the Mind
★3 *(fi 6)* (either term, 3-0-0). Language as an expression of the symbolic capacity of the mind. Attention will be given to the relation between linguistic meaning and such concepts as belief, judgement, and assertion, and between these and our knowledge of the world. Prerequisite: None.

O LING 332 The Nature of Foreign Accent
★3 *(fi 6)* (either term, 3-0-0). A study of the causes of foreign accent and a critical examination of the various strategies used in foreign accent reduction. Prerequisite: LING 210 or consent of Department.

LING 399 Special Topics in Linguistics
★3 *(fi 6)* (either term, 3-0-0). A study of recent developments in particular sub-areas of linguistics. Prerequisite: consent of Department.

O LING 401 Semantics
★3 *(fi 6)* (either term, 3-0-0). An overview of natural language semantics at both the lexical and clause levels. Topics covered include sense, reference, features, compositionality, semantic roles, logical form, categorization, and conceptualization. Prerequisite: LING 309. Not offered every year.

O LING 405 Historical Linguistics
★3 *(fi 6)* (either term, 3-0-0). Principles and methods in the study of language change. Prerequisite: LING 310. Not offered every year.

O LING 407 Linguistic Typology
★3 *(fi 6)* (either term, 3-0-0). A survey of similarities, differences, tendencies, and universals in the phonological, morphological, and syntactic patterns of different languages. Prerequisite: LING 309. Not offered every year.

LING 499 Special Topics in Linguistic Theory
★3 *(fi 6)* (either term, 3-0-0). A course designed to explore recent developments in particular areas of linguistic theory. Prerequisite: consent of Department.

O LING 500 Psycholinguistics
★3 *(fi 6)* (either term, 3-0-0). Issues and methods involved in the experimental study of language: language production, comprehension, the mental lexicon, and discourse. Prerequisites: Any two of LING 308, 309 or 310. Recommended: a course in elementary statistics.

O LING 501 Research Project Seminar
★3 *(fi 6)* (first term, 3-0-0). Requires a literature review, devising research methodology, writing and defending a project proposal. Prerequisite: consent of Department.

LING 502 Honors Project
★3 *(fi 6)* (second term, 3-0-0). Directed Honors thesis. Prerequisites: LING 501 and consent of Department. Note: Required of all BA (Honors) students in Linguistics in their final year.

LING 509 Recent Developments in Syntactic Theory
★3 *(fi 6)* (either term, 3-0-0). Advanced syntactic analysis and related theoretical issues. Prerequisite: LING 309 or consent of Department.

LING 510 Recent Developments in Phonological Theory
★3 *(fi 6)* (either term, 3-0-0). Advanced phonological analysis and related theoretical issues. Prerequisite: LING 310 or consent of Department.

O LING 512 Acoustic Phonetics
★3 *(fi 6)* (either term, 3-0-0). Analysis of the articulatory, perceptual, and acoustic aspects of speech signal; measuring the acoustic aspects of speech. Prerequisite: LING 310 or 312 (formerly LING 412).

O LING 515 Field Methods
★3 *(fi 6)* (either term, 3-0-0). Practical experience in linguistic data collection and analysis of the sound and form systems of an unfamiliar language. Prerequisites: LING 205, LING 309 (formerly 209), and LING 310 (formerly 210) or consent of Department. Not offered every year.

LING 599 Special Topics in Linguistic Research
★3 *(fi 6)* (either term, 3-0-0). A study of recent developments in particular areas of linguistic research. Prerequisite: consent of Department. Formerly LING 443.

Graduate Courses

O LING 601 Seminar in Phonology and Morphology
★3 *(fi 6)* (either term, 0-3s-0). Critical examination of selected theoretical issues and related experimental studies in phonology and morphology. Prerequisite: LING 510 or consent of Department.

O LING 602 Seminar in Syntax
★3 *(fi 6)* (either term, 0-3s-0). Critical examination of selected theoretical issues and related experimental studies in syntax. Prerequisite: LING 509 or consent of Department.

O LING 603 Quantitative Methods in Linguistics
★3 *(fi 6)* (either term, 3-0-0). Analysis of variance and experimental design in relation to problems in experimental linguistics. Prerequisite: A course in elementary statistics or consent of Department.

O LING 604 Seminar in Psycholinguistics
★3 *(fi 6)* (either term, 3-0-0). A review of the current theories and research in psycholinguistics. Prerequisite: LING 500.

O LING 605 Seminar in Experimental Phonetics
★3 *(fi 6)* (either term, 3-0-0). A survey of the present state of knowledge in speech production and perception. Prerequisite: LING 512 (LING 412 prior to 1997/98).

O LING 610 Formal Grammatical Theory
★3 *(fi 6)* (either term, 3-0-0). Current approaches in formal grammatical theory. Prerequisite: LING 602 or consent of Department.

O LING 611 Formal Phonological Theory
★3 *(fi 6)* (either term, 3-0-0). Current approaches in formal phonological theory. Prerequisite: LING 601 or consent of Department.

O LING 614 Methods in Experimental Phonetics
★3 *(fi 6)* (either term, 0-1s-3). Theoretical and practical training in experimental phonetics. Emphasis on practical experience with on-going research. Prerequisite: LING 512 (LING 412 prior to 1997/98).

O LING 615 Methods in Experimental Psycholinguistics
★3 *(fi 6)* (either term, 0-1s-3). Theoretical and practical training in experimental psycholinguistics. (Emphasis on practical experience with on-going research.) Note: This course should be taken late in the MSc program. Prerequisite: LING 603.

O LING 616 Methods in Experimental Phonology
★3 *(fi 6)* (either term, 0-1s-3). Theoretical and practical training in experimental phonology. Emphasis on practical experience with on-going research. Prerequisite: LING 603.

O LING 617 Methods in Language Acquisition
★3 *(fi 6)* (either term, 0-1s-3). Theoretical and practical training in language acquisition research, with emphasis on practical experience. Prerequisite: LING 603.

LING 618 Methods in Field Linguistics
★3 *(fi 6)* (either term, 0-1s-3). Technical and practical training in field linguistics. Prerequisite: LING 515.

O LING 636 Analysis of Meaning
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: consent of Department.

O LING 637 Discourse Analysis
★3 *(fi 6)* (either term, 0-3s-0). An examination of a variety of topics in the area of discourse including discourse structure, pragmatics, discourse-conditioned grammatical alterations, and discourse models. Prerequisite: consent of Department.

O LING 638 Topics in Language Acquisition
★3 *(fi 6)* (either term, 3-0-0). Analysis of recent theoretical and empirical research in language acquisition. Prerequisite: consent of Department.

O LING 645 Linguistic Analysis of Aphasic Language
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: consent of Department.

O LING 655 Instrumentation in Experimental Linguistics
★3 *(fi 6)* (either term, 3-0-0). Prerequisites: LING 312 and 512, MATH 117 and 118 or consent of Department.

O LING 670 Foreign Language Analysis
★3 *(fi 6)* (either term, 0-1s-3). Study and analysis of a language other than English resulting in demonstrated proficiency as well as analytic competency of the language's structural, psycholinguistic, or acquisitional properties. Prerequisite: consent of Department.

O LING 683 Conference Course I
★3 *(fi 6)* (first term, 0-3s-0).

O LING 684 Conference Course II
★3 *(fi 6)* (second term, 0-3s-0).

LING 900 Directed Research Project
★3 *(fi 6)* (variable, unassigned).

201.126 Linguistique, LINGQ

Faculté Saint-Jean

Cours de 1er cycle

O LINGQ 200 Introduction à l'étude du langage
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Etude du langage comme phénomène social et individuel. La langue et son fonctionnement. Anciennement LINGQ 101.

O LINGQ 300 Linguistique appliquée
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Application de la linguistique à l'enseignement, à la traduction, à l'ingénierie et à la littérature. Prérequis: LINGQ 200 ou équivalent. Anciennement LINGQ 430.

LINGQ 499 Etude dirigée en linguistique
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Prérequis: l'accord du Vice-doyen aux affaires académiques.

201.127 Linguistique romane, LIN R

Faculté Saint-Jean

Cours de 1er cycle

O LIN R 320 Linguistique française: phonétique et morphophonologie
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Phonétique et phonologie comparées du français standard, du canadien-français et de l'anglais. Morphèmes de l'oral et de l'écrit. Evolution phonétique: incidence sur le français actuel. Facteur auditif et acquisition de L2. Prérequis: LINGQ 200. Note: Ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits pour R LIN 401 à la Faculté des Arts. Anciennement LIN R 420.

201.128 Maintaining Registration, M REG

University of Alberta

Graduate Courses

M REG 800 Maintaining Registration
★0 *(fi 6)* (either term, unassigned). Maintaining registration in a graduate program and status as a graduate student. Graduate students who do not plan to register either in courses or in Theses or a project course but who wish to maintain their position in a program and their status as graduate students can register in M REG.

201.129 Maîtrise en sciences de l'éducation, M EDU

Faculté Saint-Jean

Cours de 2e cycle

M EDU 500 Langue, culture et éducation
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Etude interdisciplinaire (anthropologie, sociologie, psychologie sociale) des théories scientifiques contemporaines sur la nature de la culture, ses rapports avec la langue et ses mécanismes de transmission et de modification. La problématique locale sera examinée dans le contexte de la communauté scientifique internationale. L'histoire de la science de l'éducation bilingue sera aussi abordée. Ce cours peut comprendre une section à distance; voir §200 'Alternative Delivery Courses'.

M EDU 501 La culture et l'individu
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Etude de la relation entre culture et personnalité dans les sociétés homogènes selon les théories de l'anthropologie psychologique. L'application de ces principes aux sociétés industrialisées permettra de mieux comprendre le développement de l'identité culturelle chez l'être humain et ses rapports avec l'identité de soi dans/parmi les groupes ethno-culturels en situation minoritaire. Ce cours peut comprendre une section à distance; voir §200 'Alternative Delivery Courses'.

M EDU 511 Fondements théoriques de l'acquisition de la langue
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Etude des diverses théories de l'acquisition de la langue. Le rôle de la langue dans le développement de l'enfant. Le lien entre le développement langagier et le développement cognitif. Ce cours peut comprendre une section à distance; voir §200 'Alternative Delivery Courses'.

M EDU 520 Tendances actuelles en éducation des francophones
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Etude des phénomènes propres à l'éducation des Francophones au Canada selon la pratique et la recherche effectuées dans les diverses provinces: abandon du bilinguisme institutionnel; programmes socio-culturels; innovations en didactique de la langue maternelle. Ce cours peut comprendre une section à distance; voir §200 'Alternative Delivery Courses'.

M EDU 521 Tendances actuelles en pédagogie de l'immersion française
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Etude critique des orientations théoriques et des pratiques actuelles dans la pédagogie de l'immersion française. Analyse de questions importantes dans l'implantation des programmes d'immersion. Ce cours peut comprendre une section à distance; voir §200 'Alternative Delivery Courses'.

M EDU 531 La problématique de la technologie et de la science face au curriculum
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Etude des récents développements technologiques, scientifiques et sociaux qui ont un impact significatif sur le curriculum.

M EDU 532 L'écologie de la salle de classe
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Étude des influences et des relations interpersonnelles qui ont un effet sur l'apprentissage, l'enseignement et la communication en salle de classe. Ce cours peut comprendre une section à distance; voir §200 'Alternative Delivery Courses'.

M EDU 533 L'évaluation en milieu scolaire
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Etude des différents types d'évaluation utilisés dans le milieu scolaire selon les objectifs poursuivis et les innovations récentes en évaluation.

M EDU 540 Dimensions politiques et administratives de l'éducation bilingue
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Etude des structures de l'éducation française et bilingue dans les diverses provinces canadiennes et du rapport existant entre ces structures et le contexte socio-politique.

M EDU 541 Enseignement des langues assisté par ordinateur
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Ce cours vise à faire connaître les différentes approches et les fondements de l'enseignement des langues assisté par ordinateur. Il vise aussi à fournir les outils pour concevoir, construire et évaluer des didacticiels.

M EDU 560 L'administration de l'éducation
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Étude approfondie de concepts d'administration. Les rôles du gestionnaire de l'éducation. Gestion des ressources humaines et financières en éducation. Examen des problèmes en milieu d'éducation et analyse de solutions administratives pertinentes.

M EDU 561 Formation des habiletés de supervision et de leadership
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Principes, organisation et techniques de supervision. Le développement des habiletés de leadership en gestion, particulièrement pour l'éducation en français.

M EDU 562 Stage pratique de direction
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Vise à développer des habiletés en observation, en entrevues, en animation de groupes et en réflexion lors de visites dans des écoles et en travaillant avec la direction des écoles.

M EDU 580 Méthodologie de la recherche en éducation I
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Etude du processus de la recherche et des concepts de base de la recherche en éducation. Présentation des divers types de recherches: méthodes de collecte de données et les instruments, analyse et interprétation. Ce cours peut comprendre une section à distance; voir §200 'Alternative Delivery Courses'.

M EDU 581 Méthodologie de la recherche en éducation II
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Pendant ce cours, chaque étudiant doit approfondir son projet de recherche. Après un survol des devis expérimentaux (ou d'échantillonnage selon le cas), de la statistique descriptive et inférentielle, et de la probabilité, chacun fera une analyse multi-causale du problème (visant à intégrer ses recherches qualitatives et quantitatives), développera son hypothèse et des méthodes de collecte convenables, et choisira les tests statistiques appropriés: moyennes, méta-analyse avec écarts-types, régressions ou corrélations multiples, Chi carré, tests non-paramétiques, ANOVA, ANCOVA, MANOVA et d'autres analyses multivariées. Sera enseigné surtout: le choix des tests appropriés; l'utilisation des ordinateurs dans le traitement, la synthèse et la présentation graphique des données; comment éviter les erreurs d'interprétation et de prédiction. Prérequis: M EDU 580. Cours à distance. Voir §200.

M EDU 582 Séminaire de recherche
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Rédaction d'un exposé écrit dans lequel l'étudiant doit tenter de préciser le problème qui est à la source de sa recherche et les objectifs de celle-ci, de situer le sujet étudié dans un cadre de référence général, de formuler la problématique de la recherche. Présentation par l'étudiant d'un exposé écrit. Ce cours peut comprendre une section à distance; voir §200 'Alternative Delivery Courses'.

M EDU 583 La recherche et le praticien
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Étude des retombées de la recherche sur la pratique éducative. Méthodologie de la recherche-action, et la formation professionnelle continue des enseignants. Ce cours peut comprendre une section à distance; voir §200 'Alternative Delivery Courses'.

M EDU 589 Le processus créateur chez l'enseignant
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Ce cours approfondit les dimensions multiples du processus créateur dans les pratiques éducatives. Un apprentissage interdisciplinaire fait état des recherches théoriques et pratiques visant à développer ce processus dans divers contextes culturels.

M EDU 594 Lectures dirigées
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0).

M EDU 596 Thème ouvert
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Ce cours peut comprendre une section à distance; voir §200 'Alternative Delivery Courses'.

M EDU 597 Séminaire portant sur l'enseignement au niveau élémentaire et secondaire
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Ce cours peut comprendre une section à distance; voir §200 'Alternative Delivery Courses'.

M EDU 598 Choix de sujet en éducation
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Ce cours peut comprendre une section à distance; voir §200 'Alternative Delivery Courses'.

M EDU 599 Etude personnelle dirigée
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0).

M EDU 900 Activité de synthèse
★3 *(fi 6)* (variable, unassigned).

201.130 Management Information Systems, MIS

Department of Accounting and Management Information Systems
Faculty of Business

Note: Enrolment in all MIS courses is restricted to students registered in the Faculty of Business, or to students registered in specified programs that require Business courses to meet degree requirements and who have obtained prior approval of their Faculty.

Undergraduate Courses

MIS 311 Management Information Systems
★3 *(fi 6)* (either term, 3-0-2). Introduction to all major areas of information systems. Technology and file systems, organizational and behavioral issues, data modeling, databases, expert systems, systems analysis, systems development life cycle, etc. Development of analytical skills which can be brought to bear on MIS problems. Notes: Students are expected to have basic familiarity with microcomputer applications. The lab component will be taught for up to 10 weeks.

MIS 412 Managerial Support Systems
★3 *(fi 6)* (either term, 3-0-2). This course provides students with an understanding of the interaction between decision-making and technology within organizational contexts. Within the context of decision support systems (DSS), we focus on four key components: 1) the technology; 2) the broader context, including the decision-making styles which exist at the organizational, group and individual levels; 3) the design and development of DSS; 4) the effectiveness of DSS to support decision-making processes, including issues of implementation and evaluation. Note: the lab component will be taught for five weeks during the term. Prerequisite: MIS 311.

MIS 413 Systems Analysis and Design
★3 *(fi 6)* (either term, 3-0-2). Examination of the critical stages of the systems development process. These include the initiation, planning, analysis, design, implementation and maintenance of information systems needed to support business functions in organizations. The concepts of life cycle, requirements definition, analysis and design methods, and computer-assisted software engineering (CASE) tools are presented. Specific modeling techniques such as process models, data models and logic models are examined in detail. Hands-on experience with a high-end CASE tool are provided. Note: there will be a lab component for up to eight weeks during the term. Prerequisite: MIS 311. Corequisite: CMPUT 201.

MIS 414 Information Systems Management
★3 *(fi 6)* (either term, 3-0-2). Considers problems of administering and managing computer-based information systems, and managerial techniques for prevention and resolution of such problems, using case studies and lectures. Cases are large in scope and integrative rather than focusing on one discipline. Management issues in developing an effective interface between the information systems function and user groups in an organization are also discussed. Prerequisite: MIS 311. CMPUT 201 is strongly recommended. Note: There will be a lab component for up to two weeks during the term.

MIS 415 Data Base Design and Administration
★3 *(fi 6)* (either term, 3-0-2). Application of database concepts in organizations. A comprehensive introduction to the design and development of relational databases from a logical data model. The relational database access language SQL is used along with a number of key-software development tools. Effective data administration techniques for enforcing integrity and security as well as enhancing performance are discussed. Topics of special current interest include data warehousing and the object-oriented data model. Prerequisite: MIS 311. Note: There will be a lab component for up to ten weeks during the term.

MIS 416 IT and Society
★3 *(fi 6)* (either term, 3-0-0). This course will explore the relationship between information technology and society, and critically examine whether information technology is contributing to the creation of a "better" world. In this course, we debate the implications of IT in various social spheres including work, globalization, commerce, education, and our personal and public lives. Prerequisite: MIS 311.

MIS 417 Telecommunications in Business
★3 *(fi 6)* (either term, 3-0-2). An introduction to fundamental concepts required to understand and apply telecommunication technologies within a business environment. The course emphasizes the principles of those technologies to familiarize the students with the fundamental concepts and terminology of telecommunications. Telecommunications equipment, networks, protocols and architectures are introduced and discussed regarding their relevance and impact on business-oriented organizations. The course also introduces managerial aspects such as planning, design and performance of telecommunication systems. Prerequisite: MIS 413.

MIS 418 Electronic Commerce
★3 *(fi 6)* (either term, 3-0-2). An examination of the development of electronic commerce in business across a number of different sectors. Using a process modelling approach, traditional vs. electronic business transactions are discussed in business-to-business and business-to-consumer modes; strategies for e-commerce are developed with a focus on the appropriate technical architecture to support business in an electronic marketplace. In particular, requirements of payment systems, and issues of security and privacy are discussed as key considerations in implementation. The course uses software development tools in the implementation of these electronic commerce strategies. Note: The lab component will be taught for six weeks during the term. Prerequisite: MIS 413, MIS 415.

MIS 424 IS Field Projects
★3 *(fi 6)* (either term, 2-0-4). In-depth field experience through completion of a major IS project in a pre-selected business organization. The nature of the projects depends on the organizations and business issues involved. Project management concepts are included as part of the course. Students are expected to apply the knowledge acquired in other MIS courses and work closely with the instructor and the business partner on the project in a professional manner.

Note: The lab component depends on the nature of the projects, but is expected to be no more than 10 weeks in duration. Prerequisite: MIS 412, 413, 415.

MIS 488 Selected Topics in Management Information Systems
★3 *(fi 6)* (either term, 3-0-0). This course may contain a lab component. Normally restricted to third- and fourth-year Business students. Prerequisites: MIS 311 or consent of Department. Additional prerequisites may be required.

MIS 490 Management Information Systems Competition Part I
★1.5 *(fi 3)* (either term, 0-1.5s-0). Preparation for Student Competition in Management Information Systems. Prerequisite: consent of Instructor.

MIS 491 Management Information Systems Competition Part II
★1.5 *(fi 3)* (either term, 0-1.5s-0). Completion of Student Competition in Management Information Systems. Prerequisite: MIS 490 and consent of Instructor.

MIS 495 Individual Research Project I
★3 *(fi 6)* (either term, 3-0-0). Special Study for advanced undergraduates. Prerequisites: consent of Instructor and Assistant Dean, Undergraduate Program.

MIS 496 Individual Research Project II
★3 *(fi 6)* (either term, 3-0-0). Special Study for advanced undergraduates. Prerequisites: MIS 495, consent of the Instructor and Assistant Dean, Undergraduate Program.

MIS 497 Individual Research Project III
★3 *(fi 6)* (either term, 3-0-0). Special Study for advanced undergraduates. Prerequisites: MIS 496, consent of the Instructor and Assistant Dean, Undergraduate Program.

Graduate Courses

MIS 541 Introduction to Information Systems
★1.5 *(fi 3)* (either term, 18 hours). This is an introductory course on information systems with a managerial focus. Selected topics have been chosen from different areas in IS to provide an understanding of the key issues involved. These areas include top IS issues, strategic planning, competitive use, decision support, evaluation and managing IS. The intent is to provide students with sufficient working knowledge in these areas as to a manager to be able to make intelligent decisions relating to the use of IS in an organizational setting. Offered in a six-week period.

MIS 586 Selected Topics in Management Information Systems
★1.5 *(fi 3)* (either term, 3-0-0). Topics in this seminar may vary from year to year and are chosen at the discretion of the Instructor.

MIS 611 Seminar in Information Systems
★3 *(fi 6)* (either term, 3-0-0). The seminar will consider a wide range of topics concerned with information systems. These will include technology and file systems, data modelling, databases, expert systems, systems analysis and systems development life cycle, as well as the organizational and behavioral issues connected with the structure and efficiency of organizations. The seminar will also help students to develop analytical skills which can be brought to bear on MIS problems. Prerequisites: MGTSC 502 and MGTSC 514.

MIS 612 Developing Management Information Systems
★3 *(fi 6)* (either term, 3-0-0). This course will explore how information technology can be used to support the efficiency and effectiveness of management decision-making. It will discuss the fundamentals of four information technologies that have a direct impact on management: (1) decision support systems, (2) group decision support systems, (3) executive information systems, and (4) knowledge-based expert systems. While the focus will be on how these technologies are constructed and used by managers, integrative cases will be used to analyze issues such as how new managerial technology should be introduced into organizations and how managerial work is being transformed by modern information technology.

MIS 613 Systems Analysis and Design
★3 *(fi 6)* (either term, 3-0-2). This course examines the critical stages of the systems development process. These include the initiation, planning, analysis, design, implementation and maintenance of information systems needed to support business functions in organizations. The concepts of life cycle, requirements of definition, analysis and design methods, and computer assisted software engineering (CASE) tools are presented. Specific modeling techniques such as process models, data models and logic models are examined in detail. Hands-on experience with a high-end CASE tool is provided. Students must complete a major group project in a business organization. Note: the lab component will be taught for eight weeks during the term. Prerequisite: MIS 541.

MIS 614 Information Systems Management
★3 *(fi 6)* (either term, 3-0-0). The course considers problems of administering and managing computer-based information systems, and managerial techniques for prevention and resolution of such problems, using case studies and guest lectures. Cases are large in scope and integrative rather than focusing on one discipline. Management issues in developing an effective interface between the information systems function and user groups in an organization are also discussed. Prerequisite: MIS 611.

MIS 615 Data Base Design and Administration
★3 *(fi 6)* (either term, 3-0-2). Application of database concepts in organizations. This course provides a comprehensive introduction to the design and development of relational databases from a logical data model. The relational database access language SQL is used along with a number of key software development tools. Effective data administration techniques for enforcing integrity and security as well as enhancing performance are also discussed. Topics of special current interest include data warehousing and the object-oriented data model. Note: The lab component will be taught for ten weeks during the term. Prerequisite: MIS 541.

MIS 625 Information Management for Knowledge-Based Industries
★3 *(fi 6)* (either term, 3-0-2). Knowledge intensive industries have become increasingly important in a dynamic and globally competitive marketplace. There has recently been significant interest concerning the role of knowledge in the Information Age and this course seeks to examine how firms acquire, manage and transfer knowledge across the enterprise. The course examines the management of knowledge in a holistic manner, including knowledge work processes, the role of people and networks, and technologies such as warehouses, document management, Intranets/Extranets, and electronic commerce which can form the building blocks for building a knowledge base. The course focuses on the technology transfer and new product development process as application areas, which can benefit from designing an implementing knowledge management principles. Note: The lab component will be taught for three weeks during the term. Prerequisite: MIS 541.

MIS 686 Selected Topics in Management Information Systems
★3 *(fi 6)* (either term, 3-0-0). Topics dealt with in this seminar may vary from year to year and will be chosen at the discretion of the instructor.

MIS 704 Individual Research
★3 *(fi 6)* (either term, 3-0-0).

201.131 Management Science, MGTSC

Department of Finance and Management Science
Faculty of Business

Note: Enrolment in all MGTSC courses is restricted to students registered in the Faculty of Business, or to students registered in specified programs that require Business courses to meet degree requirements and who have obtained prior approval of their Faculty.

Undergraduate Courses

MGTSC 301 Probability and Statistics for Business, Part I
★3 *(fi 6)* (either term, 3-0-0). This course introduces managerial applications of probability, random variables, expectations and variance, normal and other distributions, analysis display, and presentation of information. Spreadsheets will be an important tool throughout the course and extensive computer use will be required. Therefore students should already possess basic familiarity with microcomputer applications. This course begins with an overview of spreadsheets. Prerequisite: MATH 113 or 114.

MGTSC 312 Probability and Statistics for Business
★3 *(fi 6)* (either term, 3-0-0). This course deals with model building, multiple regression analysis, and related methods useful in a business environment. Microcomputer software will be utilized throughout the course, with necessary computing skills being taught as the course proceeds. However, students are expected to already possess some basic familiarity with microcomputer applications. Prerequisite: MGTSC 301 or STAT 151. Credit will be granted for only one of MGTSC 312 and STAT 252.

MGTSC 352 Operations Management
★3 *(fi 6)* (either term, 3-0-1). A problem-solving course which introduces the student to deterministic and stochastic models which are useful for production planning and operations management in business and government. Note: Students are expected to have basic familiarity with microcomputer applications. Prerequisite: MATH 113 and MGTSC 301 or STAT 151.

MGTSC 404 Decision Analysis
★3 *(fi 6)* (either term, 3-0-0). This course helps students deal systematically with decisions involving two or more parties with opposing interests. Decision trees and influence diagrams are used to model available strategies and weigh tradeoffs. Game-theoretic models for bidding, bargaining, and negotiation are examined and applied in case studies and simulations. Particular attention is paid to the effect of uncertainty and the strategic use of private information. Possible examples include labor negotiations, baseball salary arbitration, construction bidding, international boundary disputes, and environmental hazard location. Ethical and moral issues are discussed. Prerequisites: MGTSC 312, 352.

MGTSC 405 Forecasting for Planners and Managers
★3 *(fi 6)* (either term, 3-0-0). Every decision rests upon a forecast. This course examines statistical procedures for forecasting time series, matching the forecasting

method to the setting, and assessment of forecast accuracy. Topics covered include forecasting single and multiple time series, the optimal combination of forecasts, adjusting for unmeasured events, and how to compensate for low quality data series. The emphasis is on the manager as forecaster. The objective of the course is to provide the individual with the skills necessary to produce the best possible forecasts from the sources at hand. The analysis and forecasting of series from finance, economics, marketing, accounting, and other areas relevant to business will be required. Prerequisites: MGTSC 312, 352.

MGTSC 422 Simulation and Computer Modelling Techniques in Management
★3 *(fi 6)* (either term, 3-0-0). Computer modelling of management systems in such functional areas as accounting, finance, marketing and operations. Basic concepts of deterministic and probabilistic (Monte Carlo) simulation and their applications. Microcomputer implementation of case studies using spreadsheets particularly emphasized. Required term project. Prerequisites: MGTSC 312, 352, FIN 301 and ACCTG 311.

MGTSC 426 Service Operations Management
★3 *(fi 6)* (either term, 3-0-0). This course introduces tools that managers can use to increase profits from operating decisions in service businesses and other service organizations. These decisions range from strategic (where to locate, what to sell) to tactical (how to schedule employees for the coming week). The course will emphasize realistic business projects and the use of easily available software tools. Examples of topics are models to describe and reduce congestion, work force scheduling heuristics, and selected marketing models. Prerequisites: MGTSC 312, 352.

MGTSC 428 Environmental Operations Management
★3 *(fi 6)* (either term, 3-0-0). Decision-support models for managerial decisions with environmental impact. Examination of issues such as energy planning, water resource choices, and hazardous waste logistics with management science tools. Multicriteria decision-making will be introduced and applied. Prerequisites: MGTSC 312, 352.

MGTSC 431 Managerial Performance Measures
★3 *(fi 6)* (either term, 3-0-0). The historical development and the current practice of performance measurement and evaluation in the public and private sectors. Topics include main purposes served by performance measures; uses of non-financial and financial measures within large organizations; input, throughput, output and outcome measures; measures that involve a built-in standard of comparison, which include growth rates, input-output coefficients and single factor efficiencies, output-input coefficients and single factor efficiencies, multi-factor productivity measures, and managerial accounting cost and sales variances; managerial functions and alternative ways of computing aggregative measures on a non-technical level; strategies for using performance measure and evaluation evidence in accountability agreements. Prerequisite: MGTSC 312.

MGTSC 455 Quality Management
★3 *(fi 6)* (either term, 3-0-0). The objective of the course is to study and understand process and product variation, interactions among product and process variables, and ultimately to take action to reduce variation. The topics covered include statistical process control, design of experiment, factorial design, Taguchi's methods and cases, and applications of quality control in management. Prerequisites: MGTSC 312, 352.

MGTSC 461 Distribution Management
★3 *(fi 6)* (either term, 3-0-0). This course will deal with the economically efficient distribution of goods and services from their points of creation to the customers. Topics will include strategic decisions, such as aggregate distribution plans and warehouse location, as well as operational decisions, such as selection of delivery routes and dispatching. This course has a significant microcomputer component. The potential of geographic-information-systems as a profit tool will be demonstrated. Prerequisite: MGTSC 312, 352.

MGTSC 463 Problem Solving
★3 *(fi 6)* (either term, 3-0-0). The focus of this course is on solving difficult business problems using relatively simple computational techniques. The problems will come from different functional areas of business with an emphasis on operations. The common characteristics of these problems are a large number of possible solutions, difficulty in selecting the best solution, and a level of complexity that does not allow for simple analytic solutions. The course's quick-and-dirty (heuristic) solution techniques will be implemented on microcomputers. Prerequisites: MGTSC 312, 352 .

MGTSC 465 Management of New Technology
★3 *(fi 6)* (either term, 3-0-0). In many firms, new technology has the potential to increase competitive advantage. This course looks at the development of products and services which embody new scientific and technical information, and the incorporation of up-to-date technical information in manufacturing and distribution systems. The main thrust of the course will be decisions on the profitable development and adoption of new technology, but there will also be some consideration of policies for government-business cooperation in stimulating and using new inventions and discoveries. The course will include a mix of cases and lectures designed to focus on the significant ways in which new of technology can increase profit potential. Prerequisites: MGTSC 312, 352.

MGTSC 467 Analytical Techniques for Management Consulting
★3 *(fi 6)* (first term, 3-0-0). This case-based course will cover the most popular analytical problem-solving techniques such as regression, simulation, and optimization. Topics will include inventory management, queueing, multiple regression, facility location, genetic algorithms, optimization on spreadsheets, capacity selection, process mapping, data analysis tools in spreadsheets, aggregate planning, and supply chain management. Guest speakers from the consulting sector will be invited to speak. Prerequisites: MGTSC 352 and another 400-level MGTSC or consent of Instructor.

MGTSC 468 Quantitative Management Consulting Project
★3 *(fi 6)* (second term, 3-0-0). This course applies the techniques developed in MGTSC 467 to a group project. The emphasis in the projects is on quantitative approaches to operational problems. Student groups will be assigned to consulting projects from businesses and other organizations in and near Edmonton. Groups will work on their projects under the supervision of the instructor(s). Prerequisites: MGTSC 467 or consent of Instructor.

MGTSC 471 Decision Support Systems
★3 *(fi 6)* (either term, 3-0-0). Decision support systems integrated with various management tools in a microcomputer environment. Programming language to be used is Visual Basic for Applications. Different multicriteria decision making tools such as the Analytic Hierarchy Process, Multiattribute Utility Theory, Goal Programming and Multiobjective Optimization are introduced. Students create decision support systems with graphical user interfaces that use a formal multicriteria decision-making front end as well as optimization, simulation or other appropriate engines for calculations in the background. Student projects in this implementation-oriented course will come from different areas such as employee scheduling, facility location, project/product selection and portfolio optimization. Prerequisites: MGTSC 312, 352.

MGTSC 488 Selected Topics in Management Science
★3 *(fi 6)* (either term, 3-0-0). Normally restricted to third- and fourth- year Business students. Prerequisites: MGTSC 312, 352 or consent of Department. Additional prerequisites may be required.

MGTSC 490 Management Science Competition Part I
★1.5 *(fi 3)* (either term, 0-1.5s-0). Preparation for Student Competition in Management Science. Prerequisite: consent of Instructor.

MGTSC 491 Management Science Competition Part II
★1.5 *(fi 3)* (either term, 0-1.5s-0). Completion of Student Competition in Management Science. Prerequisite: MGTSC 490 and consent of instructor.

MGTSC 495 Individual Research Project I
★3 *(fi 6)* (either term, 3-0-0). Special study for advanced undergraduates. Prerequisites: consent of Instructor and Assistant Dean, Undergraduate Program.

MGTSC 496 Individual Research Project II
★3 *(fi 6)* (either term, 3-0-0). Special Study for advanced undergraduates. Prerequisites: MGTSC 495, consent of the Instructor and Assistant Dean, Undergraduate Program.

MGTSC 497 Individual Research Project III
★3 *(fi 6)* (either term, 3-0-0). Special Study for advanced undergraduates. Prerequisites: MGTSC 496, consent of the Instructor and Assistant Dean, Undergraduate Program.

Graduate Courses

MGTSC 511 Data Analysis
★1.5 *(fi 3)* (either term, 18 hours). This course begins with a survey of graphical and numerical techniques available for studying and describing data. A statistics computer software package is used. Following an introduction to probability distributions, an overview of statistical inference for means and proportions is provided. The emphasis will be on the application of these techniques to managerial decision making. Offered in a six-week period.

MGTSC 521 Statistical Models
★1.5 *(fi 3)* (either term, 18 hours). This course is concerned with statistical inference techniques for various models. Regression, analysis of variance, and time series models are discussed. Statistical computer software is used to apply the techniques to business data sets. The data analyzed throughout the course will be representative of data commonly employed by managers. Offered in a six-week period. Corequisite: MGTSC 511.

MGTSC 531 Decision Analysis
★1.5 *(fi 3)* (either term, 18 hours). This course provides an overview of probability theory. A survey of decision theory, computer simulation and central management science concepts and techniques is included. The student is introduced to concepts using a variety of cases and assignments. Formulation of problems and interpretation of results are stressed. Computer spreadsheet software is used throughout. Offered in a six-week period. Not open to students who have completed MGTSC 501. Prerequisite: MGTSC 521.

MGTSC 541 Production and Operations Management
★1.5 *(fi 3)* (either term, 18 hours). This course focuses on the creation and

delivery of goods and services. The emphasis is on the analytical solution methods for strategic and tactical decisions. Specific modules may include forecasting, project management, facility location, aggregate planning, scheduling, inventory management, distribution and transportation. A number of cases will be introduced and models of realistic problems will be implemented on microcomputers. Prerequisite: MGTSC 531.

MGTSC 586 Selected Topics in Management Science
★1.5 *(fi 3)* (either term, 3-0-0). Topics in this seminar may vary from year to year and are chosen at the discretion of the Instructor.

MGTSC 604 Bargaining and Negotiation
★3 *(fi 6)* (either term, 3-0-0). This course is a blend of both experiential learning and theory with the objective of making the student more effective in all types of bargaining. A study of positive theories on how to improve negotiation skills will be combined with analytical models of the game theoretic structure of bargaining. Through this mix of theories and several case studies and bargaining exercises, students will see both the opportunities for joint gain (win-win) and the constraints which can lead to inferior outcomes. Prerequisite: MGTSC 531 and BUEC 501.

MGTSC 626 Service Operations Management
★3 *(fi 6)* (either term, 3-0-0). This course introduces tools that managers can use to increase profits from operating decisions in service businesses and other service organizations. These decisions range from strategic (where to locate, what to sell) to tactical (how to schedule employees for the coming week). The course will emphasize realistic business projects and the use of easily available software tools. Examples of topics are models to describe and reduce congestion, workforce scheduling heuristics, and selected marketing models. Prerequisite: MGTSC 541.

MGTSC 632 Simulation and Computer Modelling Techniques in Management
★3 *(fi 6)* (either term, 3-0-0). This course will discuss computer modelling of management systems in such functional areas as accounting, finance, marketing, and production. Basic concepts of deterministic and probabilistic (Monte Carlo) simulation and their applications will also be covered. Micro computer implementations of case studies using spreadsheets will be particularly emphasized. A term project will be required. Prerequisite: MGTSC 541.

MGTSC 655 Quality Management
★3 *(fi 6)* (either term, 3-0-0). The objective of the course is to study and understand process and product variation, interactions among product and process variables and ultimately to take action to reduce variation. The topics covered include statistical process control, design of experiment, factorial design, Taguchi's methods and cases and applications of quality control in management. Prerequisite: MGTSC 521.

MGTSC 661 Distribution Management
★3 *(fi 6)* (either term, 3-0-0). This course will deal with the economically efficient distribution of goods and services from their points of creation to the customers. Topics will include strategic decisions, such as aggregate distribution plans and warehouse location, as well as operational decisions, such as selection of delivery routes and dispatching. This course has a significant microcomputer component. The potential of geographic-information-systems as a profit tool will be demonstrated. Prerequisite: MGTSC 541.

MGTSC 663 Problem Solving
★3 *(fi 6)* (either term, 3-0-0). The focus of this course is on solving difficult business problems using relatively simple computational techniques. The problems will come from different functional areas of business with an emphasis on operations. The common characteristics of these problems are a large number of possible solutions, difficulty in selecting the best solution, and a level of complexity that does not allow for simple analytic solutions. The course's quick-and dirty (heuristic) solution techniques will be implemented on microcomputers. Prerequisite: MGTSC 541.

MGTSC 665 Management of New Technology
★3 *(fi 6)* (either term, 3-0-0). In many firms, new technology has the potential to increase competitive advantage. This course looks at the development of products and services which embody new scientific and technical information, and the incorporation of up-to-date technical information in manufacturing and distribution systems. The main thrust of the course is decisions on the profitable development and adoption of new technology, but there is also some consideration of policies for government-business cooperation in stimulating and using new inventions and discoveries. The course includes a mix of cases and lectures designed to focus on the significant ways in which new technology can increase profit potential. Prerequisite: MGTSC 541.

MGTSC 667 Analytical Techniques for Management Consulting: A Problem Solving Approach
★3 *(fi 6)* (either term, 3-0-0). This case-based course covers the most popular analytical problem-solving techniques used in management consulting, such as regression, simulation, and optimization. The goal is to train the students to become better business problem solvers. Prerequisite: MGTSC 511 or consent of the Instructor.

MGTSC 668 Quantitative Management Consulting Project
★3 *(fi 6)* (either term, 3-0-0). This project course covers quantitative approaches to operational problems. The end product may be a study addressing a strategic question, or a computational tool designed to solve a tactical problem. Prerequisite: MGTSC 667 or consent of the Instructor.

MGTSC 686 Selected Topics in Management Science
★3 *(fi 6)* (either term, 3-0-0). Topics in this seminar may vary from year to year and are chosen at the discretion of the Instructor.

MGTSC 698 Individual Study Project in Management Science
★3 *(fi 6)* (either term, 3-0-0).

MGTSC 701 Seminar in Mathematical Programming
★3 *(fi 6)* (either term, 3-0-0). Topics from the areas of linear programming, non-linear programming, quadratic programming, integer programming, stochastic programming, network analysis, and large-scale programming (decomposition and column generation) in a business context. Prerequisite: consent of Department.

MGTSC 702 Seminar in Decision Analysis and Game Theory
★3 *(fi 6)* (either term, 3-0-0). Decision-making under uncertainty, analysis of competitive strategies, competitive bidding, theory of auctions, bargaining, and negotiation models. Prerequisite: consent of Department.

MGTSC 703 Advanced Applications of Operations Research
★3 *(fi 6)* (either term, 3-0-0).

MGTSC 704 Seminar in Stochastic Systems
★3 *(fi 6)* (either term, 3-0-0). Topics from the areas of Markov processes, queuing, stochastic dynamic programming, and simulation in a business context. Prerequisite: consent of Department.

MGTSC 705 Multivariate Data Analysis I
★3 *(fi 6)* (either term, 3-0-0). An overview of multivariate data analysis normally taken by students in the first year of the Business PhD program. The course is designed to bring students to the point where they are comfortable with commonly used data analysis techniques available in most statistical software packages. Students are expected to complete exercises in data analysis and in solving proofs of the major results. Topics will include univariate analysis, bivariate, analysis, multiple linear regression and analysis of variance. It is expected that students have as background at least (a) one semester of calculus; (b) one semester of linear algebra, and (c) two semesters introduction to probability, probability distributions and statistical inference.

MGTSC 706 Multivariate Data Analysis II
★3 *(fi 6)* (either term, 3-0-0). A continuation of the overview of multivariate data analysis begun in MGTSC 705. Topics include categorical data analysis, multivariate linear regression, discriminant analysis, canonical correlation, multivariate analysis of variance, principal component analysis, factor analysis, cluster analysis and logistic regression. Prerequisite: MGTSC 705 or consent of Instructor.

MGTSC 820 Data Analysis and Modeling
★3 *(fi 32)* (first term, 3-0-0). Developing the ability to collect information and to use information technology to analyze statistically and draw conclusions; developing computer skills and understanding research methods. Restricted to Executive MBA students only.

MGTSC 830 Operations Management
★3 *(fi 32)* (second term, 3-0-0). Understanding the strategic role of operations in an enterprise and the relationship between operations and other business functions; designing, implementing and controlling an effective and efficient operating process. Restricted to Executive MBA students only.

201.132 Marine Science (Biological Sciences), MA SC

Department of Biological Sciences staff, Marine station at Bamfield, BC
Faculty of Science

Notes
(1) Courses are offered at Bamfield Marine Station (BMS). Details are available from the Department of Biological Sciences.
(2) Prerequisite for all of the following courses is consent of the Department of Biological Sciences.
(3) Students will be expected to take a full course load of ★15 during the Fall term.
(4) See also §163.11.

Undergraduate Courses

L MA SC 400 Directed Studies
★3-6 *(variable)* (two term, 0-0-6). A course of directed studies under the supervision of a visiting professor. The study will involve a research project approved by the supervisor in the field of interest of the student, and will be designed to take maximum advantage of the laboratory and/or field opportunities offered by the Bamfield Marine Station.

L MA SC 401 Special Topics in Marine Biology
★6 *(fi 12)* (two term, 0-0-6). Offered, as opportunities arise, by distinguished scientists who are working at the Bamfield Marine Station. It is expected that the course will generally be of a specialized nature and be at a level appropriate to graduate or senior undergraduate students.

L MA SC 402 Special Topics in Marine Biology
★3 *(fi 6)* (either term, 0-0-6). Offered, as opportunities arise, by distinguished scientists who are working at the Bamfield Marine Station and are prepared to offer a course extending over a three-week period. Course will be of a specialized nature.

L MA SC 403 Directed Studies in Marine Science
★3-6 *(variable)* (first term, 13 weeks). Study will involve a research project approved by a supervisor in the student's field of interest, and will be designed to take maximum advantage of the laboratory and/or field opportunities. Students may arrange for a supervisor before the start of the fall semester. Advanced students may, with the permission of their university, take a ★6 directed study in lieu of MA SC 415, 425, or 437.

L MA SC 410 Marine Invertebrate Zoology
★6 *(fi 12)* (two term, 0-0-6). A survey of the marine phyla, with emphasis on the benthic fauna in the vicinity of the Bamfield Marine Station. The course includes lectures, laboratory periods, field collection, identification, and observation. Emphasis is placed on the study of living specimens in the laboratory and in the field.

L MA SC 412 Biology of Fishes
★6 *(fi 12)* (two term, 0-0-6). Classification, physiology, ecology, behavior and zoogeography of fishes with particular emphasis on those in the marine environment of the British Columbia coast. Course will involve some field projects.

L MA SC 415 Structure and Function in Animals
★3 *(fi 6)* (first term, 4 weeks). This course is intended to examine the form and function of invertebrates and vertebrates using a comparative approach. The following subject areas are included: morphology and evolution, systems physiology, biomechanics, and development. The local marine and coastal fauna are used to illustrate the principles. The course includes fieldwork and a series of laboratory exercises and experiments.

L MA SC 420 Marine Phycology
★6 *(fi 12)* (two term, 0-0-6). A survey of the marine algae, with emphasis on the benthic forms in the vicinity of the Bamfield Marine Station. The course includes lectures, laboratory periods, field collection, identification, and observation. Emphasis is placed on the study of living specimens in the laboratory and in the field.

L MA SC 425 Ecological Adaptations of Seaweeds
★3 *(fi 6)* (first term, 4 weeks). The course explores morphological, physiological, genetic and reproductive adaptations of seaweeds to their natural and man-altered environments.

L MA SC 430 Marine Ecology
★6 *(fi 12)* (two term, 0-0-6). An analytical approach to biotic associations in the marine environment. Opportunities will be provided for study of the intertidal realm in exposed and protected areas and of beaches and estuaries in the vicinity of the Bamfield Marine Station; plankton studies and investigations of the subtidal and benthic environments by diving and dredging are envisaged.

L MA SC 437 Marine Population Ecology and Dynamics
★3 *(fi 6)* (first term, 4 weeks). An analytical approach to the study of marine ecology and marine populations. Intertidal and subtidal communities will be examined, with emphasis on the biota of the Barkley Sound region.

L MA SC 440 Biology of Marine Birds
★6 *(fi 12)* (two term, 0-0-6). A study of the interrelationship of birds and the marine environment. Lectures will emphasize the systematics and ecological relationships, behavior, life histories, movements and conservations of marine birds. Census techniques and methods of studying marine birds in the field will be treated as we observe seabirds and marine associated birds in the Barkley Sound region. Seabird identification, classification, morphology, plumages and moult will be examined in the laboratory.

L MA SC 445 Biology of Marine Mammals
★6 *(fi 12)* (two term, 0-0-6). A survey course covering systematics and distribution of marine mammals, their sensory capabilities and physiology, with special emphasis on the Cetacea. The course includes lectures, laboratory periods and the course will involve an independent field study.

L MA SC 470 Directed Research in Aquaculture
★3 *(fi 6)* (either term, 0-0-6). Design and execution of a research project in the field of aquaculture under the supervision of a scientist working in association with the Bamfield Station. A written report is a requirement.

L MA SC 480 Seminars and Papers in Marine Science
★3 *(fi 6)* (first term, 13 weeks). A series of weekly seminars covering current topics of interest in the marine sciences. Seminars will be presented by BMS researchers, graduate students, visiting scientists as well as by the students themselves.

Graduate Courses

MA SC 500 Graduate Level Directed Studies
★6 *(fi 12)* (two term, 0-0-6). A graduate level course of directed studies under the supervision of a member of the faculty. The study will involve a research project provided by the supervisor in the field of interest of the student, and will be designed to take maximum advantage of the laboratory and/or field opportunities offered at Bamfield Marine Station. May be offered over a 3-week period.

MA SC 501 Graduate Level Special Topics
★6 *(fi 12)* (two term, 0-0-6). Courses offered, as opportunities arise, by distinguished scientists who are visiting at Bamfield Marine Station. It is expected that the course will generally be of a specialized nature and will carry graduate credit.

MA SC 502 Graduate Level Special Topics
★3 *(fi 6)* (two term, 0-0-6). Courses offered as opportunities arise, by distinguished scientists who are visiting at Bamfield Marine Station and are prepared to offer a course extending over a three-week period. The course will carry graduate credit.

201.133 Marketing, MARK

Department of Marketing, Business Economics, and Law
Faculty of Business

Note: Enrolment in all MARK courses is restricted to students registered in the Faculty of Business, or to students registered in specified programs that require Business courses to meet degree requirements and who have obtained prior approval of their Faculty.

Undergraduate Courses

MARK 301 Introduction to Marketing
★3 *(fi 6)* (either term, 3-0-0). Students are introduced to the marketing concept and the role of marketing within the overall business framework. The basic tools of marketing are introduced: market segmentation, positioning, product, price, distribution, and promotion, together with marketing research, consumer behavior, planning, and global marketing. A critical theme of the course is the need for the marketing mix to fit with the requirements of consumers, the competitive environment, company strengths, and community expectations. These issues are considered from strategic and tactical perspectives. Prerequisites: ECON 101/102, MATH 113 or equivalent.

MARK 312 Marketing Research
★3 *(fi 6)* (either term, 3-0-0). Nature and significance of marketing research. Marketing research methods, investigation and analysis of specific research problems. Prerequisite: MARK 301. Not open to students with credit in MARK 412.

MARK 320 Consumer Behavior
★3 *(fi 6)* (either term, 3-0-0). The study of the factors affecting the consumer decision process. Analysis of consumer behavior models and their application to marketing decision making, with an emphasis on empirical research. Prerequisite: MARK 301. BCom degree credit will not be granted for both MARK 320 and HECOL 320. Not open to students with credit in MARK 422 or CONS 220.

MARK 420 Advanced Topics in Consumer Behavior
★3 *(fi 6)* (either term, 3-0-0). Advanced study of consumer behavior theories and their application to consumer research that informs marketing, consumer policy, and consumer education. Prerequisite: MARK 320 or HECOL 320. BCom degree credit will not be granted for both MARK 420 and HECOL 420. Not open to students with credit in MARK 423 or CONS 420.

MARK 432 Marketing Communications
★3 *(fi 6)* (either term, 3-0-0). Students study basic concepts of interpersonal and mass communications. An emphasis on integrated marketing communications (IMC) which consist of advertising, personal selling, sales promotion, direct marketing, and public relations. A focus on integrating the elements which make up an IMC plan, resulting in a coherent communications strategy. Consumer motivation and the measurement of communication effectiveness are also examined. Prerequisite: MARK 301.

MARK 442 Seminar in International Marketing
★3 *(fi 6)* (either term, 3-0-0). Analysis of problems of international marketing; development of marketing strategies in light of world cultural, economic, geographic, legal and political factors. Prerequisite: MARK 301.

MARK 450 Electronic Marketing
★3 *(fi 6)* (either term, 3-0-0). Provides an in-depth understanding of the marketing aspects of electronic commerce. Expands upon the principles of marketing by focusing on those aspects that are unique in electronic marketplaces. Combines the study of pertinent theoretical concepts with a discussion of current developments in the practice of electronic marketing. In a major group project, students have the opportunity to apply the skills and knowledge acquired in the course to a real-world electronic marketing challenge. Prerequisites: MARK 301 and MIS 311.

MARK 452 Strategic Marketing
★3 *(fi 6)* (either term, 3-0-0). The objective of this course is to provide students with the analytic, planning, and communication skills to be successful marketing managers. The focus is on practical marketing planning, along with the development and implementation of marketing strategies. Course activities may include the use of marketing simulation games, case analyses, field research projects, secondary research and in-depth discussion of current literatures. The course focuses on the integration of all the conceptual areas in marketing. Prerequisite: MARK 301.

MARK 465 Retailing and Services Internship
★3 *(fi 6)* (either term, 3-0-0). Practical application of marketing and related business skills and theory to a problem or issues addressed during a period of 13 weeks of summer placement in a sponsoring retailing or services organization. The internship includes preliminary instruction and requires, under the supervision of the Faculty, the presentation of a project report to the sponsoring organization. Prerequisites: MARK 301 and consent of Department.

MARK 466 Service Marketing
★3 *(fi 6)* (either term, 3-0-0). Students are introduced to the important differences between marketing tangible products and marketing services. The unique nature of services is examined and the importance of service quality to both consumer and business to business customers, is emphasized. The marketing mix variables are discussed from the service perspective. Designing a marketing mix for service, not-for-profit and government institutions poses interesting and formidable challenges which are dealt with in terms of marketing planning, implementation and control. Trade barriers to the global marketing of services, together with other global service issues are also given attention. Prerequisite: MARK 301.

MARK 468 Retailing and Channel Management
★3 *(fi 6)* (either term, 3-0-0). Students are introduced to the activities involved in retailing goods and services to consumers and to the elements that make up effective distribution channels. Retailing topics include the evolution of retailing, store location, store image, shopping behavior, retail marketing strategies and current trends in retailing management. Channel management topics include: channel structure, designing the marketing channel, channel relationships and responsibilities, selecting channel members, and physical distribution and transportation. Effective channel management, the application of marketing planning, and analysis of retailing and channel management are also examined Prerequisite: MARK 301.

MARK 470 Selling and Sales Management
★3 *(fi 6)* (either term, 3-0-0). The role of selling and management of the sales force is diverse modern business environments. Topics include sales strategies, sales force planning, organization and evaluation, recruiting, selection and training, leadership and motivation, sales forecasting quotas and types of compensation. Prerequisite: MARK 301.

MARK 472 Product Management and Pricing
★3 *(fi 6)* (either term, 3-0-0). Development, management and pricing of interrelated goods and services. New product development, managing a product portfolio, bundling of goods and services, and tailoring price and product to different segments. Prerequisites: MARK 301 and BUEC 311.

MARK 488 Selected Topics in Marketing
★3 *(fi 6)* (either term, 3-0-0). Normally restricted to third- and fourth- year Business students. Prerequisites: MARK 301 or consent of Department. Additional prerequisites may be required.

MARK 490 Marketing Competition Part I
★1.5 *(fi 3)* (either term, 0-1.5s-0). Preparation for Student Competition in Marketing. Prerequisite: consent of Instructor.

MARK 491 Marketing Competition Part II
★1.5 *(fi 3)* (either term, 0-1.5s-0). Completion of Student Competition in Marketing. Prerequisite: MARK 490 and consent of Instructor.

MARK 495 Individual Research Project I
★3 *(fi 6)* (either term, 3-0-0). Special study for advanced undergraduates. Prerequisites: MARK 312 or equivalent, consent of Instructor and Associate Dean Undergraduate Program.

MARK 496 Individual Research Project II
★3 *(fi 6)* (either term, 3-0-0). Special Study for advanced undergraduates. Prerequisites: MARK 495, consent of the Instructor and Assistant Dean, Undergraduate Program.

MARK 497 Individual Research Project III
★3 *(fi 6)* (either term, 3-0-0). Special Study for advanced undergraduates. Prerequisites: MARK 496, consent of the Instructor and Assistant Dean, Undergraduate Program.

Graduate Courses

MARK 501 Principles of Marketing
★1.5 *(fi 3)* (either term, 18 hours). This course covers basic concepts in marketing, including marketing orientation, relationship marketing, the marketing research process, consumer vs industrial marketing, uncontrollable vs controllable variables, market segmentation, and development of a marketing plan. The course also introduces marketing in special contexts such as not-for-profit, international, services, and environmental. Offered in a six-week period.

MARK 511 Marketing Management
★1.5 *(fi 3)* (either term, 18 hours). This course addresses in detail the concept of the marketing mix: product, price, place, and promotion. While each of these elements is covered separately, the need to synchronize them is emphasized. The course focuses on implementing the marketing mix. Offered in a six-week period. Prerequisites: MARK 501, MANEC 501.

MARK 586 Selected Topics in Marketing
★1.5 *(fi 3)* (either term, 3-0-0). Topics in this seminar may vary from year to year and are chosen at the discretion of the Instructor.

MARK 620 Marketing Research and Consumer Behavior
★3 *(fi 6)* (either term, 3-0-0). This course provides an examination of marketing research methodologies emphasizing the translation of marketing problems into researchable form, research design, data gathering, data analysis, and implementation of research results. Consideration is also given to individual and group influences on consumer decision making and their implications for marketing strategy. Prerequisite: MARK 502 or 511.

MARK 630 Advertising, Promotion and Retail Management
★3 *(fi 6)* (either term, 3-0-0). This course introduces the student to the management of advertising and other marketing communications tools in a managerial setting. It also examines the application of marketing analysis to retail management with emphasis on locations/spatial theory, market research techniques, consumer behavior, channel policies, competition analysis, and pricing, merchandising, and promotion strategies. Prerequisite: MARK 502 or 511.

MARK 644 International Marketing
★3 *(fi 6)* (either term, 3-0-0). Topics in international marketing, including the importance of international marketing to Canadian business, comparative marketing systems, evaluation of socioeconomic influences on international marketing, and marketing strategies as they relate to firm size. Prerequisites: MARK 501, 511.

MARK 650 Marketing in Electronic Environments
★3 *(fi 6)* (either term, 3-0-0). This course equips students with a conceptual understanding of the marketing-related issues that are of importance to e-commerce managers and a set of skills that will enable them to develop successful marketing strategies for digital marketplaces. In a major group project, students have the opportunity to apply the knowledge and skills acquired in the course to a real-world electronic-marketing challenge. Prerequisites: MARK 501 and 511.

MARK 654 Strategic Marketing
★3 *(fi 6)* (either term, 3-0-0).

MARK 664 Product Management and Pricing
★3 *(fi 6)* (either term, 3-0-0). Development, management and pricing of interrelated goods and services. New product development, pricing strategies for new products, managing a product portfolio, bundling of goods and services and pricing the bundles, and tailoring price and product to different segments. Prerequisites: MARK 501, 511, MANEC 511.

MARK 686 Selected Topics in Marketing
★3 *(fi 6)* (either term, 3-0-0).

MARK 701 Research Methodology in Marketing
★3 *(fi 6)* (either term, 3-0-0). The nature of scientific inquiry and its relevance and application to research in marketing. The development and testing of marketing theory. Marketing measurement methodology. Prerequisite: MARK 614 or equivalent.

MARK 702 Buyer Behavior
★3 *(fi 6)* (either term, 3-0-0). In-depth study and analysis of the current buyer behavior research literature. Models of individual and group (organizational) buying processes. Information processing views of consumer decision making. Models of attitudes, perceptions, preferences, and choice. The use of advanced econometric and psychometric techniques in analyzing buyer behavior. Prerequisite: MARK 624 or equivalent.

MARK 703 Marketing Modelling
★3 *(fi 6)* (either term, 3-0-0).

MARK 704 Individual Research
★3 *(fi 6)* (either term, 3-0-0).

MARK 705 Current Research in Marketing
★3 *(fi 6)* (either term, 3-0-0). An overview of recently published research in marketing with an emphasis on the research interests of enrolled students not adequately covered in other marketing doctoral courses.

MARK 706 Research Seminar in Marketing
★3 *(fi 6)* (two term, 3-0-0). This seminar introduces students to the most recent research in the area of marketing, examining current issues and trends. Students have an opportunity to present and discuss their own research and actively

engage in the analysis and discussion of the work of others. The seminar is a single term course offered over two terms. Evaluation of the course is based on participation and involves a presentation in the Marketing Seminar Series.

MARK 830 Marketing
★3 *(fi 32)* (second term, 3-0-0). Understanding the role of marketing in determining the direction of an organization; the customer-focused organization; opportunity identification; forecasting demand; marketing segmentation; market planning, and implementation. Restricted to executive MBA students only.

201.134 Materials Engineering, MATE

Department of Chemical and Materials Engineering
Faculty of Engineering

The following table lists renumbered courses effective 1997/98:

Old	New	Old	New
MET E 251	MATE 251	MET E 543	MATE 543
MET E 252	MATE 252	MET E 555	MATE 555
MET E 256	MATE 256	MET E 601	MATE 601
MMP E 331	MATE 331	MET E 610	MATE 610
MET E 332	MATE 332	MET E 611	MATE 611
MET E 340	MATE 340	MET E 615	MATE 615
MET E 353	MATE 353	MET E 630	MATE 630
MET E 357	MATE 357	MET E 645	MATE 645
MET E 358	MATE 358	MET E 651	MATE 651
MET E 380	MATE 480	MET E 652	MATE 652
MMP E 390	MATE 390	MET E 653	MATE 653
MMPE 408	MATE 408	MET E 654	MATE 654
MET E 430	MATE 430	MET E 660	MATE 660
MET E 434	MATE 434	MET E 662	MATE 662
MET E 441	MATE 441	MET E 664	MATE 664
MET E 442	MATE 442	MET E 665	MATE 665
MET E 443	MATE 443	MET E 666	MATE 666
MET E 444	MATE 444	MET E 668	MATE 668
MET E 445	MATE 345	MET E 676	MATE 676
MET E 448	MATE 448	MET E 680	MATE 680
MET E 452	MATE 452	MET E 682	MATE 682
MET E 453	MATE 453	MET E 738	MATE 738
MET E 467	MATE 467	MET E 778	MATE 778
MET E 533	MATE 533		

Undergraduate Courses

MATE 251 Materials Science I
★3 *(fi 6)* (either term, 3-0-0). An introduction to the science of materials from the standpoint of the relationships between structure and physical and mechanical properties. Atomic bonding, crystal structure and crystal imperfections, binary phase equilibria and phase transformations. Structures of metallic, non-metallic and composite materials. Elastic and plastic deformation, fracture, fatigue and creep in crystalline and amorphous solids. Corrosion and thermal stability of materials in service. Prerequisite: CHEM 105 or consent of Department.

MATE 252 Materials Science II
★3.8 *(fi 6)* (either term or Spring/Summer, 3-0-3/2). An introduction to the science of materials relating their mechanical, thermal, electronic and chemical properties to atomic, molecular and crystal structure. Ceramic and metallic crystals, glasses, polymers and composite materials. Multi-phase materials, strengthening processes. Laboratories include mechanical properties of metals and polymers, microstructure, heat treatment of steel, corrosion. Prerequisite: CHEM 105.

MATE 256 Materials Engineering
★4.3 *(fi 6)* (second term, 3-1s-3/2). Elements of crystallography, x-ray diffraction, and applications in materials. Compositional and microstructural characterization of materials. Crystal defects. Introduction to electronic materials. Prerequisite: MATE 252 or equivalent.

MATE 331 Mineral Processing I
★3.8 *(fi 6)* (second term, 3-0-3/2). Unit operations employed to concentrate minerals including comminution, classification, gravity concentration, froth flotation, thickening, filtering; tailings disposal; marketing of minerals; economics. Prerequisite: STAT 235 and consent of Instructor.

MATE 332 Pyrometallurgy
★3.8 *(fi 6)* (second term, 3-0-3/2). Nature of ores, furnaces fuels, slags, and mattes. Metallurgical calculations. Application of thermodynamics to metallurgical unit processes involving the use of elevated temperature to extract metals and metal compounds including calcining, roasting, reduction, smelting, refining and recycling. Air pollution problems in metallurgical industries. Prerequisites: CH E 265 and MAT E 340.

MATE 340 Materials Thermodynamics
★3 *(fi 6)* (first term, 3-0-0). Fundamentals of thermodynamics in metallurgy and materials. Review of thermodynamic variables. First and second laws. Reaction equilibria, stability diagrams. Solution thermodynamics applied to metallurgical processes. Phase relations, free energy-composition diagrams. Electrochemistry. Experimental methods and estimation of thermochemical data. Prerequisite: CH E 243.

MATE 343 Mechanical Design for Materials Engineers
★3.5 *(fi 6)* (second term, 2-0-3). Analysis and design of components including materials selection. Basic principles of designing and manufacturing components for common industrial devices such as fasteners, pressure vessels, gears, etc. Design project. Prerequisite: CIV E 270, MEC E 265 or CIV E 265, MATE 357. Corequisite: MATE 345, MATE 358.

MATE 345 Corrosion and Oxidation
★3 *(fi 6)* (either term, 3-0-0). Electrochemical theory of galvanic attack, concentration cells and differential temperature cells. Uniform attack. The interaction of mechanical stresses and corrosion. Selection of corrosion-resistant materials. Protective coatings, inhibitors and cathodic protection, corrosion testing, high-temperature oxidation and other gas-metal reactions. Not open to students with credit in MATE 445. Prerequisite: MATE 251 or 252.

MATE 353 Electronic Materials I
★3 *(fi 6)* (first term, 3-0-0). The science of electronic materials relating atomic, molecular and crystal structure to material properties; polymers, glasses, crystalline ceramics, metals, and composites; diffusion, electrochemical and corrosion properties; phase equilibria, strengthening mechanisms, mechanical properties and failure; electrical conductors, semiconductors, and dielectrics; thermal, magnetic, and optical properties. Prerequisite: CHEM 105. Not open to students with credit in MATE 251 or MATE 252.

MATE 357 Fundamentals of Physical Metallurgy
★3.8 *(fi 6)* (first term, 3-0-3/2). Diffusion in metals. Phase diagrams. Solidification and casting. Annealing. Diffusional and diffusionless solid state phase transformations. Carbon and low alloy steels and their heat treatment. Prerequisite: MATE 256.

MATE 358 Mechanical Metallurgy
★3.8 *(fi 6)* (second term, 3-0-3/2). Tensile testing, elastic deformation and plastic deformation. Dislocation theory and plastic deformation. Strengthening mechanisms in metals. Fundamentals of fracture and fracture testing. Fatigue and creep. Introduction to powder metallurgy. Prerequisite: MATE 357.

MATE 365 Materials Process Engineering Design I
★4.5 *(fi 6)* (first term, 3-0-3). Engineering design concepts in materials processing; cost estimation; project planning and scheduling, plant safety and hazards analysis: selected project design examples. Prerequisites: CH E 265, ENGG 310 or 401, and MATE 340. Corequisite: CH E 314.

MATE 408 Environmental Aspects of Resource Operations
★3 *(fi 6)* (second term, 3-0-0). Environmental impacts of mining, mineral processing, and extractive metallurgical operations. Abatement technology. Public response and environmental legislation. Safe disposal of wastes from resource industries. Land reclamation and revegetation methods. Case studies of typical Canadian resource industries. Prerequisite: MATE 331 or consent of Instructor.

MATE 410 Introduction to Welding Metallurgy
★3 *(fi 6)* (second term, 3-0-0). Heat transfer and heat flow. Thermal cycles in welding. Weld metal solidification. Weld metal metallurgical characteristics including hot cracking. Heat-affected zone characteristics including structure-property relationships, hot and cold cracking. Residual stresses and distortion. Ferrous alloy welding metallurgy. Non-ferrous welding metallurgy. Dissimilar metal joints. Prerequisite: MATE 452.

MATE 411 Introduction to Welding Processes
★3.8 *(fi 6)* (first term, 3-0-3/2). History of welding technology. Process classification and selection. Welding energy sources. Electric arcs. Heat transfer, metal transfer, gas and slag-metal reactions. Power sources. Arc welding processes. Resistance welding processes. Radiant energy welding processes. Solid state welding processes. Chemical energy welding processes. Cutting processes. Prerequisite: consent of Instructor.

MATE 430 Hydrometallurgy and Electrometallurgy
★3.8 *(fi 6)* (first term, 3-0-3/2). Principles of hydrometallurgical and electrometallurgical unit processes to recover metals and metal compounds. Application of thermodynamics and kinetics to atmospheric and pressure leaching, ion exchange, solvent extraction, hydrogen reduction, electrowinning and electrorefining. Water pollution problems in metallurgical industries. Prerequisites: CH E 265 and MATE 340.

MATE 433 Applied Surface Chemistry in Minerals and Materials Processing
★3.5 *(fi 6)* (either term, 3-1s-0). Fundamentals of surface and interfacial phenomena; physical chemistry of surfaces and interfaces; surface and interface energy and their origin; wetting adhesion and surface forces in material processing; role and mechanisms of surfactant adsorption and self assembly in materials engineering; techniques for surface characterization. Prerequisite CH E

243 or equivalent. Credit cannot be obtained in this course if credit has already been obtained in CH E 436.

MATE 434 Metallurgical Process Analysis
★3.8 *(fi 6)* (second term, 3-0-3/2). The analysis, optimization and control of mineral and metallurgical processing systems through mathematical modelling and digital simulation. Instrumentation and control of metallurgical processing plants. Prerequisite: MATE 331, 332 or 390.

MATE 440 Kinetics and Mass Transfer
★3.5 *(fi 6)* (second term, 3-1s-0). The study of diffusion, mass transfer and reaction kinetics in materials process engineering. The fundamental equations governing mass transfer are applied to study the rate of metallurgical processes. The use of dimensional analysis in scale-up of reactors and mixing in batch and continuous processes is also presented. Prerequisites: MATE 340, CH E 312, CH E 314.

MATE 441 Materials Research Project I
★1.5 *(fi 2)* (either term, 0-0-3). Research on current topics in materials engineering including structure, properties, processing or mineral processing. Literature survey on a specific topic and submission of a detailed research proposal. Corequisite: CH E 481. Requires consent of instructor.

MATE 442 Materials Research Project II
★4.5 *(fi 6)* (either term, 0-0-9). Execute research according to research proposal prepared in MATE 441. Write research report. Prerequisite: MATE 441.

MATE 443 Materials Design Project
★4 *(fi 6)* (second term, 2-1s-3). Team or individual materials design projects. Selection and optimization of physical/mechanical properties and fabrication processes for chosen components or structures. Prerequisites: CIV E 270, MATE 343, MATE 452.

MATE 448 Materials Engineering Field Trip
★0.5 *(fi 1)* (either term, 0-1s-0). An extended trip to visit materials and metallurgical plants is made at the end of the summer by fourth-year Materials Engineering students accompanied by staff. Students in Materials may also be required to make several part-day trips during the session to materials, metallurgical and other industrial plants near Edmonton. This course requires the payment of additional miscellaneous fees. See §22.2.3 for details. Prerequisite: MATE 357.

MATE 452 Applications of Physical Metallurgy
★4.5 *(fi 6)* (first term, 3-0-3). Composition, structure, heat treatment and mechanical properties of alloy steels, cast irons and non-ferrous alloys. Mechanical processing of metals, including stress-strain relationships, forging, rolling, extrusion and sheet metal forming. Metallurgy of machining. Prerequisite: MATE 357.

MATE 454 Special Topics in Materials Engineering
★3 *(fi 6)* (either term, 3-0-0). Physical and chemical principles underlying metallurgical topics of current interest such as composite materials, materials problems in energy conversion, electrofinishing, recycling, extraction of metals from fossil fuels, iron and steelmaking, and refractory-slag interactions.

MATE 455 Introduction to Stress Corrosion Cracking
★3 *(fi 6)* (either term, 3-0-0). The role of corrodents, stresses and microstructure in the phenomena of stress corrosion cracking; dissolution models and mechanical models proposed as mechanisms. Stress corrosion cracking of major systems. Evaluation and failure analysis of stress corrosion cracking. Prerequisite: MATE 345 or consent of Instructor.

MATE 456 Special Topics in Materials Processing
★3 *(fi 6)* (either term, 3-0-0). Studies of specific materials processing techniques which are of current interest. Prerequisite: MATE 452.

MATE 462 Introduction to Fracture of Materials
★3 *(fi 6)* (first term, 3-0-0). Fracture mechanisms in metals and non-metals. Sources of flaws. Linear elastic and elastic plastic fracture test methods and applications. Prerequisite: MATE 358 or consent of Instructor.

MATE 463 Introduction to Wear and Friction of Engineering Materials
★3 *(fi 6)* (either term, 3-0-0). The materials aspects of wear and tribology. Wear mechanisms, tribological behavior of materials, characterization techniques, wear protection. Prerequisite: MATE 358.

MATE 465 Materials Process Engineering Design II
★4 *(fi 6)* (second term, 1-0-6). Integration of materials process engineering practice, theory and economics into the design and evaluation of proposed capital projects. Prerequisites: MATE 365 and MATE 340. Corequisite: MATE 440.

MATE 467 Polymer Science and Engineering
★3.5 *(fi 6)* (either term or Spring/Summer, 3-1s-0). Introduction to polymer physical, mechanical and chemical properties, structure and behavior of polymers, polymer processing, fracture of polymers, fiber-polymer composites, polymer synthesis, polymer characterization, polymer solution and blend thermodynamics, crystallinity, fluid flow in melt processing. Prerequisites: MATE 252, CH E 312, STAT 235, CHEM 261, or consent of Instructor.

MATE 480 Ceramics
★3 *(fi 6)* (first term, 3-0-0). Structure, processing, characterization, properties and application of ceramic materials and glass. Ceramic raw materials. Crystal chemistry and physics. Glassy state. Crystal defects, nonstoichiometry, diffusion, phase diagrams. Powder preparation, ceramic fabrication. Characterization of ceramic powders and components. Thermal, mechanical and electrical properties. Traditional and recent applications. Not open to students with credit in MATE 380. Prerequisite: MATE 357 or consent of instructor.

MATE 481 Processing and Applications of Ceramics
★3 *(fi 6)* (either term, 3-0-0). Production of raw materials, ceramic powders, additives, forming operations, thick and thin films, sintering, finishing steps. Defects, mass and electrical transport, microstructure. Applications include space shuttle tiles, superconductors, cutting tools, integrated circuit component and substrates, turbine engines, high energy density batteries, sensors, fuel cells, lasers and composites. Prerequisite: MATE 480 or consent of Instructor.

MATE 489 Processing of Microalloyed Steels with Application to Pipeline Steel
★3 *(fi 6)* (either term, 3-0-0). Processing and metallurgy of microalloyed steels for pipelines. Steelmaking, casting, thermomechanical processing, pipe fabrication, mechanical and chemical properties and in service performance. Prerequisite: MATE 452.

MATE 533 Mineral Processing II
★2.8 *(fi 4)* (either term, 2-0-3/2). Chemical and mineralogical analyses of ores, metallurgical testing, process evaluation, flowsheet development and economic evaluation. Prerequisite: MATE 331.

Graduate Courses

MATE 601 Research Techniques in Materials Engineering
★3.5 *(fi 6)* (either term, 2-0-3). Statistical analysis, electron diffraction, crystal growth, diffuse scattering of x-rays, electron emission, high speed strain measurements, internal friction and radioactive tracers. Zone refining, high pressure and vacuum processes.

MATE 610 Welding Metallurgy
★3.8 *(fi 6)* (second term, 3-0-3/2). Heat flow. Effect of welding thermal cycles on weld joints. Weld metal solidification. Metallurgical changes during solidification. Heat-affected zones. Residual stresses and distortion. Ferrous alloy metallurgy. Nonferrous alloy metallurgy. Dissimilar metal joints. Metallurgy of brazing and soldering. Prerequisite: MATE 452 or equivalent. Credit cannot be obtained in this course if credit has already been obtained in MATE 410.

MATE 611 Welding Processes
★3.8 *(fi 6)* (first term, 3-0-3/2). Process classification and selection. Welding heat sources. Heat transfer, metal transfer, gas-metal and slag-metal reactions. Power source characteristics. Analysis of industrial arc welding processes. Cutting processes. Surfacing and metal spraying. Resistance welding. Solid phase bonding. Brazing and soldering. Welding of plastics. Adhesive bonding. Prerequisite: consent of Instructor. Credit cannot be obtained in this course if credit has already been obtained in MATE 411.

MATE 615 Quality Control of Weldments
★3.8 *(fi 6)* (either term, 3-0-3/2). Quality assurance schemes and audits; destructive and non-destructive testing methods; fabrication code requirements and fitness-for-purpose criteria; welding procedures; statistical methods; case studies. Prerequisites: MATE 610 and 611 or consent of Instructor.

MATE 630 Special Topics in Process Metallurgy
★3 *(fi 6)* (either term, 3-0-0). Topics of current interest related to process metallurgy, such as process analysis, mathematical modelling and simulation, metal extraction from secondary sources, iron and steel making, physical chemistry of molten systems and production of industrial minerals.

MATE 633 Surface Chemistry in Minerals and Materials Processing
★5 *(fi 6)* (either term, 3-1s-3). Fundamentals of surface and interfacial phenomena; physical chemistry of surfaces and interfaces; surface and interface energy and their origin; wetting, adhesion and surface forces in material processing; role and mechanisms of surfactant adsorption and self-assembly in materials engineering; techniques for surfacant adsorption and self-assembly in materials engineering; techniques for surface characterization. The course includes an experimental research project of 3 hours per week. Credit cannot be obtained in this course if credit has already been obtained in MATE 433.

MATE 640 Special Topics in Metallurgical Thermodynamics and Kinetics
★3 *(fi 6)* (either term, 3-0-0). Heterogeneous reactions involving mass transport by diffusion or vapour phase chemical reactions, solid state reactions and formation of non-equilibrium phases. Other subjects of current interest. Prerequisite: MET E 340 or consent of Instructor.

MATE 645 Electrochemical Processes
★3 *(fi 6)* (either term, 3-0-0). Aqueous, molten and solid electrolytes: thermodynamics, structure, transport properties. Applications of conductivity measurements. Electrodes: types, reactions, potential. Electrochemical cells. Applications of EMF measurements. Electrical double layer, electrode kinetics, overpotential. Chlor-alkali industry, electrometallurgy, electrolysis of water, electroplating. Electrochemical energy conversion: primary and secondary batteries, fuel cells. High temperature applications. Prerequisite: MATE 430 or consent of Instructor.

MATE 651 High-Temperature Oxidation
★3 *(fi 6)* (either term, 3-0-0). Lattice defects and diffusion in crystals. Theories of metal oxidation mechanisms. Mechanisms of alloy oxidation. Oxidation by gases other than oxygen. Experimental research methods. Protection of metal surfaces from oxidation. Prerequisite: MATE 345 or consent of Instructor.

MATE 652 Soil Corrosion and its Prevention
★3 *(fi 6)* (either term, 3-0-0). The chemical and physical character of soils; soil surveys and tests; estimation of corrosivity. Types of corrosion, including microbial corrosion, stray currents, stress corrosion. Detecting corrosion with potential measurements, line current, and earth current measurements. Methods of reducing corrosion. Cathodic protection principles, design, testing and measurement. Cathodic equipment and problems. Corrosion control management and economics. Prerequisite: MATE 345 or consent of Instructor.

MATE 653 Stress Corrosion Cracking
★3 *(fi 6)* (either term, 3-0-0). The role of corrodents, stresses and microstructure in the phenomena of stress corrosion cracking; dissolution models and mechanical models proposed as mechanisms. Stress corrosion of high-strength steels, stainless steels and the principal nonferrous metals. Stress corrosion testing and methods of preventing stress corrosion cracking. Prerequisite: MATE 345 or consent of Instructor. Credit cannot be obtained in this course if credit has already been obtained in MATE 455.

MATE 654 Electrochemical Theory of Corrosion
★3 *(fi 6)* (either term, 3-0-0). Principles and applications of electrochemical corrosion theory in basic and applied research. Equilibrium thermodynamics and electrode kinetics. Passivation and breakdown of passivity. The study of galvanic corrosion; alloy evaluation. Corrosion testing methods and electrochemical measurement of corrosion rates. Prerequisite: MATE 345 or consent of Instructor.

MATE 660 Materials Engineering Applications of X-rays
★3 *(fi 6)* (either term, 3-0-0). Production and detection of x-rays; x-ray fluorescence spectroscopy; electron probe microanalysis; interaction of x-rays with crystals; reciprocal lattice construction; single crystal diffraction patterns; powder diffractometry and measurement of preferred orientations, stress, particle size, etc.; x-ray absorption microscopy; x-ray diffraction microscopy. Prerequisite: MATE 357 or consent of Instructor.

MATE 662 Fracture of Materials
★3 *(fi 6)* (either term, 3-0-0). Theoretical strength of solids, Griffith crack theory, mechanisms of brittle and ductile fracture, the ductile to brittle transition, fatigue and creep fracture, environmental effects on fracture. Prerequisites: MATE 358 or consent of Instructor. Credit cannot be obtained in this course if credit has already been obtained in MATE 462.

MATE 663 Wear and Protection of Engineering Materials
★4.5 *(fi 6)* (either term, 3-0-3). The materials aspects of wear and tribology. Wear mechanisms, tribology behavior of materials, characterization techniques, wear protection. Prerequisite: MATE 358 or consent of Instructor. Not open to students with credit in MATE 463.

MATE 664 Diffusion and Diffusion-Controlled Processes in Metallurgy and Materials
★3 *(fi 6)* (either term, 3-0-0). Fundamentals of diffusion, diffusion in dilute alloys, diffusion in a concentration gradient, diffusion in non-metals, high diffusivity paths, thermal diffusion. Applications to materials: sintering, superplasticity, creep, metal oxides and non-stoichiometry.

MATE 665 Materials Applications of Transmission Electron Microscopy
★4.5 *(fi 6)* (either term, 3-0-3). Principles and design of the transmission electron microscope, specimen preparation, electron diffraction, image contrast theory, introduction to analytical electron microscopy. Applications to defects in metallic and non-metallic crystalline materials. Prerequisite: MATE 358 or consent of Instructor.

MATE 666 Materials Applications of Scanning Electron Microscopy
★3 *(fi 6)* (either term, 3-0-0). Principles and design of the scanning electron microscope, electron beam-specimen interactions, image formation, x-ray microanalysis in the scanning electron microscope, specimen preparation, application to materials analysis. Prerequisite: MATE 358 or consent of Instructor.

MATE 668 Colloidal Ceramics Processing
★3 *(fi 6)* (first term, 3-0-0). Principles and application of colloidal materials to the fabrication of advanced ceramics. Synthesis of fine powders, sols and gels; study of their properties, phase transformation and sintering behavior during heat treatment. Colloidal ceramics composites. Prerequisite: MATE 380 or consent of Instructor.

MATE 676 Special Topics in Physical Metallurgy
★3 *(fi 6)* (either term, 3-0-0). Subjects of current interest such as kinetics of heterogeneous nucleation and phase transformations in solids, grain boundary phenomena, internal friction, physics and chemistry of friction and wear.

MATE 680 Advanced Ceramics
★3 *(fi 6)* (either term, 3-0-0). Important ceramic materials and products, processing, typical properties. Structure: binary and ternary compounds, crystalline silicates, glass. Point defects, nonstoichiometry, defect reactions, dislocations. Diffusion, electrochemical transport, examples. Thermal and mechanical properties, thermal shock resistance, electrical conduction. Applications: solid electrolytes, energy conversion systems, refractories, electronics. Prerequisites: MATE 332 and 357 or consent of Instructor. Credit cannot be obtained in this course if credit has already been obtained in MATE 481.

MATE 682 Graduate Seminar
★1 *(fi 2)* (variable, 1-0-0). Discussion of progress and problems in research under way in the metallurgical area. Graduate students are required to attend and to give a seminar related to their research.

MATE 689 Advanced Processing of Microalloyed Steels
★3.5 *(fi 6)* (either term, 3-1s-0). Advanced processing and metallurgy of microalloyed steels for pipelines. Steelmaking, casting, microstructural development during thermomechanical processing, pipe fabrication, mechanical and chemical properties and in service performance. Prerequisites: MATE 452 or the consent of Instructor. Not open to students with credit in MATE 489.

MATE 738 Process Metallurgy
★3 *(fi 6)* (either term, 3-0-0).

MATE 778 Physical Metallurgy
★3 *(fi 6)* (either term, 3-0-0).

MATE 900 Directed Research
★6 *(fi 12)* (variable, unassigned). An engineering project for students registered in a Master of Engineering program.

201.135 Mathematical Physics, MA PH

Departments of Mathematical and Statistical Sciences, and Physics
Faculty of Science

Undergraduate Courses

Note: Permission to enrol in any mathematical physics course will not normally be granted unless the stated prerequisites have been met. However, students may enrol in a mathematical physics course if their department and the course instructor agree that their background and academic standing warrant the waiver of the stated prerequisites.

O MA PH 343 Classical Mechanics I
★3 *(fi 6)* (first term, 3-0-0). Principles of mechanics; non-inertial frames; Lagrange's equations and Hamilton's principle; dynamics of oscillating systems; rigid body kinematics and dynamics; Hamiltonian methods and canonical transformations. Prerequisite: PHYS 244. Corequisite: MATH 215 or 317.

O MA PH 451 Mathematical Methods of Physics I
★3 *(fi 6)* (first term, 3-0-0). Application to problems in physics of method of steepest descent, Fourier and Laplace transforms; boundary-value problems, integral equations, and Green's functions. Prerequisites: PHYS 372 and 381. Corequisite: PHYS 481.

O MA PH 453 Mathematical Methods of Physics II
★3 *(fi 6)* (second term, 3-0-0). Group representation theory and applications to problems in physics; spectral theory for matrices; application to the theory of resolvents and their relation to Green's functions; calculus of variations; integral representations of special functions. Prerequisite: MA PH 451.

O MA PH 467 Mechanics of Deformable Media
★3 *(fi 6)* (second term, 3-0-0). Stress and strain in continuous media; elasticity; mechanics of fluid flow in two dimensions using complex variables; three dimensional fluid flow using Eulerian and Lagrangian reference frames; thermodynamics and mechanics of compressible and viscous flows; onset of turbulence, convection, and instability. Examples from geophysics, oceanography, and atmospheric physics. Prerequisites: PHYS 211, MATH 334, MA PH 343, and MATH 411 or 311.

O MA PH 468 Introduction to Relativity
★3 *(fi 6)* (second term, 3-0-0). Special relativity; principle of equivalence; Einstein field equations; stationary and static fields; Schwarzschild metric, experimental tests; black holes; linearized equations; gravitational collapse; cosmology. Prerequisite: PHYS 351 or MATH 446 or equivalent.

201.136 Mathematics, MATH

Department of Mathematical and Statistical Sciences
Faculty of Science

Notes
(1) MATH 100, 101, 102, 201, 209, 300, 309 are open to Engineering students only.
(2) See Mathematical Physics (MA PH) listing for courses offered jointly by the Department of Physics and the Department of Mathematical and Statistical Sciences.
(3) See also Mathematical Physics (MA PH) listing.

Undergraduate Courses

MATH 100 Calculus I
★4 *(fi 6)* (either term, 3-0-2). Review of numbers, inequalities, functions, analytic geometry; limits, continuity; derivatives and applications, Taylor polynomials; log, exp, and inverse trig functions. Integration, fundamental theorem of calculus substitution, trapezoidal and Simpson's rules. Prerequisites: Pure Mathematics 30 or equivalent, and Mathematics 31. Notes: (1) This course may not be taken for credit if credit has already been obtained in MATH 113, 114, or 117. (2) Students in all sections of this course will write a common final examination. (3) Restricted to Engineering students. Non-Engineering students who take this course will receive ★3.0.

MATH 101 Calculus II
★3.5 *(fi 6)* (either term, 3-0-1). Area between curves, techniques of integration. Applications of integration to planar areas and lengths, volumes and masses. First order ordinary differential equations: separable, linear, direction fields, Euler's method, applications. Infinite series, power series, Taylor expansions with remainder terms. Polar coordinates. Rectangular, spherical and cylindrical coordinates in 3-dimensional space. Parametric curves in the plane and space: graphing, arc length, curvature; normal, binomial, tangent plane in 3-dimensional space. Volumes and surface areas of rotation. Prerequisite: MATH 100. Notes: (1) This course may not be taken for credit if credit has already been obtained in either MATH 115 or 118. (2) Students in all sections of this course will write a common final examination. (3) Restricted to Engineering students. Non-Engineering students who take this course will receive ★3.0.

MATH 102 Applied Linear Algebra
★3.5 *(fi 6)* (either term, 3-0-1). Vectors and matrices, solution of linear equations, equations of lines and planes, determinants, matrix algebra, orthogonality and applications (Gram-Schmidt), eigenvalues and eigenvectors and applications, complex numbers. Prerequisite or corequisite MATH 100. Notes: (1) This course may not be taken for credit if credit has already been obtained in MATH 120 or 125 or 127. (2) Students in all sections of this course will write a common final examination. (3) Restricted to Engineering students. Non-Engineering students who take this course will receive ★3.0.

O MATH 113 Elementary Calculus I
★3 *(fi 6)* (either term, 3-0-1). Review of analytic geometry. Differentiation and integration of simple functions. Applications. Prerequisite: Pure Mathematics 30 or equivalent. Students who have taken Mathematics 31 are advised to take MATH 114. This course may not be taken for credit if credit has already been obtained in MATH 100, 114 or 117.

O MATH 114 Elementary Calculus I
★3 *(fi 6)* (either term, 3-0-0). The course description is the same as for MATH 113. Prerequisites: Pure Mathematics 30, Mathematics 31 or equivalent. This course may not be taken for credit if credit has been obtained in MATH 100, 113 or 117.

O MATH 115 Elementary Calculus II
★3 *(fi 6)* (either term, 3-0-0). Differentiation and integration of trigonometric, exponential and logarithmic functions. Indeterminate forms and improper integrals. Techniques of integration. Application. Prerequisite: MATH 113 or 114, or equivalent. Note: This course may not be taken for credit if credit has already been obtained in either of MATH 101 or 118.

O MATH 117 Honors Calculus I
★3 *(fi 6)* (first term, 4-0-0). Functions, continuity, and the derivative. Applications of the derivative. Integration and the Fundamental Theorem. Prerequisite: Pure Mathematics 30 and 31 or their equivalents. Notes: This course is designed for students with at least a 75 percent grade in Pure Mathematics 30. Other students may be admitted with the consent of the Department. This course may not be taken for credit if credit has already been obtained in any of MATH 100, 113, or 114.

O MATH 118 Honors Calculus II
★3 *(fi 6)* (second term, 4-0-0). Techniques and applications of integration. Derivatives and integrals of the exponential, and trigonometric functions. Extended limits and l'Hospital's rule. Introduction to infinite series. Introduction to partial derivatives. Prerequisite: MATH 117 or its equivalent. Students with MATH 113 or 114 will be admitted with the consent of Department. Note: This course may not be taken for credit if credit has already been obtained in MATH 101 or 115.

O MATH 120 Basic Linear Algebra I
★3 *(fi 6)* (either term, 3-0-0). Systems of linear equations. Vectors in n-space, vector equations of lines and planes. Matrix algebra, inverses and invertibility. Introduction to linear transformations. Subspaces of n-space. Determinants. Introduction to eigenvalues and eigenvectors. The dot product and orthogonality. Applications in a variety of fields, numerical methods. Prerequisite: Pure Mathematics 30. Notes: (1) See also course description for MATH 125. (2) This course cannot be taken for credit if credit has already been obtained in any of MATH 102, 125 or 127. (3) Students planning to transfer into Engineering should take MATH 125 rather than MATH 120.

O MATH 125 Linear Algebra I
★3 *(fi 6)* (either term, 3-0-0). Systems of linear equations. Vectors in n-space, vector equations of lines and planes. Matrix algebra, inverses and invertibility. Introduction to linear transformations. Subspaces of n-space. Determinants. Introduction to eigenvalues and eigenvectors. The dot product and orthogonality. Applications in a variety of fields, numerical methods. Prerequisites: Pure Mathematics 30. Notes: (1) This course is an enriched version of the basic linear algebra course MATH 120. It covers the same basic topics as MATH 120. However, some of these basic topics will be covered in more depth than in MATH 120. Also the instructor will discuss some additional applications and/or discuss some of the applications in more depth. MATH 125 is recommended for all students who did well in Pure Mathematics 30 and all students who did well in Mathematics 31. It is also recommended for students who plan to take further courses in algebra. (2) This course cannot be taken for credit if credit has already been obtained in MATH 102, 120 or 127.

O MATH 153 Mathematics of Finance I
★3 *(fi 6)* (either term, 3-0-0). Simple and compound interest, simple and general annuities certain; variable annuities and perpetuities, amortization schedules, sinking funds, applications. Prerequisite: Pure Mathematics 30. Note: This course may not be taken for credit if credit has already been obtained in MATH 253.

L MATH 160 Higher Arithmetic
★3 *(fi 6)* (either term, 3-0-0). Elementary Number Theory, Numeration Systems, Number Systems and Elementary Probability Theory. Math Fair. Prerequisite: Pure Mathematics 30 or consent of Department. Note: This course is restricted to Elementary Education students.

MATH 164 Higher Algebra
★3 *(fi 6)* (either term, 3-0-0). Polynomial functions, factorization, theory of equations, inequalities, convexity and concavity, extremal problems, additional topics. Restricted to students in Open Studies as part of the EPSB Teacher Upgrade Program.

MATH 201 Differential Equations
★3.5 *(fi 6)* (either term or Spring/Summer, 3-0-1). First-order equations; second-order linear equations: reduction of order, variation of parameters; Laplace transform; linear systems; power series; solution by series; separation of variables for PDEs. Prerequisite or corequisite: MATH 209 or 214. Notes: (1) Open only to Engineering students and Science students in the following programs: Specialization Physics, Specialization Geophysics or Specialization Computing Science. (2) This course may not be taken for credit if credit has already been obtained in any of MATH 205, 334, or 336. (3) Students in all sections of this course will write a common final examination. Non-Engineering students who take this course will receive ★3.0.

MATH 209 Calculus III
★3.5 *(fi 6)* (either term, 3-0-1). Partial differentiation, derivatives of integrals. Multiple integration using rectangular, cylindrical, and spherical coordinates. Vector Field Theory. Prerequisite: MATH 101. Prerequisite or corequisite: MATH 102. Notes: (1) Students in all sections of this course will write a common final examination. (2) Restricted to Engineering students. Non-Engineering students who take this course will receive ★3.0.

O MATH 214 Intermediate Calculus I
★3 *(fi 6)* (either term, 3-0-0). Infinite Series. Plane curves and polar coordinates. Three dimensional analytic geometry. Partial derivatives. This course may not be taken for credit if credit has already been obtained in MATH 209 or MATH 217. Prerequisite: MATH 115 or equivalent.

O MATH 215 Intermediate Calculus II
★3 *(fi 6)* (second term, 3-0-0). First order and second order linear differential equations with constant coefficients. Curves, tangent vectors, arc length, integration in two and three dimensions, polar cylindrical and spherical coordinates, line and surface integrals. Green's divergence and Stokes' theorems. Note: This course may not be taken for credit if credit has already been obtained in MATH 209 or 317. Prerequisite: MATH 214 or equivalent.

O MATH 217 Honors Advanced Calculus I
★3 *(fi 6)* (first term, 4-0-0). Axiomatic development of the real number system. Topology of Rn. Sequences, limits and continuity. Multi-variable calculus: differentiation and integration, including integration in spherical and polar coordinates. The differential and the chain rule. Taylor's Formula, maxima and minima. Introduction to vector field theory. Prerequisites: MATH 118 (or MATH 115 with consent of Department) and MATH 120 or 125 or any linear algebra course.

O MATH 222 Introduction to Discrete Mathematics
★3 *(fi 6)* (either term, 3-0-0). A problem-solving approach to discrete mathematics, covering secret codes, public-key codes, error-correcting codes, enumeration, recurrence relations, induction, graph theory, graph algorithms and parallel algorithms. Prerequisite: Any 100-level mathematics course, MATH 120 or 125 recommended.

O MATH 225 Linear Algebra II
★3 *(fi 6)* (either term, 3-0-0). Vector spaces. Inner product spaces. Examples of n-space and the space of continuous functions. Gram-Schmidt process, QR-factorization of a matrix and least squares. Linear transformations, change of

basis, similarity and diagonalization. Orthogonal diagonalization, quadratic forms. Applications in a variety of fields, numerical methods. Prerequisite: MATH 120 or 125 or any linear algebra course, Mathematics 31 or any calculus course. Note: This course cannot be taken for credit if credit has already been obtained in MATH 121 or 227.

O MATH 228 Algebra: Introduction to Ring Theory
★3 *(fi 6)* (either term, 3-0-0). Integers. Mathematical induction. Equivalence relations. Commutative rings, including the integers mod n, complex numbers and polynomials. The Chinese remainder theorem. Fields and integral domains. Euclidean domains, principal ideal domains and unique factorization. Quotient rings and homomorphisms. Construction of finite fields. Applications such as public domain encryption, Latin squares and designs, polynomial error detecting codes, and/or addition and multiplication of large integers. Prerequisite: MATH 120 or 125 or any linear algebra course. Note: This course cannot be taken for credit if credit has already been obtained in MATH 128 or 223.

O MATH 229 Algebra: Introduction to Group Theory
★3 *(fi 6)* (either term, 3-0-0). Groups as a measure of symmetry. Groups of rigid motions. Frieze groups, and finite groups in 2 and 3 dimensions. Groups of matrices. Group actions with application to counting problems. Permutation groups. Subgroups, cosets, and Lagrange's Theorem. Quotient groups and homomorphisms. Prerequisite: MATH 120 or 125 or any linear algebra course.

O MATH 241 Geometry
★3 *(fi 6)* (first term, 3-0-0). Basic Euclidean geometry, congruence, parallelism, area, and similarity. Sound axiomatic development with emphasis on problem solving. Constructions and loci, inequalities, maxima and minima, circles, isometries, and additional topics. Prerequisites: Any 100-level Mathematics course.

O MATH 243 Transformation Geometry
★3 *(fi 6)* (second term, 3-0-0). Transformation geometry, isometry and homothety, applications in Euclidean geometry; the algebra of transformations, the Classification Theorem, frieze patterns and wall-paper groups. Prerequisite: MATH 241

O MATH 253 Theory of Interest
★3 *(fi 6)* (first term, 3-0-0). Accumulation and amount functions. Effective, simple, compound rates. Force of interest. Discount. Annuities certain, simple and general. Perpetuities. Amortization schedules and sinking funds. Bonds and other securities. Applications: valuation of securities, instalment loans, depreciation, depletion, capitalized cost. Prerequisite: MATH 115 or equivalent.

L MATH 260 Topics in Mathematics
★3 *(fi 6)* (second term, 3-0-0). Problem solving in different areas of mathematics. Note: This course is intended for Education students and is not open to Science students. Prerequisite: MATH 160 or teaching experience at the elementary or junior high school level.

MATH 300 Advanced Boundary Value Problems I
★3 *(fi 6)* (either term, 3-0-0). Derivation of the classical partial differential equations of applied mathematics, solutions using separation of variables. Fourier expansions and their applications to boundary value problems. Introduction to Fourier Transform. Emphasis on building an appropriate mathematical model from a physical problem, solving the mathematical problem, and carefully interpreting the mathematical results in the context of the original physical problem. Prerequisites: MATH 201 and 209 or equivalents. Notes: (1) Open only to students in Engineering, Specialization Computing Science, Specialization Physics, and Specialization Geophysics. (2) This course may not be taken for credit if credit has already been obtained in MATH 337.

O MATH 309 Mathematical Methods for Electrical Engineers
★3 *(fi 6)* (second term, 3-0-0). Complex numbers, analytic functions, Cauchy-Riemann equation, Cauchy Theorem, power series and Laurent expansions, residues, inverse Laplace transform. Complex inner product spaces, orthogonal expansions, Gram-Schmidt orthogonalization completeness, Fourier expansions applied signals, Parseval's relation and Bessel's inequality. Prerequisite MATH 209. This course may not be taken for credit if credit has already been obtained in MATH 311 or 411.

O MATH 311 Theory of Functions of a Complex Variable
★3 *(fi 6)* (either term, 3-0-0). Complex numbers. Complex series. Functions of a complex variable. Cauchy's theorem and contour integration. Residue Theorem and its applications. Introduction to Fourier integrals and the Heisenberg inequality. Prerequisite or corequisite: MATH 209 or 215.

O MATH 314 Analysis I
★3 *(fi 6)* (first term, 3-0-0). Construction of real numbers, Heine-Borel and related theorems, differentiation and Riemann integral of functions, topological concepts in metric spaces, sequences, continuous maps, contraction maps, and applications. Prerequisite: MATH 209 or 215 or equivalent.

O MATH 317 Honors Advanced Calculus II
★3 *(fi 6)* (second term, 4-0-0). Implicit function theorem. Transformations of multiple integrals. Line integrals, theorems of Green, Gauss and Stokes. Sequences and series of functions. Uniform convergence. Prerequisite: MATH 217.

O MATH 322 Graph Theory
★3 *(fi 6)* (first term, 3-0-0). Graphs, paths and cycles, trees, planarity and duality, coloring problems, digraphs, matching problems, matroid theory. Prerequisite: MATH 120 or 125 or equivalent and any 200-level MATH course. MATH 222 recommended.

O MATH 324 Elementary Number Theory
★3 *(fi 6)* (first term, 3-0-0). Divisibility, prime numbers, congruences, quadratic residues, quadratic reciprocity, arithmetic functions and diophantine equations; sums of squares. Prerequisites: MATH 228 (or 128 or 223).

O MATH 325 Algebra: Vector Spaces and Modules
★3 *(fi 6)* (second term, 3-0-0). Abstract vector spaces. Modules over a principal ideal domain. Finitely generated abelian groups. Linear transformations, the Jordan canonical form and the rational canonical form. Application to matrix powers, discrete system evolution, matrix exponentials and differential equations. Prerequisites: MATH 225 (or 121 or 227) and 228 (or 128 or 223). Notes: (1) This course cannot be taken for credit if credit has already been obtained in MATH 427. (2) This course will be offered starting in 2000/2001.

O MATH 329 Algebra: Groups and Fields
★3 *(fi 6)* (first term, 3-0-0). Field extensions. Groups of automorphisms of fields. Galois theory. Finite fields and applications. Solvable groups, the insolvability of the quintic equation. Ruler and compass construction. Prerequisite: MATH 228 (or 128 or 223) and 229 (or 128). MATH 225 recommended. Notes: (1) This course cannot be taken for credit if credit has already been obtained in MATH 427. (2) This course will be offered starting in 2000/2001.

O MATH 334 Introduction to Differential Equations
★3 *(fi 6)* (either term, 3-0-0). First order equations, linear equations of higher order. Power series solution. Laplace transform methods. Introduction to special functions. Introduction to linear systems. Prerequisite: MATH 120 or 125 or equivalent. Corequisite: MATH 215 or 317. Note: This course may not be taken for credit if credit has already been obtained in MATH 201 or 336.

O MATH 336 Honors Differential Equations
★3 *(fi 6)* (second term, 3-0-0). First order equations, second order equations. Systems of first order equations with constant coefficients, matrix differential equations, fundamental solutions, stability. Series solutions with a brief introduction to separation of variables, application to boundary value problems of mathematical physics. Elementary special functions. Elementary transform techniques. Prerequisite: MATH 118, MATH 217 or 214, MATH 225 (or 121 or 227). Note: This course may not be taken for credit if credit has already been obtained in either of MATH 201 or 334.

O MATH 337 Introduction to Partial Differential Equations
★3 *(fi 6)* (second term, 3-0-0). Boundary value problems of classical Math Physics, orthogonal expansions, classical special functions. Advanced transform techniques. Note: This course may not be taken for credit if credit has already been obtained in either MATH 300 or equivalent. Prerequisite: MATH 334 or 336.

O MATH 341 Geometry of Convex Sets
★3 *(fi 6)* (first term, 3-0-0). Combinatorial geometry and topology, convex sets, sets with constant width, Helly-type problems, extremal problems. Prerequisite: MATH 120 or 125 or equivalent, MATH 222 or MATH 241.

O MATH 343 Projective and Inversive Geometries
★3 *(fi 6)* (second term, 3-0-0). Projective geometry, Poncelet-Steiner constructions, inverse geometry, Mohr-Mascheroni constructions, Principle of Duality, conic sections. Prerequisite: MATH 243.

O MATH 347 Set Theory
★3 *(fi 6)* (first term, 3-0-0). Axioms for set theory, transfinite induction, cardinal and ordinal numbers, applications. Primarily intended for third and fourth year students with a good background in mathematics. Prerequisite: Any 200-level Mathematics course.

O MATH 353 Annuities and Life Insurance
★3 *(fi 6)* (second term, 3-0-0). Time at death random variables, continuous and discrete insurances, endowments and varying annuities, net premiums and reserves. Prerequisites: MATH 215, 253 and STAT 265.

O MATH 354 Actuarial Mathematics
★3 *(fi 6)* (first term, 3-0-0). Multiple life functions, multiple decrement models, frequency and severity models, credibility theory. Prerequisite: MATH 353. May be offered in alternate years.

O MATH 372 Mathematical Modelling I
★3 *(fi 6)* (either term, 3-0-0). This course is designed to develop the students' problem-solving abilities along heuristic lines and to illustrate the processes of Applied Mathematics. Students will be encouraged to recognize and formulate problems in mathematical terms, solve the resulting mathematical problems and interpret the solution in real world terms. Typical problems considered include nonlinear programming, optimization problems, diffusion models. Prerequisite: MATH 120 or 125 or equivalent; MATH 215.

O MATH 373 Mathematical Programming and Optimization I
★3 *(fi 6)* (first term, 3-0-0). Introduction to optimization. Problem formulation. Linear programming. The simplex method and its variants (revised Simplex method,

dual simplex method). Extreme points of polyhedral sets. Theory of linear inequalities (Farkas Lemma). Complementary slackness and duality. Post-optimality analysis. Interior point methods. Applications (elementary games, transportation problems, networks, etc.). Pre- or corequisites: MATH 120 or 125 or equivalent; any 200-level MATH course.

O MATH 374 Mathematical Programming and Optimization II
★3 *(fi 6)* (second term, 3-0-0). Maximizing and minimizing functions of several variables (with or without constraints). Optimality conditions (necessary, sufficient, Karush-Kuhn-Tucker conditions). Iterative methods for unconstrained optimization. Penalty methods for constrained optimization. Trust region methods. Convex sets, convex functions, convex programming and dual convex programs. Dynamic programming. Applications. Prerequisites: MATH 215 or 217 or and MATH 373.

O MATH 381 Numerical Methods I
★3 *(fi 6)* (first term, 3-0-1). Approximation of functions by Taylor series, Newton's formulae, Lagrange and Hermite interpolation. Splines. Orthogonal polynomials and least-squares approximation of functions. Direct and iterative methods for solving linear systems. Methods for solving non-linear equations and systems of non-linear equations. Introduction to computer programming. Prerequisite: MATH 214 or equivalent, MATH 120, 125 or equivalent. Note: Credit cannot be obtained for both MATH 381 and any of MATH 280, CMPUT 319, 340 or 358.

MATH 400 Industrial Internship Practicum
★3 *(fi 6)* (first term, 0-3s-0). Required by all students who have just completed a Mathematical Sciences Industrial Internship Program. Must be completed during the first academic term following return to full-time studies. Note: A grade of 1 to 9 will be determined by the student's job performance as evaluated by the employer, by the student's performance in the completion of an internship practicum report, and by the student's ability to learn from the experience of the Internship as demonstrated in an oral presentation. Prerequisite: WKEXP 953.

O MATH 409 History of Mathematics
★3 *(fi 6)* (second term, 3-0-0). Topics or trends, as selected by the instructor, in ancient (including all cultures), classical, or modern mathematics will be covered from a historical point of view. Prerequisite: MATH 314 or MATH 217.

O MATH 411 Honors Complex Variable I
★3 *(fi 6)* (first term, 3-0-0). Complex number system. Analytic functions. Single- and multi-valued functions, Cauchy's theorem and formula. Applications including the maximum modulus principle, Taylor's theorem and Laurent expansion. Harmonic functions. Dirichlet problem for the disk. Series of analytic functions. Calculus of residues. Idea of Analytic Continuation. Note: This course is primarily for Honors students in Mathematics or Physics. Offered in alternate years. It may be offered in intervening years if demand is sufficient. Prerequisite: MATH 314 or 317.

O MATH 414 Analysis II
★3 *(fi 6)* (second term, 3-0-0). Differentiation of maps in Rn, implicit function and mapping theorems, sequences of functions, Riemann-Stielties integration, additional topics at the discretion of the instructor. Prerequisite: MATH 314.

O MATH 417 Honors Real Variables I
★3 *(fi 6)* (first term, 3-0-0). Elements of set theory, cardinality, brief construction of real numbers. Lebesgue measure and Lebesgue integral on the line. Differentiability, Riemann-Stieltjes integral and functions of bounded variation. Prerequisite: MATH 317 or equivalent.

O MATH 418 Honors Real Variables II
★3 *(fi 6)* (second term, 3-0-0). Differentiation and integration. Elementary metric space theory. Banach space. Hilbert space. Baire Category. Lp spaces. Trigonometric series. Prerequisite: MATH 417.

O MATH 421 Combinatorics
★3 *(fi 6)* (second term, 3-0-0). Permutations and combinations, Binomial Theorem, Principle of Inclusion-Exclusion, recurrence relations, generating functions, orthogonal Latin squares, balanced incomplete block designs, Steiner triple systems, perfect difference sets, Boolean algebra and Finite State Machines. Prerequisites: MATH 228 (or 223 or 128); any 300-level MATH course, MATH 322 recommended.

O MATH 422 Coding Theory
★3 *(fi 6)* (second term, 3-0-0). Elements of group theory, cosets, Lagrange's theorem, binary group codes, polynomials, finite field theory, error correcting codes. Prerequisites: MATH 228 (or 223, or 128), any 300-level MATH course.

O MATH 428 Algebra: Advanced Ring Theory
★3 *(fi 6)* (second term, 3-0-0). Topics in ring theory selected by the Instructor. The topics will be chosen to illustrate the use of ring theory in another area of mathematics such as the theory of numbers, algebraic geometry, representations of groups or computational algebra. Note: This course will normally be offered in alternate years beginning in 2000/2001. Prerequisite: MATH 352 (or 427) or consent of Department.

O MATH 429 Algebra: Advanced Group Theory
★3 *(fi 6)* (second term, 3-0-0). The Sylow theorems, p-groups. Groups of small order. Simple groups and composition series. Additional topics in group theory. Note This course will normally be offered in alternate years beginning in 2001/2002. Prerequisite: MATH 329 or consent of Department.

O MATH 432 Intermediate Differential Equations
★3 *(fi 6)* (second term, 3-0-0). Elementary existence and uniqueness theorems. Systems of equations, stability, perturbation theory. Introduction to numerical methods. Introduction to phase plane analysis. Prerequisite: MATH 334 or 336.

O MATH 436 Intermediate Partial Differential Equations I
★3 *(fi 6)* (first term, 3-0-0). Introduction to partial differential equations as physical models. Linear and quasilinear first-order equations. Classification of second order linear equations and reduction to canonical form. Characteristic surfaces and curves and shock formation. Formulation of initial and boundary-value problems. Stability theory and well-posedness. Introduction to spectral theory for positive self-adjoint operators on bounded domains. Finite Fourier Transforms. Duhamel's Principle. Eigenfunction expansions for nonlinear stability theory. Prerequisite: MATH 337.

O MATH 438 Intermediate Partial Differential Equations II
★3 *(fi 6)* (second term, 3-0-0). Introduction to transforms; Fourier, Hankel, Laplace; asymptotic approximation of Fourier Integrals; applications to discontinuous solutions of the wave equation, point sources, fundamental solutions, Green's Functions, with an introduction to generalized functions. Eigenfunction expansions and applications. Difference equations. Prerequisite: MATH 436.

O MATH 446 Tensor Analysis
★3 *(fi 6)* (first term, 3-0-0). Algebra of tensors, covariant differentiation in flat space, affine geometry, Riemannian geometry, Lie differentiation, subspaces, differential forms. Prerequisites: MATH 225 (or 227); MATH 217.

O MATH 447 Elementary Topology
★3 *(fi 6)* (second term, 3-0-0). Set Theory, metric spaces and general topology. Compactness, connectedness. Urysohn's Lemma and Tietze's Theorem. Baire Category Theorem. The Tychonoff Theorem. Homotopy and covering spaces. Primarily intended for third and fourth year students with a good background in Mathematics. Prerequisite: MATH 347 (or 217 and any 300-level MATH course). Offered in alternate years. It may be offered in intervening years if demand is sufficient.

O MATH 448 Elementary Differential Geometry I
★3 *(fi 6)* (first term, 3-0-0). Local and global geometry of curves in 3-space; surfaces in 3-space: quadrics, surfaces of revolution, ruled surfaces, minimal surfaces, Gaussian curvature, theorema egregium, geodesics, complete surfaces, Gauss-Bonnet Theorem. Prerequisites: MATH 225 (or 121 or 227); MATH 217; any 300-level MATH course. Offered in alternate years. It may be offered in intervening years if demand is sufficient.

O MATH 472 Mathematical Modelling II
★3 *(fi 6)* (second term, 3-0-0). This course is a continuation of MATH 372, but with more emphasis on individual student projects (a term paper may be required) decided in consultation with the instructor and consideration of a student's present interest and mathematical/scientific background. Prerequisite: MATH 372.

O MATH 481 Numerical Methods II
★3 *(fi 6)* (second term, 3-0-1). Numerical differentiation and integration. Numerical solution of initial value problems for systems of ordinary differential equations. Numerical solution of boundary value problems for ordinary and partial differential equations. Weighted residual methods and introduction to the finite element method. Prerequisite: MATH 381. Corequisite: MATH 334. Credit cannot be obtained for both MATH 481 and any of MATH 380 or 486.

O MATH 486 Numerical Analysis
★3 *(fi 6)* (first term, 3-0-0). Selection of topics will be at the instructor's option in consultation with the students, and may be chosen from the following: nonlinear equations, direct and iterative methods for linear systems, eigenvalue problems, approximating functions, differentiation and integration, and numerical solutions of differential equations. Prerequisites: MATH 225 (or 227); MATH 317; an introductory course in Computing Science.

O MATH 496 Honors Seminar
★3 *(fi 6)* (second term, 3-0-0). This course is intended to give students experience with independent reading, and to improve their ability to present and explain mathematical ideas. The course is compulsory for all fourth year Honors students in BSc and BA Mathematics and BSc Applied Mathematics. Prerequisite: MATH 317.

O MATH 497 Reading in Mathematics
★3 *(fi 6)* (either term, 3-0-0). This course is designed to give credit to mature and able students for reading in areas not covered by courses, under the supervision of a staff member. A student, or group of students, wishing to use this course should find a staff member willing to supervise the proposed reading program. A detailed description of the material to be covered should be submitted to the Chair of the Department Honors Committee. (This should include a description of testing methods to be used.) The program will require the approval of both the Honors Committee, and the Chair of the Department. The students' mastery of the material of the course will be tested by a written or oral examination. This course may be taken in Fall or Winter and may be taken any number of times, subject always to the approval mentioned above. Prerequisite: Any 300-level MATH course.

Graduate Courses

MATH 501 Directed Study I
★3 *(fi 6)* (either term, 3-0-2). Basic principles of experimental design, completely randomized design-one way ANOVA and ANCOVA. Randomized block design. Latin square design, Multiple comparisons. Nested design. Factorial experiments. Each student will give a written report and seminar presentation highlighting statistical methods used in a research project. Prerequisite: STAT 252 or 337 or equivalent and a course in linear algebra. NOTE: Not open to graduate students in the Department of Mathematical Sciences.

MATH 506 Complex Variables
★3 *(fi 6)* (either term, 3-0-0). Conformal mapping, normal families, Riemann mapping theorem and symmetry principle. Harmonic functions: basic properties. Maximum modulus principle with Phragmen-Lindelof and Hadamard 3 circle theorem. Entire functions, infinite products and Hadamard factorization. Riemann surfaces. Prerequisite: MATH 411.

MATH 512 Algebraic Number Theory
★3 *(fi 6)* (either term, 3-0-0). Valuations and their extensions, ramifications; integral dependence, algebraic number fields, ideals and divisors, class number. Prerequisite: MATH 427.

MATH 515 Introduction to Mathematical Finance
★3 *(fi 6)* (either term, 3-0-0). Discrete time price processes. Pricing and hedging. The binomial model. Elements of continuous time stochastic calculus. Log-normal price processes. The Black-Scholes formula. Hedging in continuous time. Martingale representation. American Options. Optimal stopping results. Term structure of interest rates. Applications of filtering, etc. Prerequisite: MATH 417 or STAT 571 or consent of Department.

MATH 516 Linear Analysis
★3 *(fi 6)* (either term, 3-0-0). Banach spaces, Hahn-Banach theorem, Banach-Steinhaus theorem, Banach open mapping and closed graph theorems in Banach spaces. Hilbert spaces and orthonormal bases. Spectral theory of compact normal operators. Examples. Basic fixed point theorems and applications. Prerequisite: MATH 418 or consent of Department.

MATH 518 Functional Analysis
★3 *(fi 6)* (either term, 3-0-0). Locally convex spaces, weak topologies and duality in Banach spaces, weak compactness in Banach spaces, structure of classical Banach spaces, local structures, infinite-dimensional geometry of Banach spaces and applications. Prerequisite: MATH 516. Corequisite: MATH 447 or consent of Department.

MATH 519 Introduction to Operator Algebras
★3 *(fi 6)* (either term, 3-0-0). Banach algebras and spectral theory, compact and Fredholm operators, the spectral theorem for bounded normal operators, operator algebras, representations of C*-algebras, elementary von Neumann algebra theory, and other topics. Prerequisite: MATH 516. Corequisite: MATH 447 or consent of Department.

MATH 521 Differential Manifolds
★3 *(fi 6)* (either term, 3-0-0). Finite dimensional manifolds/submanifolds; tangent bundle, differential, inverse, and implicit function theorems, partitions of unity; imbeddings, immersions, submersions; vector fields and associated flows; Lie derivative, Lie bracket; tensor analysis, differential forms, orientation, integration, Stokes' theorem; basics of smooth bundle theory, Riemannian metrics; notion of a Lie group with basic examples, smooth Lie group actions, principal bundles. Prerequisite MATH 446 or 448.

MATH 522 Differential Geometry
★3 *(fi 6)* (either term, 3-0-0). Riemannian geometry: metrics, connections, geodesics, curvature, de Rham theorem. General theory of connections: principal bundles, linear and affine connections, holonomy groups. Lie transformation groups. Selected topics from: Singularities of maps, global analysis, G-structures, symmetric spaces, applications to partial differential equations, physics. Prerequisite: MATH 521.

MATH 523 Application of Differential Geometry to Mechanics
★3 *(fi 6)* (either term, 3-0-0). Configuration and phase spaces as smooth manifolds, second order equations, connections, holonomic and nonholonomic systems. Review of the calculus of variations on manifolds, Lagrangians, Hamiltonians, Legendre transformations. General contact, symplectic and Poisson structures on manifolds. Actions of symmetry groups on symplectic manifolds, Noether's theorems and generalizations. Introduction to systems with infinite degree of freedom. Prerequisite: MATH 521.

MATH 524 Ordinary Differential Equations IIA
★3 *(fi 6)* (either term, 3-0-0). Existence theorems, uniqueness theorems; linear systems (basic theory); stability (basic theory); nonlinear systems (local theory); nonlinear systems (global theory); bifurcations. Prerequisite: MATH 334 or equivalent.

MATH 525 Ordinary Differential Equations IIB
★3 *(fi 6)* (either term, 3-0-0). Asymptotics; boundary value problems; Poincare-Bendixson theory. Additional material will be chosen from among the following topics at the option of the instructor: separation; dichotomies; comparison and oscillation theory; bifurcation theory; nonautonomous systems; dynamical systems; functional differential equations; contingent equations; differential equations in Banach spaces. Prerequisite: MATH 524 or equivalent.

MATH 527 Intermediate Partial Differential Equations
★3 *(fi 6)* (either term, 3-0-0). Notions; Elliptic PDE's; Parabolic PDE's; Hyperbolic PDE's; Nonlinear Integrable PDE's. Prerequisite: MATH 436 or equivalent; corequisite: MATH 518.

MATH 530 Algebraic Topology
★3 *(fi 6)* (either term, 3-0-0). Particular background from point set topology (pasting and quotienting constructions); homotopy relation between maps and spaces; fundamental group; Seifert VanKampen theorem; covering spaces. Additional topics at the discretion of the instructor. Prerequisites: MATH 227, 317 and 447 or consent of Department. Corequisite: MATH 426.

MATH 531 Algebraic Topology II
★3 *(fi 6)* (either term, 3-0-0). Basics from homological algebra; (co)-homology; Lefschetz number, Euler characteristics, Lefschetz fixed point theorem (via singular theory and/or CW-theory and/or differential forms). Additional topics at the discretion of the instructor. Prerequisite: MATH 530 or consent of Department.

MATH 532 General Topology I
★3 *(fi 6)* (either term, 3-0-0). Elementary concepts of topology, nets and filters. Continuity homeomorphisms, product and quotient spaces. Axioms of separation and countability. Compactness, metrization, connectedness. Prerequisite: MATH 417 or 447.

MATH 534 Introduction to the Theory of Approximation
★3 *(fi 6)* (either term, 3-0-0). Polynomial interpolation, remainder formulae and error bounds. Best approximations in C, Lp and other norms. Degree of approximation by polynomials and trigonometric polynomials. Spline interpolation and approximation. Numerical differentiation, quadrature formulae and other applications to numerical analysis. Prerequisite: MATH 418.

MATH 536 Numerical Solutions of Partial Differential Equations I
★3 *(fi 6)* (either term, 3-0-0). Finite difference and finite element methods for boundary-value problems of elliptic equations. Numerical algorithms for large systems of linear algebraic equations: direct, classical relaxation, multigrid and preconditioned conjugate gradient methods. Algorithms for vector/parallel computers and the domain decomposition method. Prerequisites: MATH 337, 436 or equivalent and some computer programming.

MATH 537 Numerical Solutions of Partial Differential Equations II
★3 *(fi 6)* (either term, 3-0-0). Finite difference and finite element methods for parabolic and hyperbolic equations, initial-value and initial-boundary-value problems. Methods for linear/nonlinear scalar and systems of equations, singular equations. Convergence, stability analysis, and error estimate. Numerical dissipation and dispersion. Discontinuous solutions, shock and conservation laws. Prerequisites: MATH 337, 436 or equivalent, MATH 536 (recommended) and some computer programming.

MATH 538 Techniques of Applied Mathematics
★3 *(fi 6)* (either term, 3-0-0). Continuation of asymptotic expansion of integrals. Perturbation theory, asymptotic matching, perturbative eigenvalue problems. Boundary layer theory. WKB theory. Prerequisite: MATH 438.

MATH 542 Fourier Analysis
★3 *(fi 6)* (either term, 3-0-0). Review, theory and extension of Fourier series for square integrable functions; orthonormal systems, Bessel's inequality, completeness, Parseval's identity, Riesz-Fischer Theorem. Extension to Fourier series for functions in other Lebesgue classes; Fejer means, conjugate series, Dirichlet, Fejer and Poisson kernels. Norm convergence; remarks on pointwise convergence. Fourier transforms and series in several dimensions; inverse transform, Plancherel formula, Poisson Formula, maximal functions, Riesz-Thorin Theorem and applications. Elementary distribution theory; D, D', S, S' and some elementary results, Fourier transforms of tempered distributions. Examination of some earlier results with tempered distributions instead of functions and getting familiar with basic concepts. Prerequisite: MATH 418.

MATH 543 Measure Theory
★3 *(fi 6)* (either term, 3-0-0). Abstract measures. Integration. Lp spaces. Radon-Nikodym theorem. Hahn and Lebesgue decomposition theorems. Product measures. Fubini's theorem. Prerequisite: MATH 418.

MATH 556 Introduction to Fluid Mechanics
★3 *(fi 6)* (first term, 3-0-0). Fundamentals including continuum hypothesis surface tension, classical thermodynamics, and transport phenomena. Introduction to Cartesian tensors. Kinematics of flow including Lagrangian and Eulerian descriptions, streamline, path line, streak line, vorticity and circulation. Derivation of the conservation laws for mass, momentum, and energy and a detailed description of the Boussinesq approximation. Conservation laws in a rotating frame. Vortex lines and tubes, role of viscosity in vortices, Kelvin's circulation theorem, the vorticity equation in nonrotating and rotating frames. Irrotational flow including its relevance, velocity potential, sources and sinks, and flow past various shapes. Gravity waves in deep and shallow water with and without

surface tension in both the linear and nonlinear contexts. Dynamic similarity and Buckingham's Pi Theorem. Prerequisites: One of MATH 311, 411 and MATH 436 or consent of Instructor.

MATH 557 Intermediate Fluid Dynamics
★3 *(fi 6)* (second term, 3-0-0). Linear and nonlinear waves, mixing, and turbulence in fluids with varying density. Application of dimensional analysis and scaling theory to lee waves, interfacial waves, trapped and propagating internal waves, gravity currents, internal hydraulic jumps, upstream wakes, blocking, plumes, thermals, and double diffusion. The dynamics of fluids on planetary scales and Coriolis effects. Conservation laws of potential vorticity and potential temperature/density. Derivation of geostrophic and thermal wind balance. Derivation of approximate governing equations including the quasi-geostrophic equations. Planetary wave dispersion relationships and dynamics of Kelvin, Rossby, Poincare and baroclinic waves. Derive the approximate equations and dynamics of the planetary boundary layer, the Ekman layer, the Eliassen-Palm flux, sudden stratospheric warming, and the Quasi-Biennial Oscillation. Prerequisites: MATH 556 or consent of Instructor.

MATH 560 Optimization Techniques
★3 *(fi 6)* (either term, 3-0-0). An advanced treatment of the theory and applications of modern techniques in optimization: dynamic programming, sequential techniques, duality, convexity, mathematical programming. Prerequisite: MATH 418 or MATH 414 or equivalent.

MATH 581 Group Theory
★3 *(fi 6)* (either term, 3-0-0). Sylow theory, free groups, soluble/nilpotent groups; Bilinera forms, classical groups; Character theory of finite groups. Prerequisite: MATH 427.

MATH 582 Rings and Modules
★3 *(fi 6)* (either term, 3-0-0). Introduction to valuations; Free and projective modules, direct sums and products; Tensor products, central simple algebras; Aerin-Wedderburn theory; Commutative Noetherian rings including Nullstellensatz. Topics from homological algebra and category theory which may vary from year to year. Prerequisite: MATH 427 or consent of the Department.

MATH 600 Reading in Mathematics
★3 *(fi 6)* (either term, 3-0-0). Students registered in this course are supervised by individual staff members in areas of interest of the staff members. Students will be allowed to take this course only in exceptional circumstances and with the permission of the Chairman of the Department. This course shall not be counted against the minimum course requirement for graduate students.

MATH 601 Morse Theory and Its Applications I
★3 *(fi 6)* (either term, 3-0-0). Banach manifolds, tangent bundles, vector fields, semi-flows, implicit function theorem, submanifolds and transversity theorem. Riemannian manifold and Finsler structure. Deformation lemmas. Mountain Pass Theorem, Lusternik-Schnirelman theory. General Morse Lemma, critical groups and Morse inequalities, continuity of critical groups. Applications to Differential Equations and Boundary Value Problems. Prerequisites: MATH 518 and MATH 530 or consent of Department.

MATH 614 Mathematical Models for Derivative Securities
★3 *(fi 6)* (either term, 3-0-0). The Black-Scholes Models: self-financing, Feynmann-Kac. State prices and equivalent Martingale measures: arbitrage, state prices, Girsanov, pricing with dividends. American options: optimal stopping times, put options. Numerical Methods: binomial methods, finite-difference methods, simulation methods. Exotic and path-dependent options. Prerequisites: MATH 515, STAT 672.

MATH 615 Mathematical Models for the Term Structure of Interest Rates
★3 *(fi 6)* (either term, 3-0-0). The models of Vasicek and Cox-Ingersoll-Ross. The Heath-Jarrow-Morton model of forward rates. The short-rate process; single-factor and affine models. Estimation methods: Exponential splines. Nelson-Siegel Term Premia and the expectation hypothesis. Prerequisites: MATH 515, STAT 672.

MATH 617 Topics in Functional Analysis I
★3 *(fi 6)* (either term, 3-0-0).

MATH 618 Topics in Functional Analysis II
★3 *(fi 6)* (either term, 3-0-0).

MATH 623 Topics in Differential Geometry and Mechanics
★3 *(fi 6)* (either term, 3-0-0).

MATH 627 Topics in Number Theory II
★3 *(fi 6)* (either term, 3-0-0).

MATH 630 Topics in Algebraic Topology
★3 *(fi 6)* (either term, 3-0-0).

MATH 638 Nonlinear Waves
★3 *(fi 6)* (either term, 3-0-0).

MATH 642 Abstract Harmonic Analysis
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: MATH 519.

MATH 643 Topics in Analysis
★3 *(fi 6)* (either term, 3-0-0).

MATH 650 Seminar in Algebra
★1 *(fi 2)* (either term, 0-2s-0). Credit for this course may be obtained more than once.

MATH 651 Seminar in Analysis
★1 *(fi 2)* (either term, 0-2s-0). Credit for this course may be obtained more than once.

MATH 652 Seminar in Differential Equations
★1 *(fi 2)* (either term, 0-2s-0). Credit for this course may be obtained more than once.

MATH 653 Seminar in Functional Analysis
★1 *(fi 2)* (either term, 0-2s-0). Credit for this course may be obtained more than once.

MATH 654 Seminar in Nonlinear Waves/Fluid Mechanics
★1 *(fi 2)* (either term, 0-2s-0). Credit for this course may be obtained more than once.

MATH 655 Topics in Fluid Dynamics
★3 *(fi 6)* (either term, 3-0-0).

MATH 659 Research Seminar in Mathematics
★1 *(fi 2)* (either term, 0-2s-0). Credit for this course may be obtained more than once.

MATH 663 Topics in Applied Mathematics I
★3 *(fi 6)* (either term, 3-0-0).

MATH 664 Topics in Applied Mathematics II
★3 *(fi 6)* (either term, 3-0-0).

MATH 667 Topics in Differential Equations I
★3 *(fi 6)* (either term, 3-0-0).

MATH 668 Topics in Differential Equations II
★3 *(fi 6)* (either term, 3-0-0).

MATH 676 Topics in Geometry I
★3 *(fi 6)* (either term, 3-0-0).

MATH 677 Topics in Geometry II
★3 *(fi 6)* (either term, 3-0-0).

MATH 681 Topics in Algebra
★3 *(fi 6)* (either term, 3-0-0).

MATH 682 Topics in Algebra
★3 *(fi 6)* (either term, 3-0-0).

MATH 692 Topics in Group Theory
★3 *(fi 6)* (either term, 3-0-0).

MATH 693 Topics in Group Theory
★3 *(fi 6)* (either term, 3-0-0).

MATH 900 Directed Research Project
★6 *(fi 12)* (variable, unassigned).

201.137 Mathématiques, MATHQ

Faculté Saint-Jean

Cours de 1er cycle

MATHQ 100 Calcul élémentaire I
★3 *(fi 6)* (premier semestre, 3-0-2). Coordonnées polaires et rectangulaires, géométrie analytique. Fonctions transcendantes, limites, continuité, dérivées et applications. Polynômes de Taylor. Intégration et ses applications. Prérequis: Mathématique 30 et 31. Ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits pour MATH 117, MATHQ 113 ou 114.

MATHQ 101 Calcul élémentaire II
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-1). Applications de l'intégrale au calcul de longueurs, aires, volumes et masses. Fonctions trigonométriques inverses et hyperboliques. Méthodes d'intégration, équations polaires et paramétriques. Fonctions vectorielles et leurs dérivées. Prérequis: MATHQ 100. Ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits pour MATHQ 115 ou MATHQ 118.

MATHQ 102 Algèbre linéaire appliquée
★3 *(fi 6)* (deuxième semestre, 3-0-1). Vecteurs et matrices; solution d'équations linéaires; équations de lignes et de plans; déterminants; algèbre matricielle; orthogonalité de Gram-Schmidt et applications; valeurs propres, vecteurs propres et applications; nombres complexes. Prérequis ou corequis: MATHQ 100. Ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits pour MATHQ 120, MATH 125 ou 127.

L MATHQ 113 Calcul élémentaire
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-1). Revue de la géométrie analytique, différentiation et intégration des fonctions simples, applications. Prérequis: Mathématiques 30 ou l'équivalent. Les étudiants ayant complété Mathématiques 31 devront normalement suivre MATHQ 100 ou MATH 114. Ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits pour MATHQ 100, MATH 114 ou 117.

L MATHQ 115 Calcul élémentaire II
★3 *(fi 6)* (deuxième semestre, 3-0-0). Différentiation et intégration des fonctions trigonométriques, exponentielles et logarithmiques. Formes indéterminées et intégrales impropres. Techniques d'intégration. Applications. Prérequis: MATHQ 113, 114 ou l'équivalent. Anciennement MATHQ 204.

L MATHQ 120 Algèbre linéaire I
★3 *(fi 6)* (premier semestre, 3-0-0). Vecteurs et algèbre matricielle. Déterminantes. Système d'équations linéaires. Espaces vectoriels. Valeurs propres et vecteurs propres. Applications. Prérequis: Mathématiques 30 ou l'équivalent. Remarque: ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits pour MATH 127, 200, 243. Anciennement MATHQ 221.

O MATHQ 160 Mathématiques pour enseignants
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Les concepts étudiés ont pour but d'aider l'enseignant à formuler; une idée intuitive des concepts qu'ils doivent enseigner aux élèves. Nous aborderons les statistiques et les probabilités, les suites et les séries, les fonctions trigonométriques, les fonctions du deuxième degré, les polynômes. Ce cours est réservé aux étudiants du BEd Elémentaire. Prérerquis: Math 30 ou l'approbation du Vice-doyen aux affaires académiques.

MATHQ 201 Équations différentielles
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-1). Équations du premier ordre; équations lineaires du deuxième ordre; réduction d'ordre, variation des paramètres; transformation de Laplace; systèmes linéaires; séries de puissance; solutions par séries; séparation des variables pour les équations ou dérivées partielles. Prérequis ou corequis: MATH 209 ou MATHQ 214. Notes: Ce cours est accessible seulement aux étudiants en génie et aux étudiants en sciences dans les programmes suivants: spécialisation physique, spécialisation géophysique, spécialisation sciences informatiques, ou spécialisation géographie (météorologie). Ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits en MATH 205, 334 ou 336.

MATHQ 214 Calcul intermédiaire I
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Séries infinies. Courbes planes et coordonnées polaires. Vecteurs et géométrie analytique à trois dimensions. Dérivées partielles. Prérequis: MATHQ 115 ou l'équivalent. Remarque: ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits pour MATH 209 ou 217. Anciennement MATHQ 302.

MATHQ 215 Calcul intermédiaire II
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Equations différentielles linéaires de premier et de second ordre avec coefficients constants. Courbes, vecteurs, tangentes, longueur de l'arc, intégration en deux et trois dimensions, coordonnées polaires, cylindriques et sphériques, intégrale de ligne et de surface, théorème de Green. Divergence et théorème de Stokes. Prérequis: MATHQ 214. Note: Ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits pour MATH 209, 308, ou 317. Anciennement MATHQ 303.

201.138 Mechanical Engineering, MEC E

Department of Mechanical Engineering
Faculty of Engineering

The following courses were renumbered effective 2000/2001

Old	New	Old	New
MEC E 470	MEC E 370	MEC E 310	ENG G 310

Undergraduate Courses

MEC E 200 Introduction to Mechanical Engineering
★1 *(fi 2)* (either term, 0-2s-0). Introduction to the profession of mechanical engineering with special emphasis of industries in Alberta. Selected guest speakers on design problems in mechanical engineering. Communication skills including written and oral presentations.

MEC E 250 Engineering Mechanics II
★3.5 *(fi 6)* (either term, 3-1s-0). Moments of inertia. Kinematics and kinetics of rigid body motion, energy and momentum methods, impact, mechanical vibrations. Prerequisites: ENGG 130, EN PH 131 and MATH 101. There is a consolidated exam.

MEC E 260 Mechanical Design I
★3.5 *(fi 6)* (second term or Spring/Summer, 2-0-3). Design morphology, analysis and design of components, computer-aided design introduction, design project. Prerequisites: CIV E 270, MEC E 265.

MEC E 265 Engineering Graphics and CAD
★3.5 *(fi 6)* (first term, 2-0-3). Engineering drawing and sketching, conventional drafting, computer-aided drawing in 2D and 3D, solid modelling, and computer-aided design. Prerequisite: ENCMP 100.

MEC E 300 Mechanical Measurements
★3 *(fi 6)* (either term, 3-0-0). Characterization and behavior of measuring systems. Statistics and analysis of measurement data; measurement techniques applied to fundamental mechanical engineering phenomena. Prerequisites: CIV E 270, E E 239, STAT 235. Corequisite: MEC E 330.

MEC E 301 Mechanical Engineering Laboratory I
★2.5 *(fi 6)* (either term, 1-0-3). Laboratory experiments in mechanical engineering measurement techniques, treatment of measurement data, introduction to engineering report writing. Corequisite: MEC E 300.

MEC E 303 Mechanical Engineering Laboratory II
★2.5 *(fi 6)* (either term, 1-0-3). Selected laboratory experiments in applied mechanics and thermosciences. Prerequisites: MEC E 300, 301.

MEC E 330 Fluid Mechanics
★3.5 *(fi 6)* (either term, 3-0-1). Basic equations, hydrostatics, Bernoulli equation, momentum theories, similitude, fluid metering, fluid friction in pipes, external flow, boundary layers. Prerequisites: MEC E 250, MATH 209. Corequisite: CH E 243.

MEC E 340 Applied Thermodynamics
★3 *(fi 6)* (either term, 3-0-0). Review of the fundamentals of thermodynamics. Applications to gas compressors, gas and steam turbines, refrigeration. Availability analysis. Principles of combustion, psychrometry, and compressible flow. Prerequisite: CH E 243.

MEC E 360 Mechanical Design II
★3.8 *(fi 6)* (either term, 3-0-3/2). Design procedures, theories of failure, material selection, design for fatigue, creep and relaxation, selection of gears and bearings, development and application of computer-aided design software. Prerequisite: MEC E 260.

MEC E 362 Mechanics of Machines
★3.8 *(fi 6)* (either term, 3-0-3/2). Velocities and acceleration in plane mechanisms, balancing of rotating and reciprocating machinery, gears and gear trains. Prerequisite: MEC E 250.

MEC E 364 Manufacturing Processes
★2.8 *(fi 6)* (either term, 2-0-3/2). Primary and secondary processes in metal forming, material removal and fabrication techniques, selected field trips and laboratory and shop exercises. Prerequisite: MEC E 260.

MEC E 370 Heat Transfer
★3.5 *(fi 6)* (either term, 3-1s-0). Mechanisms of heat transfer, steady and unsteady heat conduction, numerical analysis, thermal radiation, free and forced convection, heat exchanger analysis and heat transfer with change of phase. Note: Credit cannot be obtained for both MEC E 470 and MEC E 370. Prerequisites: MATH 300 and MEC E 330. Corequisites: MEC E 340 and 390.

MEC E 380 Advanced Strength of Materials I
★3 *(fi 6)* (either term, 3-0-0). Stress, strain, stress-strain relation, time-independent and time-dependent behavior, virtual work and energy theorems, deformations, indeterminate systems, matrix methods. Prerequisite: MEC E 260.

MEC E 390 Numerical Methods of Mechanical Engineers
★3.5 *(fi 6)* (either term, 3-0-1). Application of numerical methods to mechanical engineering problems; topics include sources and definitions of error, root finding, solutions of linear and non-linear systems of equations, regression, interpolaton, numerical integration and differentiation, solution of initial value and boundary value ordinary differential equations. Applications include dynamics, solid mechanics, heat transfer and fluid flow. Prerequisites: MATH 102, 201, ENCMP 100 (or equivalent).

MEC E 409 Experimental Design Project I
★2.5 *(fi 6)* (either term, 1-0-3). Selected group projects in experimental measurement and mechanical design. Two to four person groups develop planning, design, testing and report writing skills on projects in applied mechanics, thermosciences and engineering management. Prerequisites: MEC E 303 and ENGG 310 or 401.

MEC E 412 Fundamentals of Quality Engineering and Management
★3.5 *(fi 6)* (either term, 3-0-1). Quality engineering and management concepts. Systems theory applied to statistical and engineering process control. Seven quality engineering and management tools. Failure analysis. Quality function deployment. Quality costing. Acceptance sampling. Basic variables and attributes control charts. Charts for small shifts, short runs and multiple variables. Design of experiments. Fundamentals of ISO 9000 quality systems. Prerequisite: STAT 235 or equivalent.

MEC E 430 Compressible Flow
★3 *(fi 6)* (first term, 3-0-0). One dimensional flow in pipes and varying area-nozzles, normal shock waves, flow in constant area pipes with friction and heat addition, methods of measurement in compressible flow, behavior of real, non-ideal gases and two phase flow, flow transients. Prerequisite: MEC E 330.

MEC E 439 Principles of Turbomachines
★3 *(fi 6)* (second term, 3-0-0). Use of turbomachines in ground based and flight applications, thermodynamic cycles for gas turbines and cogeneration, performance predictions of propellers, compressors and turbines, air-breathing and non-air-breathing engines for aerospace propulsion, combustion and emissions. Prerequisites: MEC E 370, 430.

MEC E 443 Energy Conversion
★3 *(fi 6)* (either term, 3-0-0). Sources, flow and overall efficiency of use of various energy forms in society, thermodynamic analysis of energy conversion devices such as thermoelectric and magnetohydrodynamic generators, solar and fuel cells, energy from fission and fusion reactors. Prerequisite: MEC E 340.

MEC E 451 Vibrations and Sound
★3.5 *(fi 6)* (first term, 3-0-1). Free and forced vibration of single degree of freedom systems with and without damping, vibration isolation, free vibration of multi degrees of freedom systems, vibration absorption, beam vibrations, sound waves, sound sources, subjective aspects of noise. Prerequisites: MEC E 250 and MATH 300.

MEC E 463 Thermo-Fluids Systems Design
★4 *(fi 6)* (first term, 3-0-2). Design and optimization of thermo-fluid systems, heating and ventilating equipment and load calculations, system design, piping networks, heat exchanger analysis and design, computer-aided design projects. Corequisite: MEC E 370.

MEC E 465 Design Project
★6 *(fi 12)* (two term, 1-0-4). Feasibility study and detailed design of a project which requires students to exercise creative ability, to make assumptions and decisions based on synthesis of technical knowledge, and in general, devise new designs, rather than analyse existing ones. Prerequisites: ENGG 310 or 401, MEC E 360, 370, 380. Corequisite: MEC E 362.

MEC E 469 Experimental Design Project II
★2.5 *(fi 5)* (either term, 1-0-3). Advanced project in experimental measurement and mechanical designs in applied mechanics, thermosciences and engineering management. Prerequisite: MEC E 409.

MEC E 480 Advanced Strength of Materials II
★3 *(fi 6)* (first term, 3-0-0). Special topics for beams, torsion, pressure vessels, plane stress and strain, stability, fracture mechanics. Prerequisites: MEC E 360, 380, MATH 300.

Graduate Courses

Note: The courses ENG M 620, MEC E 630, 640, 670, 680 and 681 normally will be offered annually. Other courses will be offered on a lecture basis when there is sufficient enrolment; otherwise they will be offered on a guided reading basis.

MEC E 513 Production and Operations Management
★3 *(fi 6)* (either term, 3-0-0). Production and operations management, analysis, and design of work, forecasting, inventory management including MRP, JIT, and Kanban, maintenance management, facility layout, operations scheduling, and project planning and management. Prerequisites: ENGG 310 or 401; and STAT 235 or equivalent.

MEC E 514 Design for Reliability
★3 *(fi 6)* (either term, 3-0-0). Concepts of reliability, failure rate, maintainability, and availability. Properties of various statistical distributions and their applications in reliability engineering. Failure data analysis techniques including probability plotting. Load and strength interference in mechanical component design. Design of components for high reliability. System reliability models and system reliability evaluation methods. Optimal system design considering reliability issues. Models for operation and maintenance of equipment. Prerequisite: STAT 235.

MEC E 537 Aerodynamics
★3 *(fi 6)* (either term, 3-0-0). Boundary layer flow, vorticity, circulation and aerodynamic lift, wing theory, aeronautical applications. Prerequisite: MEC E 330 or equivalent.

MEC E 539 Applied Computational Fluid Dynamics
★3 *(fi 6)* (either term, 3-0-0). Grid generation, time-marching methods, control volume formulations, shock capture, artificial dissipation, upwind flux-limiting, space-marching multigrid acceleration. Hands-on experience with commercial CFD codes to illustrate practical implementations and performance of theory. Prerequisites: MEC E 390, and 330 or equivalent.

MEC E 541 Combustion Engines
★3 *(fi 6)* (either term, 3-0-0). History of basic cycles, combustion theory including ignition flame propagation and engine knock, cycle analysis with deviations from ideal cycles and performance characteristics, fuels, design and operation of carburation and injection processes, exhaust emissions measurements. Identification of design parameters and their effect on emissions. Prerequisite: MEC E 340.

MEC E 542 Multiphase Flow and Heat Transfer for Energy and Environmental Technologies
★3 *(fi 6)* (either term, 3-0-0). Multiphase flow and transport phenomena, widespread occurrence and the design problems that arise, the central role of flow patterns and transition phenomena. Transport, heat transfer and separation processes of gas-liquid-solid systems are presented using recent research and development projects applied to enhanced oil production, energy recovery and environmental problems. Prerequisite: MEC E 330 or equivalent.

MEC E 553 Acoustics and Noise Control
★3 *(fi 6)* (either term, 3-0-0). Acoustic waves, sound transmission through walls and structures, acoustics of large and small rooms, mechanisms of sound absorption. Design of silencers. Prerequisites: MEC E 330 and 451.

MEC E 555 Introduction to Robotics
★3 *(fi 6)* (either term, 3-0-0). History and description of industrial robot applications, kinematics of industrial manipulators, actuators and servo-mechanisms, gripper design, motion planning, programming and simulation, work cell design, social implications. Prerequisites: MEC E 250 and MATH 102 or equivalent.

MEC E 563 Finite Element Method for Mechanical Engineering
★3 *(fi 6)* (either term, 3-0-0). Application of finite element methods to mechanical engineering problems; topics include direct stiffness methods, assembly, constraints, solution techniques, post-processing, element types and the Galkerin procedure. Applications include beam truss and frame analysis, plane strain and stress problems, heat transfer and dynamic analysis Prerequisites: MATH 300, MEC E 360, 390 (or equivalents).

MEC E 565 Environmental Factors in Mechanical Engineering
★3 *(fi 6)* (either term, 3-0-0). System dynamics and limits to technological growth. Source inventories and regulatory standards for biological effects of pollutants, atmospheric dispersion models, stack design, analysis of source control of particulate and combustion product emissions, probability theory for risk analysis, and toxic release hazard assessments. Prerequisite: CH E 243. Corequisite: MEC E 330.

MEC E 567 Engineering Evaluation Using Life Cycle Assessment
★3 *(fi 6)* (either term, 3-0-0). Introduction to the concept of Life Cycle Assessment (LCA). History and development of existing LCA methodologies. Stages of LCA analysis: goal definition, scoping, inventory assessment, impact analysis, improvement analysis, reporting. Sources of data, boundary selection and uncertainty. Relationship between LCA, Design for Environment, and the ISO 14000 Environmental Management Standards. Prerequisites: STAT 235 or equivalent, and consent of Instructor.

MEC E 569 Mechanics and Design of Composite Materials
★3 *(fi 6)* (either term, 3-0-0). Introduction to composite materials. Mechanical characterization and strength theories of a lamina. Micro-mechanical analysis of a lamina. Macro-mechanical analysis of laminates. Failure analysis and design of laminates. Prerequisite: MEC E 380.

MEC E 582 Principles of Smart Materials
★3 *(fi 6)* (either term, 3-0-0). Introduction to coupled field theories. Constitutive response of materials with thermal and electromagnetic coupling. Microstructural changes due to phase transformations. Shape memory alloys, piezoelectric and magnetostrictive materials, smart polymers and solutions. Micromechanics of active composites. Prerequisites: MEC E 480 or consent of instructor.

MEC E 583 Mechanics of Electroelastic Solids
★3 *(fi 6)* (either term, 3-0-0). Dielectrics, polarization, ferroelectrics. Electrostatics of dielectrics. Linear piezoelectrics, thickness vibrations, multi-layered piezoelectric plates. Fracture of electroelastic solids. Piezoelectric composites, effective medium models. Applications to transducers, actuators and reliability design of electromechanical devices. Prerequisites: MEC E 480 or consent of Instructor.

MEC E 601 Graduate Seminar
★0.5 *(fi 1)* (either term, 0-1s-0). Presentations by Master's graduate students, staff, and visiting scientists on current research topics.

MEC E 602 Graduate Seminar
★0.5 *(fi 1)* (either term, 0-1s-0). Presentations by PhD graduate students on current research projects.

MEC E 605 Experimental Strain Analysis
★3 *(fi 6)* (either term, 3-0-0). Basic experimental methods used in engineering mechanics, including photoelasticity, strain gauges, brittle coatings; measurement in static, dynamic and transient system, ultrasonics; laboratory exercises.

MEC E 612 Engineering Optimization
★3 *(fi 6)* (either term, 3-0-0). The applications of optimization techniques in solving engineering problems. Linear programming, non-linear programming, dynamic programming, integer programming, stochastic programming, genetic algorithms, heuristic methods, queuing theory, and new optimization methods. Credit may not be obtained in both ENG M 640 and MEC E 612. Prerequisite: MP E 497, MGTSC 352 or equivalent.

MEC E 620 Combustion
★3 *(fi 6)* (either term, 3-0-0). Chemical reactions, chemical equilibrium and flame temperatures. Flame propagation and explosion theories. Detonations. Air pollution from combustion sources.

MEC E 630 Fluid Dynamics
★3 *(fi 6)* (either term, 3-0-0). Kinematics of fluid motion, fundamental fluid equations and concepts, laminar boundary layers, potential flow, stability and transition, introduction to turbulence.

MEC E 632 Turbulent Fluid Dynamics
★3 *(fi 6)* (either term, 3-0-0). Governing equations of turbulent flow. Statistical and phenomenological theories of turbulent transport of momentum, heat and mass in wall-bounded and free flows. Computational techniques, empirical data and applications. Prerequisite: MEC E 630 or equivalent or consent of Instructor.

MEC E 635 Mechanics of Respiratory Drug Delivery
★3 *(fi 6)* (either term, 3-0-0). Introduction to pharmaceutical aerosol delivery to the lung. Particle size distributions. Motion of a single aerosol particle in a fluid. Particle size changes due to evaporation or condensation. Fluid dynamics and particle deposition in the respiratory tract. Jet nebulizers. Dry powder inhalers. Metered dose propellant inhalers. Prerequisite: MEC E 330 or equivalent or consent of Instructor.

MEC E 638 Vortex Flows
★3 *(fi 6)* (either term, 3-0-0). Vortex dynamics approach to large-scale structures in turbulent flows. Vortex motion equations, conservation laws, and modelling using discrete vortices. Prerequisite: a senior undergraduate course in fluid mechanics or consent of Instructor.

MEC E 639 Computational Fluid Dynamics
★3 *(fi 6)* (either term, 3-0-0). Computational fluid dynamics methods for incompressible and compressible fluids. Application to aeronautical and internal flows, finite difference, finite volume, and spectral methods. Prerequisite: CH E 674 or equivalent or consent of Instructor.

MEC E 640 Analytical Thermodynamics
★3 *(fi 6)* (either term, 3-0-0). Extension of classical thermodynamics, statistical thermodynamics applied to engineering systems. Irreversible thermodynamics, thermoelectricity and thermodiffusion.

MEC E 642 Surface Thermodynamics
★3 *(fi 6)* (second term, 3-0-0). Introduction to surface thermodynamics, 2-D surface/interface phases and 1-D linear phases, equilibrium conditions of solid-liquid-fluid surface systems, wetting, capillary and adhesion phenomena, surface energetics, thin liquid films and elastic liquid-fluid interfaces, van der Waals and electrostatic forces in interfacial interactions, interfacial electrokinetic phenomena, modern techniques for surface/interfacial tension and contact angle measurements. Prerequisites: MEC E 640 or consent of Instructor.

MEC E 650 Analytical Dynamics
★3 *(fi 6)* (either term, 3-0-0). Principle of virtual work; Lagrange's equations of motion for holonomic and non-holonomic systems; Hamilton's principle; application to gyroscopes, stabilizers, etc.

MEC E 652 Nonlinear Oscillations
★3 *(fi 6)* (either term, 3-0-0). Phase plane, singular points, non-linear conservative systems, limit cycles, stability, perturbation method, non-linear resonance.

MEC E 653 Signal Processing of Time and Spectral Series
★3 *(fi 6)* (either term, 3-0-0). Practical application of processing techniques to the measurement, filtering and analysis of mechanical system signals; topics include: signal classification, A/D conversion, spectral analysis, digital filtering and real-time signal processing.

MEC E 655 Dynamics of Structures
★3 *(fi 6)* (either term, 3-0-0). Behavior of elastic structures subjected to dynamic loads. Vibrations of buildings and bridges excited by machinery, earthquakes, wind and traffic.

MEC E 656 Wave Propagation in Structures
★3 *(fi 6)* (either term, 3-0-0). Introduction to advanced structures, dynamic elasticity equations and concepts, wave propagation in flexural structures, active control of wave propagation and vibration.

MEC E 657 Dynamics of Rotating Machinery
★3 *(fi 6)* (either term, 3-0-0). Modal behavior and fundamental response of rotors including gyroscopic and Coriolis effects. Finite elements modeling of rotor-bearing systems. Instrumentation for the measurement and analysis of vibration characteristics of rotors. Modal and influence coefficient methods of balancing. Transfer function techniques and coherence measurements. Fluid induced instabilities and self-excited instabilities. Prerequisites: MEC E 451 or equivalent, MEC E 563 or equivalent, or consent of Instructor.

MEC E 663 Discrete Element Analysis of Mechanical Systems
★3 *(fi 6)* (either term, 3-0-0). Applications of matrix methods, finite element and boundary element techniques to problems in applied mechanics. Emphasis on the use of micro-computers.

MEC E 665 Pressure Vessel Design
★3 *(fi 6)* (either term, 3-0-0). This course offers an integrated treatment of stress analysis, design theory, material behavior and construction of pressure vessels used in the energy, chemical and petroleum industries. Special topics covered include the basis of the ASME code, stresses in shells and heads, discontinuity stresses arising from openings and attachments, and design of welded joints. Prerequisite: MEC E 480 or consent of Instructor.

MEC E 670 Advanced Heat Transfer
★3 *(fi 6)* (second term, 3-0-0). Advanced topics in conduction and convection heat transfer; solution by analytical and numerical methods.

MEC E 680 Continuum Mechanics
★3 *(fi 6)* (either term, 3-0-0). Introduction to cartesian tensor algebra and calculus; analysis of finite deformation and kinematics of motion; transport theorems and balance laws; analysis of stress; continuum thermodynamics, constitutive equations and material symmetry with application to solids and fluids.

MEC E 681 Elasticity
★3 *(fi 6)* (either term, 3-0-0). Extension, torsion and flexure of beams; two-dimensional problems; complex variable methods; integral transform methods; variational methods.

MEC E 682 Plasticity
★3 *(fi 6)* (either term, 3-0-0). Yield condition, plastic potential, elastic-plastic problems, characteristic theory, slip line fields, plane stress anisotropy.

MEC E 683 Plates and Shells
★3 *(fi 6)* (either term, 3-0-0). Solutions of the plate equation for rectangular and circular plates with various boundary conditions; special and approximate methods; membrane theory of shells; bending theory of cylindrical shells.

MEC E 684 Static and Dynamic Stability
★3 *(fi 6)* (either term, 3-0-0). Classical stability analysis of bars and plates subjected to various loading conditions. Energy methods. Dynamic stability of non-conservative force systems and the effects of internal friction. Inelastic buckling, torsional buckling.

MEC E 685 Macro Fracture Mechanics
★3 *(fi 6)* (either term, 3-0-0). Basic concepts of linear and nonlinear fracture mechanics: linear and nonlinear stationary crack-tip stress, strain and displacement fields; energy balance and energy release rates; fracture resistance concepts-static and dynamic fracture toughness; criteria for crack growth; fracture control methodology and applications.

MEC E 686 Fatigue of Engineering Materials
★3 *(fi 6)* (either term, 3-0-0). A study of mechanisms and mechanics of fatigue process: damage caused by constant and variable cyclic amplitudes and random loading; effects of load interaction; initiation and propagation of fatigue cracks; life prediction; effects of multiaxial stress states, temperature and environment.

MEC E 690 Analytical Techniques in Engineering
★3 *(fi 6)* (either term, 3-0-0). Application of mathematical techniques to the solution of ordinary and partial differential equations arising in engineering problems. In particular, separation of variables, method of characteristics, transform methods, solution by complex variables, and variational methods will be considered. Prerequisite: MATH 300 or equivalent.

MEC E 728 Advanced Topics in Applied Thermodynamics I
★3 *(fi 6)* (either term, 3-0-0). 0

MEC E 729 Advanced Topics in Applied Thermodynamics II
★3 *(fi 6)* (either term, 3-0-0). Combustion, refrigeration.

MEC E 738 Advanced Topics in Fluid Dynamics I
★3 *(fi 6)* (either term, 3-0-0).

MEC E 739 Advanced Topics in Fluid Dynamics II
★3 *(fi 6)* (either term, 3-0-0). Aerodynamics, rarefied gas dynamics, turbulence, hydro and thermo stability.

MEC E 748 Advanced Topics in Thermodynamics I
★3 *(fi 6)* (either term, 3-0-0).

MEC E 749 Advanced Topics in Thermodynamics II
★3 *(fi 6)* (either term, 3-0-0). Energy conversion, general thermodynamics, irreversible thermodynamics.

MEC E 758 Advanced Topics in Dynamics I
★3 *(fi 6)* (either term, 3-0-0).

MEC E 759 Advanced Topics in Dynamics II
★3 *(fi 6)* (either term, 3-0-0). Wave propagation, orbital dynamics.

MEC E 778 Advanced Topics in Heat Transfer I
★3 *(fi 6)* (either term, 3-0-0).

MEC E 779 Advanced Topics in Heat Transfer II
★3 *(fi 6)* (either term, 3-0-0). Conduction, convection, radiation.

MEC E 788 Advanced Topics in Solid Mechanics I
★3 *(fi 6)* (either term, 3-0-0).

MEC E 789 Advanced Topics in Solid Mechanics II
★3 *(fi 6)* (either term, 3-0-0). Elasticity plasticity, viscoelasticity, shells.

MEC E 900 Directed Research Project
★6 *(fi 12)* (variable, unassigned). Detailed Engineering report in the student's major area of interest.

201.139 Medical Genetics, MDGEN

Department of Medical Genetics
Faculty of Medicine and Dentistry

Graduate Courses

MDGEN 601 Selected Topics in Medical Genetics
★3 *(fi 6)* (either term, 0-3s-0). A directed reading and seminar course based on papers taken from the recent literature of medical genetics. The course consists of lectures on a specific topic in medical genetics and oral presentations of the current literature by students. Selected topics vary so that students may take the same course but examining a different topic for additional credit. Prerequisite: consent of the Department of Medical Genetics.

MDGEN 602 Special Topics in Medical Genetics
★1 *(fi 2)* (either term, 0-1s-0). This course is designed as a journal club and discussion group in which topics in medical genetics are discussed. Students will critically discuss papers and give oral presentations to the class. Specific topics will include research in genomics, disease gene cloning, chromosome structure, and clinical aspects of medical genetics. Prerequisite: consent of the Department of Medical Genetics.

MDGEN 603 Seminars in Medical Genetics
★1 *(fi 2)* (either term, 0-1s-0). A seminar course on topics of current research interest in medical genetics. Seminars will focus alternately on clinical and basic research, and will comprise seminars in Medical Genetics Rounds and other special seminars by external speakers. Students will submit a written report based on a topic presented by one of the speakers. Prerequisite: consent of the Department.

201.140 Medical Laboratory Science, MLSCI

Division of Medical Laboratory Science
Faculty of Medicine and Dentistry

Notes
(1) See also INT D 409 and 491 for courses offered by more than one department or faculty and which may be taken as options or as a course in this discipline.
(2) MLSCI 320, 330, 340, 350, 360, and 370 are to be taken as a unit over a 42-week period. They are open to students of Medical Laboratory Science only or by special permission of the Division.

Undergraduate Courses

MLSCI 230 Hematology
★3 *(fi 6)* (first term, 3-0-6). An introduction to the theory and practise of hematology, this course will include the morphology, structure, and function of red cells, white cells, and platelets, malignant and benign conditions that affect each cell type, and tests to distinguish among disease states including anemia and leukaemia. Restricted to Medical Laboratory Science students.

MLSCI 231 Hematology
★3 *(fi 6)* (first term, 3-0-0). This course is designed for students who are excused from the laboratory component of the normal MLSCI course. An introduction to the theory and practise of hematology, this course will include the morphology, structure, and function of red cells, white cells, and platelets, malignant and benign conditions that affect each cell type, and tests to distinguish among disease states including anemia and leukaemia. Prerequisite: RT (CSMLS) certification or consent of Department. Credit granted for only one of MLSCI 230 or 231.

MLSCI 235 Hemostasis
★1 *(fi 2)* (second term, 3-0-6 in 4 weeks). Four weeks. This course will present the theory and practice of hemostasis. Topics include the vascular, platelet, clotting factor, fibrinolytic, and inhibitor systems: coagulation disorders; tests that identify factor deficiencies, monitor anticoagulant therapy, and assess thrombolytic states; disorders of hemostasis. Prerequisite: MLSCI 230 or consent of Department. Restricted to Medical Laboratory Science students.

MLSCI 236 Hemostasis
★1 *(fi 2)* (second term, 3-0-0 in 4 weeks). Four weeks. This course is designed for students who are excused from the laboratory component of the normal MLSCI course. This course will present the theory and practice of hemostasis. Topics include the vascular, platelet, clotting factor, fibrinolytic and inhibitor systems: coagulation disorders; tests that identify factor deficiencies, monitor anticoagulant therapy, and assess thrombolytic states; disorders of hemostasis. Prerequisite: MLSCI 230 or consent of Department. Restricted to Medical Laboratory Science students.

MLSCI 250 Human Histology and Histotechnology
★3 *(fi 6)* (either term, 3-0-4). This course is primarily designed to provide an understanding of human histology and of the techniques used in its study. It will also include, in part, basic pathology (including the nature of malignant disease) and the application of histological and histochemical techniques to demonstrate the diagnostic features of human disease processes. The goal of the course is for students to understand the structure and functions of the cell, and the components and functions of organ systems. The course will also teach students to recognize human tissues at the light and electron microscopical levels. Lectures will be used to illustrate basic principles, and the ability to recognize tissues and organ systems will be acquired in the laboratory. Students will be expected to acquire a detailed knowledge of the subject both from a theoretical and practical level. Restricted to Medical Laboratory Science students or consent of Department.

MLSCI 262 Clinical Biochemistry
★3 *(fi 6)* (first term, 3-0-3). This course considers how the analysis of samples from the body for various constituents can give insight into pathological processes. Included are the principles for tests routinely carried out in a clinical biochemistry laboratory, and the biological understanding of test results. Specific subjects considered are carbohydrates, renal function, blood proteins and electrolytes, and acid-base balance. Restricted to Medical Laboratory Science students.

MLSCI 263 Clinical Biochemistry
★3 *(fi 6)* (second term, 3-0-3). This course considers how the analysis of samples from the body for various constituents can give insight into pathological processes. Included are the principles for tests routinely carried out in a clinical biochemistry laboratory, and the biological understanding of test results. Specific subjects considered are clinical enzymology, heme catabolism, liver function toxicology and therapeutic drug monitoring principles of immunoassays, blood lipids porphyrins, endocrinology, gastric and GI function, fetal-placental function, and biochemical tumor markers. Restricted to Medical Laboratory Science students.

MLSCI 264 Clinical Biochemistry
★3 *(fi 6)* (first term, 3-0-0). This course considers how the analysis of samples from the body for various constituents can give insight into pathological processes. Included are the principles for tests routinely carried out in a clinical biochemistry laboratory, and the biological understanding of test results. Specific subjects considered are carbohydrates, renal function, blood proteins and electrolytes, and acid-base balance. Prerequisites for non-Medical Laboratory Science students only: CHEM 101, 161, 163 and BIOL 107. Credit granted for only one of MLSCI 262 or 264.

MLSCI 265 Clinical Biochemistry
★3 *(fi 6)* (second term, 3-0-0). This course considers how the analysis of samples from the body for various constituents can give insight into pathological processes. Included are the principles for tests routinely carried out in a clinical biochemistry laboratory, and the biological understanding of test results. Specific subjects considered are clinical enzymology, heme catabolism, liver function, toxicology and therapeutic drug monitoring, principles of immunoassays, blood lipids, porphyrins, endocrinology, gastric and GI function, fetal-placental function, and biochemical tumor markers. Prerequisites for non-Medical Laboratory Science students only: MLSCI 264. Credit granted for only one of MLSCI 263 or 265.

MLSCI 270 Transfusion Science
★2 *(fi 4)* (second term, 3-0-6 in 9 weeks). Nine weeks. This course will present the theory and practice of transfusion science. Topics covered include the genetics of blood groups pretransfusion testing, blood donation and component therapy, adverse effects of transfusion, hemolytic disease of the newborn, and autoimmune hemolytic anemia Prerequisite: MLSCI 230 or consent of Department. Restricted to Medical Laboratory Science students.

MLSCI 271 Transfusion Science
★2 *(fi 4)* (second term, 3-0-0 in 9 weeks). Nine weeks. This course is designed for students who are excused from the laboratory component of the normal MLSCI course. This course will present the theory and practice of transfusion science. Topics covered include the genetics of blood groups, or pretransfusion testing, blood donation and component therapy, adverse effects of transfusion, hemolytic disease of the newborn, and autoimmune hemolytic anemia. Prerequisite; MLSCI 230 or consent of Department. Restricted to Medical Laboratory Science students.

MLSCI 320 Analysis and Communication of Biomedical Information
★3 *(fi 6)* (two term, 1-0-2). Lectures, seminars, and assignments address the following components of writing a literature review: library searches, critical analysis, organizing, writing and editing. Speaking skills are developed through oral presentation of case studies. Prerequisite: consent of Division.

MLSCI 330 Clinical Hematology
★5 *(fi 10)* (two term, clinical rotation). As a part of a clinical laboratory education for Medical Laboratory Science students, this course will provide experience in a modern hospital hematology laboratory along with weekly tutorials followed by comprehensive theoretical and practical examinations.

MLSCI 340 Clinical Microbiology
★5 *(fi 10)* (two term, clinical rotation). As a part of a clinical laboratory education for Medical Laboratory Science students, this course will provide experience in a modern hospital microbiology laboratory along with weekly tutorials followed by comprehensive theoretical and practical examinations.

MLSCI 350 Histopathology
★3 *(fi 6)* (two term, clinical rotation). As a part of a clinical laboratory education for Medical Laboratory Science students, this course will provide experience in a modern hospital histopathology laboratory along with weekly tutorials followed by comprehensive theoretical and practical examinations.

MLSCI 360 Clinical Biochemistry
★5 *(fi 10)* (two term, clinical rotation). As a part of a clinical laboratory education for Medical Laboratory Science students, this course will provide experience in a modern hospital clinical biochemistry laboratory along with weekly tutorials followed by comprehensive theoretical and practical examinations.

MLSCI 370 Transfusion Science
★3 *(fi 6)* (two term, clinical rotation). As a part of a clinical laboratory education for Medical Laboratory Science students, this course will provide experience in a modern hospital transfusion service laboratory, along with weekly tutorials, followed by comprehensive theoretical and practical examinations.

MLSCI 410 Introduction to Clinical Laboratory Management
★1 *(fi 2)* (second term, 1-0-0). An introduction to the principles of management as they apply to clinical laboratories. Subject matter will include healthcare funding and allocation of funds, the management process in small and large clinical laboratories, performance appraisals, ethics and setting priorities for laboratory services. Prerequisite: consent of Division.

MLSCI 430 Advanced Hematology
★3 *(fi 6)* (second term, 3-0-0). This course is designed to enhance the student's ability to assimilate new and specialized knowledge in an evolving hematology discipline. As such, the course content will change from year to year. Consent of Division is required for non-Medical Laboratory Science students.

MLSCI 460 Clinical Biochemistry
★3 *(fi 6)* (second term, 3-0-0). Advanced lectures on specialized topics including diagnostic enzymology, blood lipids, transplantation biochemistry, hormone receptors and protein purification. Other topics will be considered through studies of case reports. A term paper is a requirement for this course. Prerequisite: BIOCH 203 and 205.

MLSCI 466 Applied Toxicology
★3 *(fi 6)* (first term, 3-0-0). A consideration of the protocols and their rationale used in a large toxicology laboratory. Topics include analytical, environmental, regulartory, and inhalation toxicology; clinical and forensic toxicology; and doping related to sports. This course is similar to MLSCI 465 except no laboratory sessions will be offered. Prerequisites: BIOCH 203 and 205 or consent of Division.

MLSCI 475 Clinical Immunology
★3 *(fi 6)* (first term, 3-0-0). The application of basic immunology concepts to disease and transplantation, and their monitoring by the clinical laboratory. Topics include the cellular and humoral immune responses, human immune development, immunology and cancer, immune deficiency, autoimmune disease, immunopathology, and transplant immunology. Prerequisite: IMMUN 370 or MICRB 370 or consent of Division.

MLSCI 480 Molecular Genetic Approaches to the Study and Diagnosis of Disease
★3 *(fi 6)* (first term, 3-0-0). Emphasis on the application of techniques of molecular genetics to the practice of Medicine. General subject areas include: organization of the genome, techniques of molecular genetics and their application to medicine, molecular genetics and oncology, and ethical issues involving these techniques as applied to medicine. Prerequisites: Genetics and BIOCH 203 and 205 or equivalent.

MLSCI 481 Techniques in Molecular Biology
★3 *(fi 6)* (first term, 1-0-5). A laboratory course emphasizing introductory and advanced techniques in molecular biology. Isolation of RNA, Northern blotting, construction of cDNA, amplification of DNA by the polymerase chain reaction, analysis of DNA by restriction digestion, transfection of eukaryotic cells for protein expression and Western blot analysis. Corequisite: MLSCI 480 or consent of Department. This course is designed for senior undergraduate and graduate students.

201.141 Medical Microbiology and Immunology, MMI

Department of Medical Microbiology and Immunology
Faculty of Medicine and Dentistry

Note: See also the INT D listings for the following courses offered by more than one department or faculty which may be taken as options or as a course in this discipline, specifically: INT D 224, 371, 372, and 452 (courses in virology and immunology); and INT D 409 and 491 (research project courses for medical laboratory science students).

Undergraduate Courses

MMI 240 Pathogenic Microbiology
★6 *(fi 12)* (two term, 3-0-4). The course considers the role of bacteria viruses, fungi, and parasites in human disease. Lectures emphasize mechanisms of microbial pathogenicity and immune response to infection. Laboratory emphasizes diagnostic procedures. Prerequisite: BIOL 107. Priority given to Medical Laboratory Science students.

MMI 241 Pathogenic Microbiology
★6 *(fi 12)* (two term, 3-0-0). The course considers the role of bacteria, viruses, fungi, and parasites in human disease. Lectures emphasize mechanisms of microbial pathogenicity and immune response to infection. Prerequisite: RT (CSMLS) certification or consent of Department.

MMI 351 Bacterial Pathogenesis
★3 *(fi 6)* (second term, 3-0-0). Medically important bacteria, how they cause disease and the body's immune response to bacteria. Lectures will systematically discuss the organisms and describe their distinctive as well as their common features of structure and pathogenicity. Prerequisite: MICRB 265. May not be taken for credit if credit already obtained in MMID 240 or 241 or 350, or in MMI 240 or 241 or 350.

MMI 352 Practical Pathogenic Bacteriology
★3 *(fi 6)* (second term, 0-0-4). This laboratory course will emphasize development of skills and knowledge for the safe handling of infectious bacteria, how medically important organisms are identified and will examine some of the molecular mechanisms of bacterial virulence. Prerequisite or corequisite: MMI 351 or consent of the Department. May not be taken for credit if credit already obtained in MMID 240 or 241 or 350, or in MMI 240 or 241 or 350.

MMI 405 Mechanisms of Pathogenicity I
★3 *(fi 6)* (first term, 3-3s-0). Selected topics regarding the production of disease by bacterial pathogens, with special emphasis on the biochemical, immunological, and physiological properties of the host and microbe that account for the pathological process. Contemporary concepts will be introduced by means of lectures and student seminars. Prerequisites: BIOCH 203 and 205, and MMI 240 or 241 or 351.

MMI 415 Mechanisms of Pathogenicity II
★3 *(fi 6)* (second term, 3-0-0). Mechanisms of pathogenesis by chlamydiae, mycoplasmas, viruses, fungi, and protozoa. Through intensive study of selected systems, down to the molecular level where current knowledge permits, the general principles governing the interactions between human host and pathogen will be examined. Prerequisites: BIOCH 203 and 205, MMI 240 or 241 or 350 or 351, and INT D 370 or INT D 371.

MMI 422 Microbiology
★2 *(fi 4)* (first term, 37 hours). A course in medical microbiology and immunology designed for students in dental hygiene. The course deals with general characteristics of microorganisms, their distribution, relation to disease and their control. Bacterial, viral and mycotic infectious diseases, as related to general health, dental health and dental hygiene are covered. Resistance (immunity) to disease with practical infection control as applied to patient care and treatment of disease is also covered.

MMI 426 Medical Parasitology
★3 *(fi 6)* (first term, 3-0-3). A survey of the protozoan and metazoan parasites of man. Emphasis will be placed on biology epidemiology clinical presentation and methods for detection and identification as well as global impact of parasitic diseases in today's world. Prerequisite: MMI 240 or 241, consent of Department.

MMI 427 Fungi in the Human Environment
★3 *(fi 6)* (first term, 3-0-3). Human health implications of allergenic, toxigenic, and pathogenic fungi will be considered. Topics include pathogenicity, epidemiology, ecology and distribution, occupational and environmental risks of exposure to fungi or their metabolites, immune responses, diversity of fungi involved in human disease, aspects of clinical disease, and therapy. Laboratories will emphasize techniques for detection, isolation, manipulation, and identification of medically important fungi. Prerequisites: Introductory course in medical microbiology (MMI 240 or MMI 350) or mycology (BOT 306) or microbiology (MICRB 265 or 391) or consent of Department.

MMI 440 Medical Microbiology
★3 *(fi 6)* (second term, 3-0-0). An advanced level lecture course covering the latest topics in medical microbiology. Topics include models for infectious processes in different organ systems, novel methods for antimicrobial susceptibility testing, the application of molecular techniques in the diagnostic laboratory for HIV, hepatitis B and C, infections in the compromised patient, and strategies for control of infections. The emphasis will be on laboratory applications to infectious processes. Prerequisite: MMI 240 or MMI 241 or MMI 350.

MMI 498 Research Project in Infection and Immunity
★3 *(fi 6)* (either term, 0-0-6). Directed research on a specific topic in medical microbiology or immunology in the laboratory of a faculty member in the department. Can be taken for credit more than once. An oral presentation on the research project is required for completion of the course. Pre- or corequisites: INT D 370 or 371 or INT D 452 or MMI 351 and/or consent of Department.

MMI 499 Independent Research in Infection and Immunity
★6 *(fi 12)* (two term, 0-0-6). Directed research project in the laboratory of an academic staff member of the Department of Medical Microbiology and Immunology. An oral presentation and a written report on the research project is required for completion of the course. Pre- or corequisites: INT D 370 or 371 or INT D 452 or MMI 351 and/or consent of Department.

Graduate Courses

Note: The following undergraduate courses may be taken for credit by graduate students: MMI 405, 415, 425, 426, 427.

MMI 501 Current Concepts in Immunology
★3 *(fi 6)* (either term, 0-3s-0). Lecture and seminar course on three to four areas of immunology of current interest based on original literature. The course will emphasize interpretation of published evidence based on theoretical models in the literature and will involve student participation. Offered in alternate years. Prerequisite: INT D 452 or consent of Department.

MMI 505 Mechanisms of Pathogenicity I
★3 *(fi 6)* (first term, 3-3s-0). Selected topics regarding the production of disease by bacterial pathogens, with special emphasis on the biochemical, immunological and physiological properties of the host and microbe that account for the pathological process. Contemporary concepts will be introduced by means of lectures and student seminars. Lectures and seminars are the same as MMI 405, but there will be an additional requirement of a written research proposal. This course may not be taken for credit if credit has already been obtained in MMI 405. Prerequisites: BIOCH 203 and 205, and MMI 240 or 241 or 351.

MMI 512 Special Projects
★3 *(fi 6)* (either term, 0-0-3).

MMI 515 Mechanisms of Pathogenicity II
★3 *(fi 6)* (second term, 3-0-0). Mechanisms of pathogenesis by chlamydiae, mycoplasmas, viruses, fungi and protozoa. Through intensive study of selected systems, down to the molecular level where current knowledge permits, the general principles governing the interactions between human host and pathogen will be examined. Lectures are the same as MMI 415, but there will be an additional requirement of a written research proposal. This course may not be taken for credit if credit has already been obtained in MMI 415. Prerequisites: BIOCH 203 and 205, MMI 240 or 241 or 350 or 351, and INT D 370 or 371.

MMI 520 Bacterial Plasmids
★3 *(fi 6)* (first term, 3-0-0). The biology of plasmids and plasmids as tools for molecular biology. The structure and properties of various bacterial plasmids (antibiotic resistance plasmids, colicin and enterotoxin-producing plasmids) will be considered in light of our current understanding of the evolution of plasmids. The involvement of insertion sequences and transposons in plasmids organization will be discussed. The course will focus on the modes of plasmids DNA replication and the means by which bacterial plasmids are maintained in host cells. Important plasmid-coded functions such as incompatibility and conjugative transfer will be discussed in detail. The effect of plasmids in human and veterinary medicine and on plant pathogenesis (the crown gall disease) will also be considered. The use of plasmids in genetic engineering including the choice of vectors, cloning methods and risks and benefits will complete the course. Note: Designed for advanced honors and graduate students and offered in alternate years. Prerequisites: BIOCH 203 and 205, GENET 270, or consent of Department.

MMI 526 Medical Parasitology
★3 *(fi 6)* (first term, 3-0-3). A survey of the protozoan and metazoan parasites of man. Emphasis will be placed on biology, epidemiology, clinical presentation and methods for detection and identification, as well as the global impact of parasitic diseases in today's world. Lectures and laboratories are the same as MMI 426, but there will be an additional requirement for a written literature review/discussion paper on recent developments or controversies in the field of parasitology. This course may not be taken for credit if credit has already been obtained in MMI 426. Prerequisite: MMI 240 or 241, consent of Department.

MMI 552 Advanced Immunology
★3 *(fi 6)* (second term, 3-1s-0). A lecture course on the detailed mechanisms of the immune system, describing recent discoveries in cellular and molecular immunology. Topics include mechanisms of T-cell receptor selection, antigen processing, activation of B and T lymphocytes, cellular collaboration, negative and positive regulatory mechanisms in immunity, transplantation, cytokine actions and interactions. Interaction between immune systems and pathogens, and immunogenetics. Lectures are the same as INT D 452, but there will be an additional requirement of a written paper to evaluate a current controversy in immunology. This course may not be taken for credit if credit has already been obtained for IMMUN 452, MICRB 451 or INT D 452. Prerequisites: BIOCH 203 and 205 and IMMUN 370 or MICRB 370 or INT D 371.

MMI 601 Seminar in Medical Microbiology and Immunology
★3 *(fi 6)* (either term, 0-3s-0). The student will prepare a seminar on an assigned topic in medical microbiology or immunology. Evaluation will focus on presentation, content, discussion of other student seminars, and proficiency in chairing other presentations. Required of all second- and third-year graduate students in medical microbiology and immunology. Open to graduate students in Medical Microbiology and Immunology only.

MMI 605 Current Topics in Infection and Immunity
★3 *(fi 6)* (either term, 0-4s-0). Selected topics in infections and immunity are explored in depth through evaluation of the primary research literature. Emphasis is on the molecular and cellular mechanisms underlying pathogenesis, host resistance, and immune regulation. Information is provided through selected readings and student seminar presentations. The primary objective is to introduce students to current research topics in infection and immunity, and develop their ability to critically evaluate, organize, and present scientific information.

201.142 Medicine, MED

Department of Medicine
Faculty of Medicine and Dentistry

Undergraduate Courses

201.142.1 Faculty of Medicine and Dentistry Courses

Note: Joint Medicine/Dentistry Courses are listed in §201.54 (DMED).

MED 400 Two-Week Medical Elective
★0 *(fi 1)* (either term, 2 weeks). This represents a contract period of registration with variable start and end dates for undergraduate medical students who are undertaking clinical electives. The type of clinical elective is open to any area of specialization. Prerequisite: enrolment in an MD program and approval by the Electives Coordinator of the Faculty of Medicine.

MED 401 Four-Week Medical Elective
★0 *(fi 1)* (either term, 4 weeks). This represents a contract period of registration with variable start and end dates for undergraduate medical students who are undertaking clinical electives. The type of clinical elective is open to any area of specialization. Prerequisites: enrolment in an MD program and approval by the Electives Coordinator of the Faculty of Medicine.

MED 402 Eight-Week Medical Elective
★0 *(fi 2)* (either term, 8 weeks). This represents a contract period of registration with variable start and end dates for undergraduate medical students who are undertaking clinical electives. The type of clinical elective is open to any area of specialization. Prerequisites: enrolment in an MD program and approval by the Electives Coordinator of the Faculty of Medicine.

MED 403 Twelve-Week Medical Elective
★0 *(fi 3)* (either term, 12 weeks). This represents a contract period of registration with variable start and end dates for undergraduate medical students who are undertaking clinical electives. The type of clinical elective is open to any area of specialization. Prerequisites: enrolment in an MD program and approval by the Electives Coordinator of the Faculty of Medicine.

MED 516 Practice of Medicine, Part 1
★6 *(fi 12)* (two term, 0-8s-0). A discussion of medical skills which may be generalized across different disease states and different specialities. Topics include epidemiology, evidence-based Medicine, and public health, clinical skills, family issues, ethics, the role of the health-care team, and related areas. Open only to students registered in the MD program. Corequisite: INT D 410.

MED 517 First-Year Elective
★1 *(fi 2)* (either term, 12 hours). Electives time to be developed by the students in consultation with a Faculty supervisor. Open only to students registered in the MD program.

MED 518 Optional Summer Elective
★1 *(fi 2)* (variable, variable). An optional elective of variable length, to be developed by the student in consultation with a Faculty supervisor. Open only to students registered in the MD program.

MED 520 Pre-Clinical Exam
★5 *(fi 10)* (second term, 9 hours). Final pre-clinical exam for students registered in the MD program.

MED 522 Reproductive Medicine and Urology
★6 *(fi 12)* (either term, 7 weeks). An overview of reproductive medicine in both genders, including discussion of conception, pregnancy and fetal development, birth, reproductive technology and relevant health-related issues in men and women. Also covered will be the physiology, pathophysiology and anatomy of the urinary tract, and management of problems in the genitourinary system. Open only to students registered in the MD program.

MED 523 Musculoskeletal System
★0 *(fi 12)* (two term, 7 weeks). Anatomy, physiology, pathophysiology and management in the musculoskeletal system. Open only to students registered in the MD program.

MED 526 Practice of Medicine, Part II
★6 *(fi 12)* (two term, 0-8s-0). A continuation of MED 516, which involves further discussion of medical skills which may be generalized across different disease states and different specialities. Open only to students registered in the MD program.

MED 527 Second Year Elective
★1 *(fi 2)* (either term, 12 hours). Elective time to be developed by the student in consultation with a Faculty supervisor. Open only to students registered in the MD program.

MED 528 Optional Summer Elective
★1 *(fi 2)* (variable, variable). An optional elective of variable length, to be developed by the student in consultation with a Faculty supervisor. Open only to students registered in the MD program.

MED 531 Clinical Problems Series
★1 *(fi 2)* (two term, 36 hours). A series for students registered in the MD program.

MED 532 Link Block
★3 *(fi 6)* (first term, 3 weeks). This block serves as a link between the pre-clinical and clinical years. It will include procedural skills, emergency medicine, otolaryngology, radiology, a review of history taking and physical exam skills and of the responsibilities of the health care team. Open only to students registered in the MD Program.

MED 540 Comprehensive Exam
★5 *(fi 10)* (second term, 9 hours). Final comprehensive exam for students registered in the MD program.

MED 541 Clinical Problems Series
★1 *(fi 2)* (two term, 36 hours). A series for students registered in the MD Program.

MED 542 Review of Student Internship
★1 *(fi 2)* (second term, 3 weeks). Lecture and seminar series for students registered in the final year of the MD Program.

MED 545 Geriatrics Student Internship
★2 *(fi 4)* (either term, 2 weeks). Student internship in Geriatrics for students registered in the MD Program.

MED 546 Medicine Student Internship
★6 *(fi 12)* (either term, 6 weeks). Student internship in Medicine for students registered in the MD Program.

MED 547 Clinical Electives
★8 *(fi 16)* (either term, 8 weeks). Student internship in electives for students registered in the MD program.

MED 556 Medicine Student Internship
★6 *(fi 12)* (either term, 6 weeks). Student internship in medicine for students registered in the MD Program.

MED 557 Clinical Electives
★5 *(fi 10)* (either term, 5 weeks). Student internship in Medicine for students registered in the MD Program.

MED 558 Emergency Medicine Students Internship
★4 *(fi 8)* (either term, 4 weeks). Student internship in emergency medicine for students registered in the MD Program.

Graduate Courses

201.142.2 Department of Medicine Courses

MED 501 Clinical Pulmonary Physiology
★3 *(fi 6)* (second term, 2-0-0). Basic and clinical lectures on: Lung Structure; Pulmonary Blood Flow; Airflow; Gaseous Diffusion; Ventilation/Perfusion Matching; Control of Ventilation; Oxygen Transport; Lung Defense; Mucociliary Transport; ARDS; Asthma; Exercise; Lung Growth; Surfactant; Lung Metabolism; Pulmonary Function Testing. Prerequisites: General courses in Physiology, Physics and Biochemistry or consent of Department.

MED 571 Directed Reading in the Basic Medical Sciences
★3 *(fi 6)* (either term, 3-0-0). Reading and study of basic medical science topics relevant to the student's chosen field of study under the direction of one or more faculty members. Prerequisite: consent of Department.

MED 573 Directed Reading in Clinical Medicine
★3 *(fi 6)* (either term, 3-0-0). Reading and study in a field relevant to the student's chosen field of study under the direction of one or more Faculty members. Prerequisite: consent of Department.

MED 575 Nutrition and Metabolism
★3 *(fi 6)* (two term, 1-1s-0). A seminar and discussion course in advanced nutrition and metabolism that examines current topics in nutrition and features regular seminars on alternate weeks throughout Fall and Winter Terms. A discussion group meets after each seminar. Preference will be given to graduate and postgraduate students in the area of nutrition and metabolism. Maximum enrolment of 15. Prerequisite: consent of Department.

MED 600 Advanced Clinical Trials
★3 *(fi 6)* (either term, 3-0-0). A formal lecture course to provide a background knowledge in clinical trials. Each session will consist of a formal lecture, followed by discussion on class assignments. Lectures will consist of Experimental Designs; Patient Recruitment, Randomization, Blinding, Compliance and Generalization; Sample Size Calculations, Statistical Methods; Outcomes Measures; Equivalence Trials; Economic Evaluation and Clinical Trials; Multicentre Clinical Trials; Data: Efficacy and Safety and Working with Industry and Funding Agencies. Prerequisite: consent of Department.

MED 671 Current Topics in Biomedical Research
★2 *(fi 4)* (two term, 0-1s-0). A general seminar course covering recent advances across the field of biomedical research. Research topics will feature the areas of research being investigated by the graduate students and staff of the department. All graduate students are required to participate and to give a research presentation. Other topics will provide for the acquisition of basic skills and knowledge in biomedical research and will include experimental design, critical review of the literature, communication skills, ethics of experimentation, and career development. Note: Restricted to graduate students in the Department of Medicine.

201.143 Microbiology (Biological Sciences), MICRB

Department of Biological Sciences
Faculty of Science

Notes
(1) See the following sections for listings of other Biological Sciences courses: Biology (BIOL); Botany (BOT); Entomology (ENT); Genetics (GENET); Zoology (ZOOL)
(2) See also INT D 224, 371, 372, and 452, for other courses in Virology and Immunology (taught by the Department of Biological Sciences, MMI and Oncology).

Undergraduate Courses

L MICRB 265 General Microbiology
★3 *(fi 6)* (either term, 3-0-4). This course will focus on the structure and physiology of free-living and pathogenic bacteria. The diversity of their metabolic activities, the interaction of microbes with their environment, symbiotic relationships and cell-to-cell communication are major topics. Lectures and laboratory exercises are coordinated to explore topics in basic microbiology, environmental microbiology, molecular microbiology, and the production of economically or medically important products through microbial biotechnology. Prerequisites: BIOL 107 and CHEM 161 or 261.

L MICRB 295 Infection and Immunity
★3 *(fi 6)* (second term, 3-0-0). Introduces the principles and mechanisms of immunity in eukaryotes. Provides an overview of the major groups of infectious agents (virus, bacteria, parasites) and examines selected microorganisms within the context of the host response to pathogens and pathogen evasion strategies. Prerequisites: MICRB 265 and BIOCH 203 or 220. May not be taken for credit if credit already obtained in INT D 371.

L MICRB 311 Microbial Physiology
★3 *(fi 6)* (first term, 3-0-0). The structure, growth, and metabolic path-ways used by bacteria, yeasts, and molds. Emphasis is placed on the comparative biochemical aspects of microbial life. Prerequisites: MICRB 265 and BIOCH 203/205.

L MICRB 313 Microbial Physiology Laboratory
★3 *(fi 6)* (first term, 0-0-6). Laboratory exercises introduce the microanalytical techniques used for measuring microbial growth and for following metabolic events at the cellular and subcellular level. Prerequisite or corequisite: MICRB 311.

L MICRB 316 Molecular Microbiology
★3 *(fi 6)* (second term, 3-0-0). Factors that affect gene expression at the levels of replication, transcription, post-transcriptional and post-translational control. Topics will include mobile genetic elements and their effect on chromosome structure and gene expression; alternate sigma factors; protein modification and degradation; RNA structure, processing and decay; and DNA modification and rearrangements in gene control. Prerequisites: GENET 270, MICRB 265 and BIOCH 203/205. Note: MICRB 316 and 516 cannot both be taken for credit.

L MICRB 343 Topics In Microbial Laboratory Techniques
★3 *(fi 6)* (second term, 3-0-0). Description and critical discussion of current techniques used for the isolation and characterization of macromolecular constituents of prokaryotic cells. Emphasis will be placed on examples from the recent literature. Prerequisite MICRB 313.

L MICRB 345 Microbial Laboratory Techniques
★3 *(fi 6)* (second term, 0-0-8). A series of laboratory projects employing current techniques used in the isolation and characterization of macromolecular constituents of prokaryotic cells, including enzymes, plasmids and RNA molecules. Prerequisite MICRB 313. Corequisite MICRB 343. Credit may not be obtained for both MICRB 344 and 345.

L MICRB 406 Topics in Cell Biotechnology
★3 *(fi 6)* (two term, 0-2s-0). This course is designed to develop familiarity with current research literature in Cell Biotechnology. Note: Restricted to Honors Cell Biotechnology students. Prerequisites: A 300-level Microbiology course and consent of the Cell Biotechnology Committee.

L MICRB 410 Structure of Microorganisms
★3 *(fi 6)* (second term, 3-0-0). Cellular structure of prokaryotes with particular emphasis on cell wall active antibiotics and experimental methodologies. Prerequisite: MICRB 311. Note: MICRB 410 and 510 cannot both be taken for credit.

L MICRB 415 Industrial Microbiology
★3 *(fi 6)* (second term, 3-0-0). Microbial production of commercially important metabolites and products. Emphasis will be placed on control and regulation of metabolic pathways involved in the production of these microbial products and the use of genetic manipulation to improve production levels. Prerequisites: GENET 270 and MICRB 311.

L MICRB 450 Fermentation Biotechnology
★6 *(fi 12)* (two term, 1-0-6). This course will describe the use of microbes and recombinant DNA constructs in fermentation technology. Course material will also include theoretical aspects of kinetics, design, scale-up and downstream processing. The selection, modification and optimization of the proper organism, medium and fermentation facility and economic considerations will be discussed. Prerequisites: MICRB 311, 313.

MICRB 491 Environmental Microbiology
★3 *(fi 6)* (first term, 3-0-0). Interactions between microorganisms and the environment. Topics include methods of sampling various environments, methods for monitoring microbial activities, petroleum microbiology, bioremediation, survival of airborne microorganisms, microbial metabolism of selected pollutants. Prerequisite: MICRB 265, corequisite: a 300-level Biological Sciences course or consent of Instructor. Note: Credit can be received in only one of MICRB 391, 491 and 591.

MICRB 492 Laboratory Methods for Environmental Microbiology
★3 *(fi 6)* (first term, 0-0-6). Laboratory experiments evaluate methods for enumerating bacteria from aquatic environments and introduce methods for monitoring their metabolic activities. Factors that influence petroleum biodegradation and comparisons of methods for sampling airborne microorganisms are also studied. Strong emphasis on statistical analysis of numerical data obtained. Restricted to Honors or Specialization students in Biological Sciences or consent of Department. Pre- or corequisite: MICRB 491. MICRB 392 and 492 cannot both be taken for credit.

Note: For other Immunology courses not listed above, see MMI listing.

Graduate Courses

Notes
(1) All 300- and 400-level courses in the Department of Biological Sciences may be taken for credit (except for BIOL 490, 498 and 499) by graduate students with approval of the student's supervisor or supervisory committee.
(2) The following courses may be taken as an option in graduate programs in the Department of Biological Sciences with approval of the student's supervisor or supervisory committee: BIOCH 510, 520, 530, 540, 541, 550, 555, 560; CHEM 361, 363, 461; CELL 300, 301; INT D 371, 372, 421, 452, 455, 464, 543, 544, 545, 551; MA SC 400, 401, 402, 410, 412, 420, 425, 430, 437, 440, 445, 450, 454, 470, 480; MMI 350, 405, 415, 516, 520; NEURO 472, 503, NU FS 363; PALEO 318, 319; PHARM 601.

MICRB 510 Advanced Topics in Microbial Structure
★3 *(fi 6)* (second term, 3-0-0). Lecture course on cellular structure of prokaryotes with particular emphasis on experimental methodologies. Oral presentations are required. Prerequisite: consent of the Department. Note: MICRB 410 and 510 cannot both be taken for credit.

MICRB 514 Advanced Topics in Microbiology
★3 *(fi 6)* (second term, 3-0-0). This course will consist of mini-series of lectures by rotating department faculty members dealing with their special research and general interest areas. Topics covered will vary from year to year. Prerequisite: consent of Department.

MICRB 516 Advanced Topics in Molecular Microbiology
★3 *(fi 6)* (second term, 3-1s-0). Lecture and seminar course on molecular mechanisms found in prokaryotes based on the current literature. Grades are assigned based on participation at weekly seminars and written analyses of assigned readings. Prerequisite: consent of the Department. Note: MICRB 316 and 516 cannot both be taken for credit.

MICRB 591 Environmental Microbiology
★3 *(fi 6)* (first term, 3-0-0). Interactions between microorganisms and their environment. Topics include methods of sampling various environments, methods for monitoring microbial activities, petroleum microbiology, bioremediation, survival of airborne microorganisms, microbial metabolism of selected pollutants. Lectures and exams are the same as MICRB 491, but preparation of a major term paper and an oral presentation are required. Prerequisite: consent of Instructor. Note: Credit can be received in only one of MICRB 391, 491 and 591.

MICRB 606 Microbiology Seminar
★6 *(fi 12)* (two term, 0-3s-0). Credit may be obtained more than once.

MICRB 607 Microbiology Seminar
★6 *(fi 12)* (two term, 0-3s-0). Intended for second-year graduate students.

201.144 Mining Engineering, MIN E

School of Mining and Petroleum Engineering
Department of Civil and Environmental Engineering
Faculty of Engineering

Note: See also Materials Engineering (MATE); Mining and Petroleum Engineering (MPE); and Petroleum Engineering (PET E) listings.

Undergraduate Courses

MIN E 295 Introduction to Mining Engineering
★3.8 *(fi 6)* (either term, 3-0-3/2). Essential mining concepts and terminology; mining in Alberta; company operations; stages of mining; unit mining operations; surface mine development and methods; underground mine development and methods; mining methods selection and comparison; feasibility studies and mine costs. Laboratories will cover case studies, basic mine design problems, mine visits and mining films/videos. Students will also undertake small group projects on the operations of selected Canadian mining companies. Prerequisite: consent of Instructor.

MIN E 310 Ore Reserve Estimation
★4.5 *(fi 6)* (second term, 3-0-3). Conventional and geostatistical methods for construction of orebody models. Contouring techniques for mapping bounding surfaces of stratigraphic layers. Coordinate transforms and geometric techniques for modelling rock types. Estimation and simulation methods for characterizing ore grade variability. Students will learn the principles and procedures for constructing orebody models in a variety of geologic settings. Specialized topics such as ore reserve classification, uncertainty assessment, mine selectivity, and grade control will also be covered. A variety of public-domain and commercial software will be used for a series of laboratories. Pre- or corequisites: MATH 209 and STAT 235 and EAS 210.

MIN E 323 Rock Mechanics
★4.5 *(fi 6)* (first term, 3-0-3). Mechanical properties of rock masses, field and laboratory determination; classification and index testing; permeability and flow; stresses around underground openings, elastic prototypes and numerical methods; ground support principles and mechanics of common support systems, loads on supports; hydraulic backfill, earth pressures, consolidation theory and practical consequences in mining; mechanics of subsidence and caving; rockburst mechanics; slope stability, rock mechanics instrumentation. Prerequisite: CIV E 270 or consent of Instructor.

MIN E 324 Drilling, Blasting, and Explosives
★3 *(fi 6)* (either term, 3-0-0). Drilling methods, breakage mechanics, performance, and equipment. Explosive characteristics, initiation systems, selection, handling, and loading. Blasting, rock dynamics, design of surface and underground blasts, fragmentation prediction, vibrations and damage control, monitoring. Prerequisite: MIN E 295 or consent of Instructor.

MIN E 325 Mine Planning and Design
★4.5 *(fi 6)* (first term, 3-0-3). Planning of surface mines; pit designs, pit limits and optimization; haul road design; waste dump design; and mine plan requirements. Planning of underground mines; mine access and development methods; mine layout and mine plan requirements. Laboratories will include introduction to commercially available Mine Planning software. Prerequisites: MIN E 295, CIV E 265, MIN E 310 or consent of Instructor.

MIN E 330 Mine Transport and Plant Engineering
★3.8 *(fi 6)* (either term, 3-3s/2-0). Covers underground and surface mine transport systems, rail haulage, hoisting, conveying and slurry pipelining. Auxiliary mining services such as electric power distribution, pumping and compressed air power. Seminars will include design problems dealing with the materials taught in the classroom. Oral presentation is required. Prerequisites: MIN E 295 and E E 239 or consent of Instructor.

MIN E 402 Mine Design Project I
★4 *(fi 6)* (first term, 1-0-6). First phase of a full Prefeasibility Study of a commercial mining property. Data collection, preparation of geological model using commercially available software. Calculate reserves and prepare plans and

sections. Prepare geotechnical, hydrogeological, hydrological sections and review and identify conceptual mining methods for development in Mine Design Project II, (see MIN E 403). Prepare report. Present report at seminar. Weekly session (one hour) with project supervisor. Prerequisites or corequisites: MIN E 310, MIN E 325, MIN E 413 and MIN E 414 or consent of instructor.

MIN E 403 Mine Design Project II
★4 *(fi 6)* (second term, 1-0-6). Second phase of a full Prefeasibility Study of a commercial mining property. This phase follows on from Phase I (MIN E 402) requiring the development of marketing plans, detailed mine plans and equipment selection, environmental aspects, capital and operating cost estimates and financial and economic analyses. Prepare report. Submit report and present at seminar. Weekly session (one hour) with project supervisor. Prerequisite: MIN E 402.

MIN E 407 Principles of Mine Ventilation
★3.8 *(fi 6)* (second term, 3-0-3/2). Principles and practices for control of the underground environment including application of software and governing legislation. Prerequisite: CH E 312, MIN E 414, or equivalent.

MIN E 408 Mining Enterprise Economics
★3 *(fi 6)* (either term, 2-0-2). Fundamentals of economic evaluation. Cost estimation, commodity price modelling and revenue forecasts and taxation related to mine development. Economic evaluation of mining ventures, profitability, risks and uncertainty analyses. Commodity markets and mine management strategies. Weekly laboratory/tutorial sessions will address case studies and specific problems. Prerequisites: ENGG 310 or 401, STAT 235 or consent of Instructor.

MIN E 413 Surface Mining Methods
★3.8 *(fi 6)* (first term, 3-0-3/2). Surface mining methods, equipment types specification and operation; production and productivity; control of operations; mine drainage; land conservation and reclamation. Prerequisites: MIN E 310, MIN E 330, MIN E 323, and MIN E 325 or consent of Instructor.

MIN E 414 Underground Mining Methods
★3.8 *(fi 6)* (first term, 3-0-3/2). Underground mining methods; Equipment types; specification and operation, mine organization, labor productivity, cost estimating and cost control. Methods studied include room-and-pillar, sublevel stoping and caving, vertical crater retreat, block caving, selective methods for vein mines, and underground coal mining systems. Prerequisites: MIN E 323, MIN E 324 and MIN E 325 or consent of Instructor.

MIN E 420 Mine Equipment Selection and Maintenance
★3 *(fi 6)* (second term, 3-0-0). Equipment selection principles; equipment sizing and matching; mining/mechanical/electrical aspects; capital and operating costs; decision/risk analysis; purchasing principles; maintenance principles and practices; maintenance characteristics of major equipment, maintenance support facilities. Prerequisite: MIN E 413 or 414 or consent of Instructor.

MIN E 428 Mining Field Trip
★0.5 *(fi 1)* (either term, 0-1s-0). An extended trip to visit surface and underground mines is made every year by students entering third or fourth year Mining Engineering, accompanied by staff. A report on the trip is to be submitted. All Mining students may be required to make other field trips during the sessions. Prerequisite: MIN E 295.

MIN E 555 Special Topics in Mining Engineering
★3 *(fi 6)* (either term, 3-0-0). Research studies and/or projects dealing with selected metal, nonmetal and coal mining subjects. Suitable subjects are chosen in consultation with a mining engineering faculty member. Typical study categories are reserve evaluation, surface and underground mining methods and operations, mine planning, computer simulation of mining operations, mineral processing, ventilation, regulations, mine safety, feasibility studies, economics and management. Prerequisite: consent of Instructor

Graduate Courses

MIN E 602 Design Project I
★3 *(fi 6)* (either term, 3-0-0). Design of a mining operation.

MIN E 603 Design Project II
★3 *(fi 6)* (either term, 3-0-0). Continuation and extension of MIN E 602.

MIN E 611 Mining Property Evaluation
★3.5 *(fi 6)* (either term, 3-1s-0). Basic valuation concepts, ore reserve estimation, factors influencing mining economics, time value of money, cost estimation, taxation, project evaluation criteria, risk analysis, feasibility analysis, case studies. PET E 685 is recommended as either an alternative or complementary course.

MIN E 612 Geostatistical Methods for Modelling Earth Sciences Data
★3.5 *(fi 6)* (either term, 3-1s-0). Geostatistical methods are presented for characterizing the spatial distribution of regionalized variables, such as ore grades, porosity, permeability, and contaminant concentrations. This class focuses on the geostatistical methodologies for quantifying spatial variability with variograms/covariance functions, estimation with kriging techniques, and stochastic simulation with Gaussian, indicator, and annealing-based methods. Important subjects such as uncertainty quantification, volume-variance relations, and modelling multiple variables will also be addressed. Case studies will be presented from mining, petroleum, and environmental engineering. Students will undertake a variety of theoretical and practical assignments using the GSLIB software (where appropriate). Prerequisite: consent of Instructor.

MIN E 613 Application of Geostatistical Methods to Spatial Mapping and Decision Making
★3.5 *(fi 6)* (either term, 3-1s-0). Geostatistical methods are used for orebody modelling, petroleum reservoir modelling, or environmental site characterization. This class focuses on the computational and hands-on aspects of using geostatistical methodologies for practical problem solving. Lectures present practical approaches to problems of (1) variogram inference in presence of sparse data, (2) optimal estimation, (3) stochastic simulation for local and global uncertainty, (4) volume-variance relationships, and (5) loss functions for optimal decision making in the presence of uncertainty. Students undertake a class project individually or in small groups. Prerequisite: consent of Instructor.

MIN E 620 Rock Mechanics
★4 *(fi 6)* (either term, 3-1s-1). An advanced treatment of selected topics in rock mechanics.

MIN E 621 Geomechanics in Underground Mining
★3 *(fi 6)* (either term, 3-0-0). Energy changes due to mining; multi-seam mining; interactions; pillar design in hard rock, coal and potash; strata mechanics in longwall and shortwall coal mining; rock mechanics of potash mining and caving methods; rock bursts and bumps; subsidence; underground rock mechanics instrumentation and applications of numerical methods of stress analysis. Prerequisite: MIN E 323 or equivalent.

MIN E 622 Surface Mining Systems and Equipment
★3 *(fi 6)* (either term, 3-0-0). An advanced treatment of selected topics in surface mine methods, selection of mining equipment, equipment maintenance techniques, and equipment performance and productivity. Case studies. Prerequisite: MIN E 413 or consent of Instructor.

MIN E 623 Rock Slope Stability in Surface Mining
★3.5 *(fi 6)* (either term, 3-1s-0). Economic, operational and geological factors affecting slope design. Design stages; collection of structural and strength data. Data synthesis, interpretation, design values. Methods of design, deterministic and probabilistic methods. Bench design. Controlled blasting; stabilization techniques. Monitoring. Spoil pile stability. Prerequisite: MIN E 323 or equivalent.

MIN E 630 Advanced Mine Transport
★3.5 *(fi 6)* (either term, 3-1s-0). Advanced studies in the methods and systems of material movement in mines. Indepth consideration of selection, specifications, and costs of transportation for surface and underground mines. Prerequisites: MIN E 330 and 413, or 414, or consent of Instructor.

MIN E 631 Surface Mine Design and Optimization
★3.5 *(fi 6)* (either term, 3-1s-0). Surface mining methods, mechanics of surface mine layouts design, haul roads design, waste dump design, theory of Lerchs-Grossman's, floating cone, conditional simulation, neural network and heuristic algorithms for surface mine optimization. Large scale applications of these algorithms for designing and optimizing surface mine layouts and subsequent advance mining systems design. Students undertake design projects under Instructor's direction. Prerequisites: MIN E 413 or consent of Instructor.

MIN E 632 Surface Mine Production Engineering
★3.5 *(fi 6)* (either term, 3-1s-0). Surface mine production methods, equipment selection, maintenance and mine production economics. Theory and application of operations research techniques in strategic and tactical mine production models and mine plans, production and development schedules, blending and stockpiling, cut-off grade dynamics, fleet production management and inventory control and management. Case studies from existing mining operations will be presented by guest lecturers. Students undertake design projects under Instructor's direction. Prerequisites: MIN E 413 or consent of Instructor.

MIN E 640 Simulation of Industrial Systems
★3.5 *(fi 6)* (either term, 3-1s-0). Formulation of models of engineering problems and industrial systems for experimentation using a general purpose simulation language. Statistical and operational validation of simulation results. Prerequisite: consent of Instructor.

MIN E 650 Special Topics in Mining Engineering
★3 *(fi 6)* (either term, 3-0-0). Special studies of developments of current interest within the mining industry in exploration, mining methods, mine planning, mine simulation, environment, regulations, economics and management; e.g. tar sands mining, ocean mining, in situ gasification.

MIN E 682 Graduate Seminar
★0.5 *(fi 2)* (variable, 0-1s-0). Discussion of progress and problems in mining research.

MIN E 685 Advanced Energy and Mineral Economics
★3 *(fi 6)* (either term, 3-0-0). Application of advanced statistical and probability theory in mineral resource investment risk and uncertainty analysis in random multivariable states. Numerical modelling of mineral resource stochastic processes using derivative mine valuation concepts. Case studies include application of simulation and numerical modelling packages for mineral resources, coal and oil and gas properties analysis. Prerequisite: consent of Instructor.

MIN E 710 Mining
★3 *(fi 6)* (either term, 3-0-0). Readings and discussion of selected topics in mining engineering.

MIN E 900 Directed Research
★6 *(fi 12)* (either term, unassigned). An engineering project for students registered in a Masters of Engineering program.

201.145 Mining and Petroleum Engineering, MP E

Department of Civil and Environmental Engineering
Faculty of Engineering

Note: See also Mining Engineering (MIN E), Materials Engineering (MAT E), and Petroleum Engineering (PET E) listings.

The following courses were renumbered effective 1997/98:

Old	New	Old	New
MMP E 392	MP E 292	MMP E 508	MP E 408
MMP E 422	MP E 322	MMP E 597	MP E 497
MET E 431	MP E 331	MMP E 599	MP E 499
MMP E 490	MP E 390		

Undergraduate Courses

MP E 322 Rock Structures and Intact Rock Properties
★3.5 *(fi 6)* (second term, 3-1s-0). Rock texture and fabric; compaction, fracture and deformation properties, effect of environment and time, strength theories. State of stress in the Earth's crust and its measurement. Formation, geometry and classification of depositional, diastrophic and non-diastrophic structures including bedding, jointing, faulting, folding, cleavage. Representation of structures on maps and stereographic projections. Prerequisite: CIV E 270 or consent of Instructor.

MP E 499 Undergraduate Seminar
★1 *(fi 2)* (first term, 1-0-0). Special lectures and discussion on topics in engineering.

201.146 Modern Languages and Cultural Studies, MLCS

Department of Modern Languages and Cultural Studies: Germanic, Romance, Slavic
Faculty of Arts

Undergraduate Courses

O MLCS 201 Reading European Cultures
★3 *(fi 6)* (either term, 3-0-0). Basic questions of culture in Europe, their common denominator, and historical foundations from the Middle Ages to the present.

O MLCS 205 Folklore
★3 *(fi 6)* (either term, 3-0-0). Basic concepts and practices of folklore studies using specific examples of stories, customs, beliefs, and objects from diverse cultures.

O MLCS 300 Introduction to Translation
★3 *(fi 6)* (either term, 3-0-0). Translation problems and strategies illustrated with examples from a variety of languages. Prerequisite: ★6 in a foreign language at the 150-level or above.

O MLCS 311 Russia and its Neighbours: Nations in Dialogue and Conflict
★3 *(fi 6)* (either term, 3-0-0). Cultural and political relations between Russia and the West, with emphasis on the Soviet period since 1945 and after perestroika.

O MLCS 312 Russian and Non-Russian Cultural and Political Space
★3 *(fi 6)* (either term, 3-0-0). Cultural and political relations between Russian and non-Russian components of the Imperial and Soviet empires, and between their equivalents in the successor states. Identity, cultural formation, metahistory.

O MLCS 400 The History of Translation
★3 *(fi 6)* (either term, 3-0-0). A broad historical perspective on the contributions made by translators to the intellectual and cultural history of the world through consideration of the Germanic, Romance and Slavic traditions. The role of the translator and basic principles governing the various traditions are examined to gain insight into different types of translation (religious, literary, technical) and significant moments in the history of translation. Prerequisite: MLCS 300 or consent of Department.

MLCS 471 Minority Languages
★3 *(fi 6)* (either term, 3-0-0). Sociolinguistic problems of the maintenance and loss of minority languages and cultures in Europe and the diaspora. Prerequisite: ★6 at the 150-level or above in language courses offered by the Department of Modern Languages and Cultural Studies.

MLCS 499 Special Topics
★3 *(fi 6)* (either term, 3-0-0).

Graduate Courses

MLCS 507 Topics in Major Contemporary Currents in Literary and Cultural Theory
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: Reading knowledge of one relevant language other than English. Note: This course is equivalent to C LIT 507 and EASIA 507.

MLCS 545 Literary and Cultural Theory
★3 *(fi 6)* (either term, 3-0-0). Introduction to 20th century theories in literary and cultural studies. Prerequisite: consent of Department.

MLCS 550 Research Methods
★3 *(fi 6)* (either term, 3-0-0). The bibliographical and electronic tools of research in pertinent modern language disciplines. The presentation of research in these disciplines - electronically and traditionally - in conformity with internationally accepted styles of documentation. Prerequisite: consent of Department.

MLCS 555 Teaching Strategies for Postsecondary Language Instructors
★3 *(fi 6)* (either term, 3-0-0). Designed to help graduate teaching assistants to develop practical expertise in language instruction at the college and university levels. Prerequisite: consent of Department.

MLCS 561 The Cultures of the Avant-Garde
★3 *(fi 6)* (either term, 3-0-0). The literary and artistic avant-grade in Germanic, Romance and Slavic countries, circa 1900 to 1930. Prerequisite: consent of Department.

MLCS 570 Applied Linguistics
★3 *(fi 6)* (either term, 3-0-0). Applied linguistics, including second language acquisition, sociolinguistics, discourse analysis, second language pedagogy, and bilingualism.

MLCS 571 Minority Languages in Europe and the Diaspora
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: consent of Department.

MLCS 599 Directed Reading
★3 *(fi 6)* (either term, 3-0-0).

MLCS 600 Translation Theories
★3 *(fi 6)* (either term, 3-0-0). The multiple ways in which linguistics, literary criticism, philosophy, cultural theories and feminist theories have informed the practice of translation and contributed to the production of different translation theories. In their presentations and papers, students are encouraged to use examples taken from languages with which they are familiar.

MLCS 601 Special Topics in Translation
★3 *(fi 6)* (either term, 3-0-0).

MLCS 698 Topics in Applied Linguistics
★3 *(fi 6)* (either term, 3-0-0).

MLCS 699 Topics in Literary Studies
★3 *(fi 6)* (either term, 3-0-0).

201.147 Music, MUSIC

Department of Music
Faculty of Arts

Undergraduate Courses

MUSIC 100 Rudiments of Music
★3 *(fi 6)* (either term, 3-0-0). Fundamentals of music theory approached through aural and written training. Note: Not available for degree credit to students enrolled in a BMus (all routes) degree program.

L MUSIC 101 Introduction to Western Art Music
★3 *(fi 6)* (either term, 3-0-0). A study of music literature with an emphasis on listening and analytical tools. A brief survey of the history of Western music will be included. Note: Not open to BMus (all routes) students.

O MUSIC 102 Introduction to World Music
★3 *(fi 6)* (either term, 3-0-0). Not available to students with credit in MUSIC 165.

MUSIC 122 Second Practical Subject
★3 *(fi 8)* (two term, 0.5-0-0). Restricted to BMus (all routes), BMus/ BEd, and BEd students majoring in secondary music education. Twenty-six half-hour lessons for two terms. Prerequisite: consent of Department.

MUSIC 124 Applied Music
★3 *(fi 8)* (either term, 1-0-0). For non-BMus students. Thirteen one-hour lessons for one term. Prerequisite: consent of Department, based on audition.

MUSIC 125 Applied Music
★6 *(fi 14)* (two term, 2-0-0). Restricted to BMus (all routes) and BMus/BEd students.

MUSIC 126 Applied Music
★3 *(fi 8)* (two term, 0.5-0-0). For non-BMus students. Twenty-six half-hour lessons for two terms. Prerequisite: consent of Department, based on audition.

MUSIC 127 Applied Music
★6 *(fi 14)* (two term, 1-0-0). For non-BMus students. Twenty-six one-hour lessons for two terms. Prerequisite: consent of Department, based on audition.

MUSIC 129 Fundamental Keyboard Skills
★3 *(fi 6)* (two term, 0-2L-0). Prerequisite: consent of Department. Restricted to BMus (all routes), BMus/BEd, and BA (Honors) Music Major students.

MUSIC 132 Second Practical Subject
★3 *(fi 8)* (either term, 1-0-0). For non-BMus students. Thirteen one-hour lessons for one term. Prerequisite: consent of Department, based on audition.

O MUSIC 140 Choral Ensemble
★3 *(fi 6)* (two term, 0-4L-0). Concert Choir or Madrigal Singers. Prerequisite: consent of Department, based on audition.

O MUSIC 141 Instrumental Ensemble
★3 *(fi 6)* (two term, 0-4L-0). Concert Band, Wind Ensemble, Academy Strings, Orchestral Winds, or Jazz Band I or II. Prerequisite: consent of Department based on audition.

O MUSIC 143 Indian Music Ensemble I
★3 *(fi 6)* (two term, 0-4L-0). The classical music of India, through group instruction in singing, tabla (drums), sitar (plucked lute), sarangi (bowed lute), bansuri (flute), harmonium, and ensemble performance. A set of instruments will be available. The ability to read music is not required. Prerequisite: consent of Department.

O MUSIC 144 West African Music Ensemble I
★3 *(fi 6)* (two term, 0-4L-0). Polyphonic and polyrhythmic music of West Africa, primarily through ensemble performance of the percussion and vocal music of the Ewe people of Ghana. A set of Ewe percussion instruments will be available. The ability to read music is not required. Prerequisite: consent of Department.

MUSIC 151 Aural and Keyboard Skills I
★3 *(fi 6)* (two term, 0-3L-0). The development of basic musicianship skills through dictation and performance of pitch, rhythmic, and keyboard exercises. Prerequisite: MUSIC 100 or satisfactory completion of Dept. of Music Theory Placement Exam and Aural Skills Exam for other than BMus students. Corequisite: MUSIC 155 or 156. Restricted to BMus (all routes), BMus/BEd, BEd Music Major/Minor, BA (Honors) Music Major, and BA Music Major/Minor students.

MUSIC 155 Music Theory I
★3 *(fi 6)* (either term, 3-0-0). A study of common-practice harmony, including elementary analysis with preliminary discussion of elements of formal contrapuntal writing and chorale texture. Prerequisite: MUSIC 100 or satisfactory completion of Department of Music Theory Placement Examination. Note: Not open to students with credit in MUSIC 150. Restricted to BMus (all routes), BMus/BEd, BEd Music Major/Minor, BA (Honors) Music Major, and BA Music Major/Minor students.

MUSIC 156 Music Theory II
★3 *(fi 6)* (either term, 3-0-0). Continuing the study of common-practice harmony and elementary formal analysis. Prerequisite: MUSIC 155. Note: Not open to students with credit in MUSIC 150. Restricted to BMus (all routes), BMus/BEd, BEd Music Major/Minor, BA (Honors) Music Major, and BA Music Major/Minor students.

Note: The ability to read music is required for all of the following courses, except MUSIC 201.

MUSIC 170 Introduction to Music History
★3 *(fi 6)* (first term, 3-0-0). Issues in and approaches to the historical study of music. Topics drawn from a variety of musical traditions and historical periods. Prerequisite: MUSIC 100 or successful completion of the Department of Music Rudiments Placement Exam. Registration priority given to BMus (all routes), BMus/BEd, BEd Music Major/Minor, BA (Honors) Music Major, and BA Music Major/Minor students.

MUSIC 201 Masterworks of Music
★3 *(fi 6)* (either term, 3-0-0). A study of great works of music, chosen to represent various media and historical styles. Prerequisite: MUSIC 101 or equivalent. Note: Not open to BMus (all routes) students.

MUSIC 207 Instruments for Children
★3 *(fi 6)* (either term, 3-0-0). Laboratory experience with recorder ensemble, small winds, chording and percussion instruments. Prerequisites: MUSIC 150 or 156, and 151.

MUSIC 209 Woodwind Techniques I
★3 *(fi 6)* (first term, 3-0-0). Practical and theoretical instruction on single-reed instruments. Prerequisites: MUSIC 150 or 156, and 151. Corequisite or prerequisite: MUSIC 121 or 125, 124, or equivalent. Restricted to BMus (all routes), BMus/BEd, BEd Music Major/Minor, and BA (Honors) Music Major students.

MUSIC 211 Woodwind Techniques II
★3 *(fi 6)* (second term, 3-0-0). Practical and theoretical instruction on flute, oboe and bassoon. Prerequisite: MUSIC 209. Note: Restricted to BMus (all routes), BMus/BEd, BEd Music Major/Minor, and BA (Honors) Music Major students.

MUSIC 216 Brass Techniques I
★3 *(fi 6)* (first term, 3-0-0). Practical and theoretical instruction on trumpet. Prerequisite: MUSIC 151 or 150 or 156. Corequisite or prerequisite: MUSIC 121 or 125, or 124 or equivalent. Note: Restricted to BMus (all routes), BMus/BEd, BEd Music Major/ Minor, and BA (Honors) Music Major students.

MUSIC 217 Brass Techniques II
★3 *(fi 6)* (second term, 3-0-0). Practical and theoretical instruction on brass instruments. Prerequisite: MUSIC 216 or proficiency examination. Note: Restricted to BMus (all routes), BMus/BEd, BEd Music Major/Minor, and BA (Honors) Music Major students.

MUSIC 220 Percussion Techniques
★3 *(fi 6)* (first term, 3-0-0). Practical and theoretical instruction on percussion instruments. Prerequisites: Music 150 or 156, and 151, or equivalent. Corequisite or prerequisite: MUSIC 121 or 125, or 124, or equivalent. Restricted to BMus (all routes), BMus/BEd, BEd Music Major/Minor, and BA (Honors) Music Major students.

MUSIC 222 Second Practical Subject
★3 *(fi 8)* (two term, 0.5-0-0). Restricted to BMus (all routes), BMus/BEd, and BEd students majoring in secondary music education. Twenty-six half-hour lessons for two terms. Prerequisite: consent of Department.

MUSIC 224 Applied Music
★3 *(fi 8)* (either term, 1-0-0). For non-BMus students. Thirteen one-hour lessons for one term. Prerequisites: MUSIC 121 or 125, or 124 or equivalent and consent of Department.

MUSIC 225 Applied Music
★6 *(fi 14)* (two term, 2-0-0). Restricted to BMus (all routes) and BMus/BEd students. Prerequisite: MUSIC 121 or 125, or 124 or equivalent.

MUSIC 226 Applied Music
★3 *(fi 8)* (two term, 0.5-0-0). For non-BMus students. Twenty-six half-hour lessons for two terms. Prerequisite: consent of Department, based on audition.

MUSIC 227 Applied Music
★6 *(fi 14)* (two term, 1-0-0). For non-BMus students. Twenty-six one-hour lessons for two terms. Prerequisite: consent of Department, based on audition.

MUSIC 230 Choral Techniques and Pedagogy
★3 *(fi 6)* (first term, 3-0-0). Prerequisites: MUSIC 150 or 156, and 151, or equivalent. Note: Restricted to BMus (all routes), BMus/BEd, BEd Music Major/Minor, and BA (Honors) Music Major students.

MUSIC 232 Second Practical Subject
★3 *(fi 8)* (either term, 1-0-0). For non-BMus students. Thirteen one-hour lessons for one term. Prerequisite: consent of Department, based on audition.

O MUSIC 239 Vocal and Instrumental Chamber Ensemble
★3 *(fi 6)* (two term, 0-2L-0). Prerequisite: consent of Department, based on audition.

O MUSIC 240 Choral Ensemble
★3 *(fi 6)* (two term, 0-4L-0). Concert Choir or Madrigal Singers. Prerequisite: consent of Department, based on audition.

O MUSIC 241 Instrumental Ensemble
★3 *(fi 6)* (two term, 0-4L-0). Concert Band, Wind Ensemble, Academy Strings, Orchestral Winds, or Jazz Band I or II. Prerequisite: consent of Department, based on audition.

O MUSIC 243 Indian Music Ensemble II
★3 *(fi 6)* (two term, 0-4L-0). For description see MUSIC 143. Prerequisite: consent of Department.

O MUSIC 244 West African Music Ensemble II
★3 *(fi 6)* (two term, 0-4L-0). For description see MUSIC 144. Prerequisite: consent of Department.

MUSIC 245 Introduction to Music Technologies
★3 *(fi 6)* (either term, 0-3L-0). Computer technology with a focus on MIDI, synthesis, and software programs for sequencing, music notation, audio recording and transformation, and music on the Internet. Prerequisites: MUSIC 151 and 156, or consent of Department. Registration priority will be given to BMus (all routes), BMus/BEd, BEd Music Major/Minor and BA (Honors) Music Major students.

MUSIC 246 Opera Workshop
★3 *(fi 6)* (two term, 0-4L-0). The coaching and staging of opera literature. Prerequisite: consent of Department, based on audition.

MUSIC 251 Aural and Keyboard Skills II
★3 *(fi 6)* (two term, 0-3L-0). A continuation of MUSIC 151. Prerequisite: MUSIC 151. Corequisite: MUSIC 255 or 256 or consent of Department.

MUSIC 255 Music Theory III
★3 *(fi 6)* (either term, 3-0-0). A continuation of the study of common-practice harmony, including larger forms and writing in a variety of textures. Prerequisites: MUSIC 150 or 155 and 156. Note: Not open to students with credit in MUSIC 250.

MUSIC 256 Music Theory IV
★3 *(fi 6)* (either term, 3-0-0). A continuation of the study of common-practice harmony, including larger forms and writing in a variety of textures. Prerequisite: MUSIC 255. Note: Not open to students with credit in MUSIC 250.

MUSIC 259 Introduction to Composition
★3 *(fi 6)* (first term, 3-0-0). Prerequisites: MUSIC 150 or 156, and 151 or equivalent. Note: Public performance of works completed in the course will be expected. Registration priority given to BMus (all routes), BMus/BEd, BA (Honors) Music Major, BEd Music Major/Minor, and BA Music Major students.

MUSIC 260 Composition
★3 *(fi 6)* (second term, 3-0-0). Prerequisite: MUSIC 259. Registration priority given to BMus, BA (Honors) Music Major, BEd Music Major/Minor, and BA Music Major students.

MUSIC 263 Instrumentation and Arranging
★3 *(fi 6)* (first term, 3-0-0). A study of the technical and expressive characteristics of the standard orchestral instruments. An introduction to historical developments in orchestration is included. Prerequisites: MUSIC 150 or 156 or equivalent. Formerly MUSIC 462.

MUSIC 271 Western Music History I
★3 *(fi 6)* (second term, 3-0-0). Middle Ages to 1700. Prerequisite: MUSIC 170.

MUSIC 272 Western Music History II
★3 *(fi 6)* (first term, 3-0-0). 1700-1870. Prerequisite: MUSIC 170.

MUSIC 273 Western Music History III
★3 *(fi 6)* (second term, 3-0-0). 1870 to the present. Prerequisite: MUSIC 170.

MUSIC 303 Piano Pedagogy I
★3 *(fi 6)* (first term, 3-0-0). Prerequisites: MUSIC 221, 224, 225, or equivalent.

MUSIC 304 Piano Pedagogy II
★3 *(fi 6)* (second term, 3-0-0). Prerequisite: MUSIC 303.

MUSIC 313 History of Jazz
★3 *(fi 6)* (either term, 3-0-0). A historical survey of the main evolutionary trends in jazz through analysis of distinctive jazz styles and listening to recorded examples. Prerequisite: MUSIC 100 or satisfactory completion of the Department of Music Theory Placement Examination for other than BMus (all routes) and BMus/BEd students. Not available to students with credit in MUSIC 213.

MUSIC 314 Canadian Music
★3 *(fi 6)* (either term, 3-0-0). The history of music in Canada from colonial times to the present. Prerequisite: MUSIC 101 or equivalent. Not available to students with credit in MUSIC 215.

MUSIC 315 Introduction to Conducting
★3 *(fi 6)* (first term, 3-0-0). Development of basic conducting techniques and score reading. Prerequisites: MUSIC 150 or 156, and 151, or equivalent

MUSIC 320 Diction for Singers
★3 *(fi 6)* (two term, 0-2L-0). The application of the International Phonetic Alphabet (IPA) to singing in English, Italian, German and French. Prerequisite: MUSIC 125 (Voice), or consent of Department.

MUSIC 342 Specialized Ensemble I
★3 *(fi 6)* (two term, 0-4L-0). Prerequisite: consent of Department, based on audition.

O MUSIC 343 Indian Music Ensemble III
★3 *(fi 6)* (two term, 0-4L-0). For description see MUSIC 143. Prerequisite: consent of Department.

O MUSIC 344 West African Music Ensemble III
★3 *(fi 6)* (two term, 0-4L-0). For description see MUSIC 144. Prerequisite: consent of Department.

O MUSIC 365 Introduction to Ethnomusicology
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: MUSIC 101 or 102 or consent of Department for students not in the BMus (all routes) or BMus/BEd program. Not available to students with credit in MUSIC 265.

L MUSIC 379 Women and Music
★3 *(fi 6)* (either term, 3-0-0). A study of music created by women and the social, cultural and musical phenomena that have shaped women's relationships to music throughout history and across different cultures. Prerequisite: MUSIC 101 or equivalent. Not available to students with credit in MUSIC 279.

MUSIC 400 Studies in the History of Opera
★3 *(fi 6)* (either term, 3-0-0). Prerequisites: MUSIC 271, 272, and 273.

MUSIC 403 Piano Literature I
★3 *(fi 6)* (first term, 3-0-0). Prerequisite: consent of Department.

MUSIC 404 Piano Literature II
★3 *(fi 6)* (second term, 3-0-0). Prerequisite: consent of Department.

MUSIC 407 Studies in the History of the Concerto
★3 *(fi 6)* (either term, 3-0-0). Prerequisites: MUSIC 271, 272, and 273.

MUSIC 410 Studies in Musical Style I
★3 *(fi 6)* (either term, 3-0-0). Forms, techniques, and styles studied through representative composers and genres of selected style periods. Prerequisite: consent of Department.

MUSIC 411 Studies in Musical Style II
★3 *(fi 6)* (either term, 3-0-0). Forms, techniques, and styles studied through representative composers and genres of selected style periods. Prerequisite: consent of Department.

MUSIC 413 Studies in the History of Jazz
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: MUSIC 313.

MUSIC 416 Instrumental Conducting
★3 *(fi 6)* (second term, 3-0-0). Prerequisite: MUSIC 315.

MUSIC 417 Choral Conducting and Pedagogy
★3 *(fi 6)* (second term, 3-0-0). Prerequisite: MUSIC 315.

MUSIC 420 Applied Music
★6 *(fi 14)* (two term, 1-0-0). For non-BMus students. Twenty-six one-hour lessons for two terms. Prerequisite: consent of Department, based on audition.

MUSIC 422 Second Practical Subject
★3 *(fi 8)* (two term, 0.5-0-0). Restricted to BMus (all routes), BMus/BEd and BEd students majoring in secondary music education. Twenty-six half-hour lessons for two terms. Prerequisite: consent of Department.

MUSIC 424 Applied Music
★3 *(fi 8)* (either term, 1-0-0). For non-BMus students. Thirteen one-hour lessons for one term. Prerequisites: MUSIC 224 or equivalent and consent of Department.

MUSIC 425 Applied Music
★6 *(fi 14)* (two term, 2-0-0). Restricted to BMus (all routes) and BMus/BEd students. Note: Students intending to enrol in MUSIC 526 are required to have successfully presented a public recital while enrolled in MUSIC 425. Prerequisite: MUSIC 225.

MUSIC 426 Applied Music
★3 *(fi 8)* (two term, 0.5-0-0). For non-BMus students. Twenty-six half-hour lessons for two terms. Prerequisite: consent of Department, based on audition.

MUSIC 431 Band Techniques
★3 *(fi 6)* (either term, 0-3L-0). Musical and practical aspects of band conducting. Prerequisite: A conducting course or substantial conducting experience.

MUSIC 432 Second Practical Subject
★3 *(fi 8)* (either term, 1-0-0). For non-BMus students. Thirteen one-hour lessons for one term. Prerequisite: consent of Department, based on audition.

MUSIC 433 The Organ and Its Literature I
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: consent of Department.

MUSIC 434 The Organ and Its Literature II
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: consent of Department.

MUSIC 435 Vocal Pedagogy
★3 *(fi 6)* (either term, 3-0-0). Prerequisites: MUSIC 221 or 225, or 224, or equivalent.

MUSIC 436 Tonal Counterpoint
★3 *(fi 6)* (either term, 3-0-0). Elementary tonal counterpoint in two and three parts. Prerequisite: MUSIC 256.

O MUSIC 439 Vocal and Instrumental Chamber Ensemble
★3 *(fi 6)* (two term, 0-2L-0). Prerequisite: consent of Department, based on audition.

O MUSIC 440 Choral Ensemble
★3 *(fi 6)* (two term, 0-4L-0). Concert Choir or Madrigal Singers. Prerequisite: consent of Department, based on audition.

O MUSIC 441 Instrumental Ensemble
★3 *(fi 6)* (two term, 0-4L-0). Concert Band, Wind Ensemble, Academy Strings, Orchestral Winds, or Jazz Band I or II. Prerequisite: consent of Department, based on audition.

MUSIC 442 Specialized Ensemble II
★3 *(fi 6)* (two term, 0-4L-0). Prerequisite: consent of Department based upon audition.

O MUSIC 443 Indian Music Ensemble IV
★3 *(fi 6)* (two term, 0-4L-0). For description see MUSIC 143. Prerequisite: consent of Department.

O MUSIC 444 West African Music Ensemble IV
★3 *(fi 6)* (two term, 0-4L-0). For description see MUSIC 144. Prerequisite: consent of Department.

MUSIC 445 Electroacoustic Music
★3 *(fi 6)* (second term, 0-3L-0). Electroacoustic music techniques, history and repertoire. Prerequisite: consent of department. Registration priority will be given to BMus (all routes), BA (Honors) Music Major, BEd Music Major/Minor, BA Music Major and graduate students in Music.

MUSIC 446 Opera Workshop
★3 *(fi 6)* (two term, 0-4L-0). The coaching and staging of opera literature. Prerequisite: consent of Department, based on audition.

MUSIC 451 Aural and Keyboard Skills III
★3 *(fi 6)* (two term, 0-3L-0). The development of advanced musicianship skills. Prerequisites: MUSIC 250 or 256, and 251, or equivalent.

MUSIC 455 Music Theory V
★3 *(fi 6)* (first term, 3-0-0). Theories of 20th-century music. Prerequisite: MUSIC 256. Note: Not open to students with credit in MUSIC 450.

MUSIC 456 Music Theory VI
★3 *(fi 6)* (second term, 3-0-0). Analysis of pieces from tonal and atonal repertoires. Prerequisite: MUSIC 256. Note: Not open to students with credit in MUSIC 450.

MUSIC 460 Composition
★6 *(fi 12)* (two term, 3-0-0). A sequent course to MUSIC 259 and 260 with emphasis on the study of, and writing in, larger forms. Note: Public performance of works completed in the course will be expected. Prerequisite: MUSIC 260 or equivalent, portfolio review, and consent of Department. Registration priority given to BMus, BA (Honors) Music Major, BEd Music Major/Minor, and BA Music Major students.

MUSIC 463 Orchestration
★3 *(fi 6)* (second term, 3-0-0). A detailed study of orchestration and its historical developments. Prerequisite: MUSIC 263.

MUSIC 471 The Music of Bach
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: MUSIC 201 or equivalent.

MUSIC 473 The Music of Mozart
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: MUSIC 201 or equivalent.

MUSIC 475 The Music of Beethoven
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: MUSIC 201 or equivalent.

MUSIC 477 The Music of Stravinsky
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: MUSIC 201 or equivalent.

MUSIC 501 Music History Seminar I
★3 *(fi 6)* (either term, 0-3s-0). Prerequisite: consent of Department.

MUSIC 502 Music History Seminar II
★3 *(fi 6)* (either term, 0-3s-0). Prerequisite: consent of Department.

MUSIC 504 Honors Essay
★3 *(fi 6)* (either term, 3-0-0). Restricted to BA Honors Music major students.

MUSIC 505 Bibliography and Methods of Research
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: consent of Department. Registration priority given to MA students in music, MMus, BMus (Music History), and BA (Honors) Music Major students. If space remains, restricted to BMus (all routes) students only.

MUSIC 506 Tutorial Study
★3 *(fi 6)* (either term, 3-0-0). Independent research in a specific area of the student's interest. Prerequisite: consent of Department.

MUSIC 508 Seminar in Canadian Music
★3 *(fi 6)* (either term, 0-3s-0). Prerequisite: consent of Department.

MUSIC 520 Applied Music
★3 *(fi 8)* (two term, 0.5-0-0). For non-BMus students. Twenty-six half-hour lessons for two terms. Prerequisite: consent of Department, based on audition.

MUSIC 522 Second Practical Subject
★3 *(fi 8)* (two term, 0.5-0-0). Restricted to BMus (all routes), BMus/BEd and BEd students majoring in secondary music education. Twenty-six half-hour lessons for two terms. Prerequisite: consent of Department.

MUSIC 524 Applied Music
★3 *(fi 8)* (either term, 1-0-0). For non-BMus students. Thirteen one-hour lessons for one term. Prerequisites: MUSIC 424 or equivalent and consent of Department.

MUSIC 525 Applied Music
★6 *(fi 14)* (two term, 2-0-0). Restricted to BMus (all routes) students.

MUSIC 527 Applied Music
★6 *(fi 14)* (two term, 1-0-0). For non-BMus students. Twenty-six one-hour lessons for two terms. Prerequisite: consent of Department, based on audition.

MUSIC 532 Second Practical Subject
★3 *(fi 8)* (either term, 1-0-0). For non-BMus students. Thirteen one-hour lessons for one term. Prerequisite: consent of Department, based on audition.

MUSIC 533 Hymnody and Service Playing I
★3 *(fi 6)* (either term, 0-3L-0). Prerequisite: consent of Department. Not available to students with credit in MUSIC 406.

MUSIC 534 Hymnody and Service Playing II
★3 *(fi 6)* (either term, 0-3L-0). Prerequisite: Music 533 or consent of Department. Not available to students with credit in MUSIC 406.

MUSIC 535 Organ Construction, Tonal Design and the Art of Registration
★3 *(fi 6)* (either term, 0-3L-0). Prerequisite: consent of Department.

O MUSIC 539 Vocal and Instrumental Chamber Ensemble
★3 *(fi 6)* (two term, 0-2L-0). Prerequisite: consent of Department, based on audition.

O MUSIC 540 Choral Ensemble
★3 *(fi 6)* (two term, 0-4L-0). Concert Choir or Madrigal Singers. Prerequisite: consent of Department, based on audition.

O MUSIC 541 Instrumental Ensemble
★3 *(fi 6)* (two term, 0-4L-0). Concert Band Wind Ensemble, Academy Strings, Orchestral Winds, or Jazz Band I or II. Prerequisite: consent of Department, based on audition.

MUSIC 542 Specialized Ensemble III
★3 *(fi 6)* (two term, 0-4L-0). Prerequisite: consent of Department based on audition.

MUSIC 545 Seminar in Computer Music and Media Technology
★3 *(fi 6)* (either term, 0-3L-0). Advanced studies in electroacoustic music techniques, aesthetics and composition. Prerequisites: Music 445 or consent of Department. Registration priority given to BMus, BA (Honors) Music Major, BEd Music Major/Minor, BA Music Major, and graduate students in Music.

MUSIC 546 Opera Workshop
★3 *(fi 6)* (two term, 0-4L-0). The coaching and staging of opera literature. Prerequisite: consent of Department, based on audition.

MUSIC 555 Issues in Theory and Analysis
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: MUSIC 456.

MUSIC 556 Seminar in Music Theory
★3 *(fi 6)* (either term, 0-3s-0). Prerequisites: MUSIC 256 and consent of Department.

MUSIC 560 Composition
★6 *(fi 12)* (two term, 3-0-0). Emphasis is given to the study of, and writing for, larger groups of voices and instruments. Note: Public performance of works completed in the course will be expected. Registration priority given to BMus, BA (Honors) Music Major, BEd Music Major/Minor, and BA Music Major students. Prerequisite: MUSIC 460 or equivalent, portfolio review, and consent of Department. Co, or prerequisite: MUSIC 263.

MUSIC 565 Area Studies in Ethnomusicology
★3 *(fi 6)* (either term, 3-0-0). Undergraduate students require MUSIC 265 as a prerequisite.

MUSIC 566 Topics in Ethnomusicology
★3 *(fi 6)* (either term, 3-0-0). Undergraduate students require MUSIC 265 as a prerequisite.

MUSIC 581 Studies in Avant Garde Music
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: MUSIC 455.

Graduate Courses

Note: The following undergraduate courses may be taken for credit by graduate students: MUSIC 320, 400, 401, 407, 410, 411, 413, 433, 434, 436, 445, 501, 502, 505, 507, 508, 525, 533, 534, 535, 542, 545, 555, 556, 560, 565, 566, 581.

O MUSIC 543 Indian Music Ensemble V
★3 *(fi 6)* (two term, 0-4L-0). For description see MUSIC 143. Prerequisite: consent of Department.

O MUSIC 544 West African Music Ensemble V
★3 *(fi 6)* (two term, 0-4L-0). For description see MUSIC 144. Prerequisite: consent of Department.

MUSIC 601 Tutorial Study
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: consent of Department.

MUSIC 602 Tutorial Study
★3 *(fi 6)* (two term, 1.5-0-0). Prerequisite: consent of Department.

MUSIC 610 Current Topics in Music Research
★3 *(fi 6)* (first term, 0-3s-0). A study of current research in musicology, music theory, ethnomusicology, and the interdisciplinary studies of music, focusing on methodological issues. Prerequisite: consent of Department.

MUSIC 613 Seminar in Romantic Music
★3 *(fi 6)* (either term, 0-3s-0).

MUSIC 614 Proseminar in Musicology
★3 *(fi 6)* (either term, 0-3s-0). An overview of history, methodologies, and current issues in musicology. Prerequisite: MUSIC 505.

MUSIC 615 Seminar in Musicology I
★3 *(fi 6)* (either term, 0-3s-0).

MUSIC 616 Seminar in Musicology II
★3 *(fi 6)* (either term, 0-3s-0).

MUSIC 621 Applied Music
★6 *(fi 14)* (two term, 2-0-0).

MUSIC 623 Supplementary Applied Music
★3 *(fi 8)* (two term, 1-0-0). Prerequisite: consent of Department.

MUSIC 630 Choral Conducting
★6 *(fi 12)* (two term, 3-0-0).

MUSIC 631 Advanced Band Techniques
★3 *(fi 6)* (either term, 3-0-0). Advanced musical and practical aspects of band conducting. Prerequisite: MUSIC 431 or equivalent, or substantial conducting experience, and consent of the Department.

MUSIC 632 Advanced Wind Band Conducting
★6 *(fi 12)* (two term, 2-0-0). Prerequisite: MUSIC 431 or equivalent, or substantial conducting experience, and consent of the Department.

MUSIC 633 Seminar in Choral Literature I
★3 *(fi 6)* (either term, 0-3s-0).

MUSIC 634 Seminar in Choral Literature II
★3 *(fi 6)* (either term, 0-3s-0).

MUSIC 637 Vocal and Instrumental Chamber Ensemble
★3 *(fi 6)* (either term, 0-2L-0). Prerequisite: consent of Department, based upon audition.

O MUSIC 639 Vocal and Instrumental Chamber Ensemble
★3 *(fi 6)* (two term, 0-2L-0). Prerequisite: consent of Department, based upon audition.

O MUSIC 640 Choral Ensemble
★3 *(fi 6)* (two term, 0-4L-0). Concert Choir or Madrigal Singers. Prerequisite: consent of Department, based upon audition.

O MUSIC 641 Instrumental Ensemble
★3 *(fi 6)* (two term, 0-4L-0). Concert Band Wind-Ensemble, Academy Strings, Orchestral Winds, or Jazz Band I or II. Prerequisite: consent of Department, based upon audition.

MUSIC 646 Opera Workshop
★3 *(fi 6)* (two term, 0-4L-0). The coaching and staging of opera literature. Prerequisite: consent of Department, based on audition.

MUSIC 650 Proseminar in Music Theory
★3 *(fi 6)* (either term, 0-3s-0).

MUSIC 651 Seminar in Music Analysis
★3 *(fi 6)* (either term, 0-3s-0).

MUSIC 653 Seminar in History of Theory
★3 *(fi 6)* (either term, 0-3s-0).

MUSIC 654 Seminar in Theory and Music
★3 *(fi 6)* (either term, 0-3s-0).

MUSIC 660 Advanced Composition I
★6 *(fi 12)* (two term, 3-0-0).

MUSIC 661 Advanced Composition II
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: MUSIC 660.

MUSIC 665 Issues in Ethnomusicology
★3 *(fi 6)* (either term, 0-3s-0).

MUSIC 666 Field Methods in Ethnomusicology
★3 *(fi 6)* (either term, 0-3s-0).

MUSIC 685 Graduate Keyboard Seminar
★3 *(fi 6)* (two term, 0-1.5s-0). Topics in performance-practice issues. Restricted to pianists and organists in the MMus and DMus programs.

MUSIC 697 Case Study in Music Theory
★1 *(fi 2)* (either term, 0-1s-0).

MUSIC 699 Directed Research
★3 *(fi 6)* (either term, 3-0-0).

MUSIC 721 Special Projects in Keyboard Music
★6 *(fi 14)* (two term, 2-0-0).

MUSIC 737 Special Projects in Chamber Music
★3 *(fi 6)* (either term, 0-2L-0). Restricted to Doctor of Music students.

MUSIC 739 Special Projects in Chamber Music
★3 *(fi 6)* (two term, 0-2L-0). Restricted to Doctor of Music students.

MUSIC 900 Directed Research Project
★3 *(fi 6)* (either term, unassigned).

MUSIC 903 Directed Research Project
★3 *(fi 6)* (either term, unassigned).

MUSIC 906 Directed Research Project
★6 *(fi 12)* (either term, unassigned).

MUSIC 909 Directed Research Project
★9 *(fi 18)* (either term, unassigned).

201.148 Musique, MUSIQ

Faculté Saint-Jean

Cours de 1er cycle

O MUSIQ 100 Les rudiments de la musique
★3 *(fi 6)* (premier semestre, 3-0-0). L'étude de la notation musicale et des rudiments de la musique. Introduction à la lecture élémentaire. Note: Les étudiants en BMus ne peuvent pas prendre ce cours. Anciennement MUSIQ 200.

O MUSIQ 101 Introduction à la musique
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Une étude de la littérature musicale en insistant sur l'audition et les moyens analytiques. Un bref survol historique de la musique occidentale. Anciennement MUSIQ 206.

MUSIQ 103 Fondements de la musique
★3 *(fi 6)* (l'un ou l'autre semestre, 0-3L-0). L'acquisition et le développement de connaissances et d'habiletés musicales fondamentales nécessaires à l'enseignement élémentaire. Prérequis: MUSIQ 100 ou l'équivalent mesurable par un test sur les rudiments de la musique. Note: ce cours est réservé aux étudiants du BEd. Anciennement MUSIQ 203.

MUSIQ 124 Musique appliquée
★3 *(fi 6)* (aux deux semestres, 1-0-0). Leçons de chant individuelles pour les étudiants non inscrits au BMus. Prérequis: accord du professeur après audition.

O MUSIQ 140 Ensemble choral
★3 *(fi 6)* (aux deux semestres, 0-4L-0). Cours de chant choral. Prérequis: accord du professeur après audition.

MUSIQ 151 Culture de l'oreille et facilité au clavier I
★3 *(fi 6)* (aux deux semestres, 0-3L-0). Perception auditive des matières couvertes en MUSIQ 155 et 156, par la mise en pratique de la lecture à vue, de la dictée et de l'harmonie au clavier. Prérequis: MUSIQ 100 ou l'équivalent mesurable par un test de placement en théorie musicale de la Faculté et un examen sur les habilités auditives sauf pour les étudiants du BMus. Corequis: MUSIQ 155 et 156. Note: Un demi-cours qui s'étale sur les deux semestres. Anciennement MUSIQ 251.

MUSIQ 155 Théorie musicale I
★3 *(fi 6)* (premier semestre, 3-0-0). Une étude de l'harmonie classique (c.-à-d. des XVIIe et XVIIIe siècles) qui inclut l'analyse élémentaire et une discussion préliminaire des éléments relatifs à l'écriture du contrepoint et à la texture chorale. Prérequis: MUSIQ 100 ou l'équivalent mesurable par un test de placement en théorie musicale de la Faculté. Note: ce cours n'est pas accessible aux étudiants ayant des crédits pour MUSIQ 150.

MUSIQ 156 Théorie musicale II
★3 *(fi 6)* (deuxième semestre, 3-0-0). La continuation de l'étude de l'harmonie classique et de l'analyse formelle élémentaire. Prérequis: MUSIQ 155.

O MUSIQ 201 Les chefs-d'oeuvre de la musique
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Une étude des plus grands chefs-d'oeuvre musicaux choisis pour représenter divers moyens d'expression et divers styles historiques. Prérequis: MUSIQ 101 ou l'équivalent. Anciennement MUSIQ 306.

MUSIQ 224 Musique appliquée
★3 *(fi 6)* (aux deux semestres, 1-0-0). Leçons de chant individuelles pour les étudiants non inscrits au BMus. Prérequis: MUSIQ 124 ou l'équivalent et l'accord du professeur.

O MUSIQ 240 Ensemble choral
★3 *(fi 6)* (aux deux semestres, 0-4L-0). Cours de chant choral. Prérequis: accord du professeur après audition.

MUSIQ 315 Introduction à l'art de diriger
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Prérequis: MUSIQ 151 et 156, ou l'équivalent.

O MUSIQ 440 Ensemble choral
★3 *(fi 6)* (aux deux semestres, 0-4L-0). Cours de chant choral. Prérequis: accord du professeur après audition.

MUSIQ 471 La musique de Bach
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Prérequis: MUSIQ 201, ou l'équivalent.

MUSIQ 473 La musique de Mozart
★3 *(fi 6)* (l'un ou l'autre semestre, 3-0-0). Prérequis : MUSIQ 201 ou l'équivalent.

201.149 Native Studies, NS

School of Native Studies

Undergraduate Courses

NS 100 Introduction to Native Studies
★3 *(fi 6)* (either term, 3-0-0). This course will introduce the discipline and expectations of Native Studies to the student by emphasizing research and writing skills necessary in an academic environment. The subject matter for the course will come from such areas as the cultural histories and an analysis of contemporary conditions of Native societies in Canada.

O NS 105 Cree Language Challenge
★3 *(fi 6)* (either term, unassigned). This is an exam only course open to fluent speakers of the Cree language. Credit: Pass/Fail.

O NS 152 Introductory Cree
★6 *(fi 12)* (two term, 4-0-1). A general introduction to Plains Cree (Y dialect) grammar and vocabulary, with practice in speaking and work in the language laboratory. No prior knowledge of Cree is assumed. Not open to students with matriculation standing in Cree. Note: Students cannot receive credit for NS 152 and NS 153.

O NS 153 Introduction to the Structure of the Cree Language for Cree Speakers
★3 *(fi 6)* (second term, 4-0-0). A course designed specifically for fluent speakers of Cree who require an introduction to the Pentland othography writing system and formal training and practice with Cree grammatical structure. The focus is on literacy in the Plains Cree dialect. Note: Students cannot receive credit for NS 152 and NS 153. Prerequisite: NS 105.

O NS 154 Introduction to a Dene Language I
★3 *(fi 6)* (first term, 4-0-1). A general introduction to a Dene language, grammar and vocabulary, with practice in speaking and work in the language laboratory. No prior knowledge of the language is assumed. Not open to students with matriculation standing in a Dene language.

O NS 155 Introduction to a Dene Language II
★3 *(fi 6)* (second term, 4-0-1). A continuation of NS 154. Prerequisite: NS 154.

O NS 210 Native Issues and Insights I
★3 *(fi 6)* (either term, 3-0-0). An overview of various background issues in Native Studies that continue to have a definite impact on the contemporary Canadian Aboriginal situation. The focus of the course will be from a Native Studies perspective and deal with issues such as Aboriginal rights, conditions regarding land claims, and colonialism.

O NS 211 Native Issues and Insights II
★3 *(fi 6)* (either term, 3-0-0). An overview of various major issues facing Canadian aboriginal peoples and governments today, including a comparison with issues for indigenous peoples elsewhere. The focus of the course will be from a Native Studies perspective and deal with issues such as land, self-government, economic development, education, and health.

O NS 240 Introduction to Aboriginal Legal Issues
★3 *(fi 6)* (either term, 3-0-0). This course is designed to give students an introduction to the development of Native law in Canada. It examines the Canadian legal context for Aboriginal Law, identifies sources of Aboriginal law, discusses the Treaty and Aboriginal rights and the nature of the fiduciary obligations of the Crown to Aboriginal people.

NS 252 Intermediate Cree
★6 *(fi 12)* (two term, 3-0-1). Introduction to more complex grammatical structures; translation to and from Cree; reading of selected texts; oral practice, including conversation and work on individual projects. Prerequisite: NS 152 or 153.

NS 300 Traditional Cultural Foundations I
★3 *(fi 6)* (either term, 3-0-0). This course is intended to introduce students to Native traditions as aspects of dynamic cultural systems that have enabled Native peoples to survive and thrive in the centuries prior to European arrival, to resist assimilation efforts, and to persist as culturally distinct peoples. They will be contrasted with stereotypes and mythologies about Native peoples. Students will learn why such stereotypes developed and why they still persist. Prerequisites: NS 210 and 211 or consent of the School.

NS 314 History of Indians of Western Canada
★3 *(fi 6)* (either term, 3-0-0). A survey of the evolution of Indian/European and Canadian relations in western Canada. Emphasis is on Indian historical perspectives and analyzing events and issues relevant to the various Indian groups of western Canada, including treaties and the history and development of reserves. Prerequisites: NS 210 and 211 or consent of the School.

NS 320 Aboriginal Governments and Politics
★3 *(fi 6)* (either term, 3-0-0). The description, analysis, and principles of various aboriginal governments will be examined. The relative merits of constitutional, legislative, and administrative options for realizing aboriginal self-government will be compared. A study of the international and Canadian examples of local and regional Aboriginal governments in practice will be an important focus of this course. Prerequisites: NS 210 and 211 or consent of the School.

NS 330 Native Economic Development
★3 *(fi 6)* (either term, 3-0-0). This course will review underlying factors which affect the economies of Native communities and examine different approaches to Native Economic development, including community, corporate and entrepreneurial business approaches. The Native perspective to Native Economic Development will be a principal theme. The objective of the course will be to assess approaches to the identification, planning, and implementation of economic development strategies for Native communities. Prerequisites: NS 210 and 211 or consent of the School.

NS 335 Native People and the Fur Trade
★3 *(fi 6)* (either term, 1-2s-0). Perspectives on the economic, cultural and geographical aspects of the Native fur trade, with an emphasis on the subarctic fur trade between 1670 and 1870, will be explored and examined critically. The influence of the changing relationships between Aboriginal peoples and mercantile trading interests will be assessed through lectures and seminars. Prerequisites: Any ★6 from NS 210, 211, 314, HIST 368 and 369, or consent of the School.

NS 340 Aboriginal Legal Issues
★3 *(fi 6)* (either term, 3-0-0). A general and critical overview of the legal issues affecting Native people, with particular reference to Alberta and the NWT. Special attention is given to the Constitutional Act of Canada, selected federal and provincial legislation, treaties, and major court cases to introduce current application of Native law. Prerequisites: NS 210 or 211, and NS 240 or consent of the School.

NS 345 Management Issues in Native Communities
★3 *(fi 6)* (either term, 3-0-0). The course introduces the major management issues commonly faced by contemporary Native community, public administration, and business organizations as a result of their unique cultural, social, economic, demographic, and political environment. Students will acquire an orientation to the management process and to modern management theory and practices. In addition, opportunities will be made to develop and practice the managerial skills involved in diagnosis, analysis and resolution of management issues frequently encountered in Native organizations. Prerequisites: NS 210 and 211 or consent of the School.

NS 352 Advanced Cree
★6 *(fi 12)* (two term, 3-0-1). An intensive course designed to enable students to acquire considerable facility both in oral communication and in writing, employing both Roman and syllabic orthography. Prerequisite: NS 252.

NS 355 Native Oral Traditions and Indigenous Knowledge
★3 *(fi 6)* (either term, 3-0-0). This course considers oral traditions as aspects of broader, culturally-defined systems of knowledge, in which stories are vehicles for encoding and transmitting knowledge about the people, their culture, and their history. It focuses on new academic and community-based approaches, as well as the complementarity of oral traditions/indigenous knowledge and Western science. Students will explore the evolving roles of oral traditions for contemporary Native peoples. Prerequisites: NS 210 and 211 or consent of the School.

O NS 360 Contemporary Native Art
★3 *(fi 6)* (either term, 3-0-0). A study of contemporary North American Native artists with emphasis on the philosophical and cultural statements made through their artistic expression. Special attention will be placed on living mainstream Canadian Native artists, as well as on Canadian Native artists that are part of the Northwest Coast, Plains, Woodland, Algonquin, and Pan-Indian schools of art. Prerequisites: NS 210 and 211 or consent of the School.

NS 370 The Métis: The Emergence of a People
★3 *(fi 6)* (either term, 3-0-0). An examination of the factors responsible for the emergence of Métis communities in different areas at different times, with the emphasis on Canada. The development of Métis people together with lifestyles that serve to distinguish them from others will receive much attention. Where applicable, comparisons with similar experiences elsewhere in the world will be made. Prerequisites: NS 210 and 211 or consent of the School.

NS 375 Native Health Issues
★3 *(fi 6)* (either term, 3-0-0). This course is designed to introduce students to selected contemporary health care issues in Alberta Métis and Indian communities. A description of the existing health status of these populations will facilitate exploration of socio-economic issues of disease prevention, illness treatment and health promotion. Concepts of health, illness and disease from several points of view will provide a foundation for discussion of issues associated with Native control of health care planning delivery. Prerequisites: NS 210 and 211 or consent of the School.

NS 380 Selected Topics in Native Studies
★3 *(fi 6)* (either term, 3-0-0). Prerequisites: NS 210 and 211 or consent of the School.

NS 381 Selected Topics in International Indigenous Studies
★3 *(fi 6)* (either term, 3-0-0). Prerequisites: NS 210 and 211 or consent of the School.

NS 390 Community Research Methods
★3 *(fi 6)* (either term, 3-0-0). An introduction to the basic concepts, principles, and issues in the area of community research. The objective of the course is to both apply and critique a range of research methods and to describe different facets of a community. Research methods, particularly in relation to the oral traditions of Indigenous peoples, will be a focus of the course. Prerequisites: NS 210 and 211 and one other 300-level NS course.

NS 400 Traditional Cultural Foundations II
★3 *(fi 6)* (either term, 3-0-0). This course will use case studies to examine the range of Native societies in North America and how these distinctive societies have maintained their unique identities over time, while experiencing often-considerable culture change as they have coped with new circumstances, both positive and negative. Students will consider how Native peoples are drawing upon earlier cultural forms in creative ways to meet modern needs, emphasizing that "traditional cultural forms" are dynamic. Prerequisite: One 300-level course or consent of the School. NS 300 is strongly recommended.

NS 403 Selected Topics in Native Studies
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: One 300-level course or consent of the School.

NS 404 Selected Topics in Native Studies
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: One 300-level course or consent of the School.

NS 405 Selected Topics in International Indigenous Studies
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: One 300-level course or consent of the School.

NS 408 Conference Course in Native Studies
★3 *(fi 6)* (either term, 3-0-0). Prerequisite: One 300-level course or consent of the School.

NS 420 Negotiation Strategies
★3 *(fi 6)* (either term, 3-0-0). An exploration of the theory and practice of negotiation and mediation from different perspectives, including perspectives from the dominant society and indigenous peoples. The strategies of litigation, and coercion to overcome conflict and achieve settlements of disputes will also be examined. These negotiation theories will then be applied to concrete dispute situations in Canada, including multi-party disputes over land, governance, development of resources and the environment. This course will be taught in a seminar format. Prerequisite: NS 320 or 340 or consent of the School.

NS 430 Native Land Use Research and Planning
★3 *(fi 6)* (either term, 3-0-0). This course will approach land use research and planning as it applies specifically to traditional Native land use. Two perspectives will be considered. Native land use research will be examined to demonstrate land use and occupancy to support Native land claims. Planning the use of Native lands and resources by incorporating traditional and contemporary usage and management methods into land use plans will be the second thrust. Included in the course are the land claims process; control of land and management of resources; land use planning in the context of Native self-government; and the roles of resource development and the traditional sector of Native economies. Issues such as Native participation in the co-management of resources affecting traditional Native lands and economies, the cultural applications of land use research and indigenous values, and practices of land use will also be covered. Prerequisite: One 300-level course or consent of the School.

NS 435 Management of Aboriginal Natural Resources
★3 *(fi 6)* (either term, 3-0-0). The application of knowledge of resource management to the traditional Native economic activities, especially hunting, fishing and trapping. Conservation problems which developed with the spread of the commercial economy will be analyzed by examining Aboriginal and European approaches to resource management. The use of conservation to rationalize the re-allocation of traditional resources are examined. Prerequisite: Any ★6 in EAS 290, 291, ENCS 201 or 260, and one 300-level NS course or consent of the School.

NS 440 Treaties and Indigenous Land Claims Agreements
★3 *(fi 6)* (either term, 3-0-0). An exploration of the contemporary issues associated with treaties and indigenous land claims agreements. The background, negotiations, and implementation of post-1867 Indian treaties and modern agreements in Canada will be one focus for the course. Another focus will be the experiences of indigenous peoples with Treaties elsewhere in the world, such as the Treaty of Waitangi in New Zealand and selected Indian treaties in the United States of America. This course will be taught in a seminar format. Prerequisite: one 300-level NS course or consent of the School.

NS 445 Community Development Processes
★3 *(fi 6)* (either term, 3-0-0). In a seminar, students will identify, analyze and integrate community development philosophy, principles and practice. The relevance of traditional community development models to Native communities will be critically examined in light of the recent experiences of Native communities themselves. Prerequisite: one 300-level course (NS 330 or NS 345 recommended).

NS 470 Métis Politics
★3 *(fi 6)* (either term, 3-0-0). This seminar concentrates on recent events, processes, and issues. It examines the political attitudes, opinions, and activities of Métis peoples, as well as organizations and their leaders. Similarities between the politics of Métis and Indian collectivities are explored. Considerable attention is given to the strategy and tactics employed by Métis in dealing with the provincial and federal governments. Prerequisite: NS 370 or History 369 or consent of the School. POL S 100 or 320 or 321 strongly recommended.

NS 480 Métis/Indian/Inuit Issues Seminar
★3 *(fi 6)* (either term, 3-0-0). A seminar in which an examination is made of current issues facing indigenous peoples. Topics are selected from contemporary developments in major areas of interest including educational and vocational implications of land claims and self government settlements; Métis, Indian and Inuit perspectives on the environment, development, and cultural arts. Emphasis is given to the comparative analysis of such issues at the regional, national and international levels. Prerequisite: One 300-level course or consent of the School.

NS 490 Community-Based Research
★3 *(fi 6)* (either term, 0-3s-0). A seminar exploring the issues in the area of community-based research. The course will be organized primarily around the examination of case studies. Methodological concerns will focus on the political, cultural, ethical, and practical aspects of conducting community-based research in conjunction with Native groups and communities. Prerequisite: NS 390.

NS 499 Research Project
★3 *(fi 6)* (either term, 0-0-3). The research project is designed to provide students with a variety of options for carrying out their own research. The specific route taken will depend upon the resources of the School, opportunities available in the community, and the skills of the student. While the program is intended to be flexible, the main route around which students may design their projects will be research conducted in conjunction with a local native organization. Prerequisite: consent of the School of Native Studies. Normally consent will not be given without credit in NS 390.

NS 520 Honors Paper (or Project)
★6 *(fi 12)* (two term, 0-3s-0). For students in the Honors program in Native Studies in their final year.

Graduate Courses

NS 503 Directed Readings in Native Studies
★3 *(fi 6)* (either term, 0-3s-0).

NS 504 Directed Advanced Readings in Native Studies
★3 *(fi 6)* (either term, 0-3s-0). Prerequisite: NS 503 or consent of the School.

NS 599 Selected Research Topics in Native Studies
★3 *(fi 6)* (either term, 0-3s-0).

201.150 Neuroscience, NEURO

Faculty of Medicine and Dentistry

Note: Additional courses in Neuroscience are offered by members of the Centre for Neuroscience through individual departments such as Cell Biology, Pharmacology, Physiology, Psychiatry, Psychology, Surgery, and Zoology.

Undergraduate Courses

NEURO 443 Neuroendocrine Concepts
★3 *(fi 6)* (first term, 3-0-0). Regulation within the neuroendocrine system. Conceptual consideration of the diffuse neuroendocrine system, hypothalamopituitary interactions, neural integration, signal inactivation, feedback control, differential regulation, neurosteroids and hormones and behavior. Prerequisite: PHYSL 210 or equivalent, or PHYSL 371 or consent of instructor.

NEURO 450 Readings on Selected Topics in Neuroscience
★3 *(fi 6)* (either term, 3-0-0). An individual study course involving detailed reading on a selected topic in cellular, molecular, systems, or cognitive neuroscience. Students will select a member of the Centre for Neuroscience who will guide them through a course of reading on a specialized topic at an advanced level. Completion of this course requires an oral presentation to an examining committee. Restricted to students in the Honors program in Neuroscience. Prerequisites: PMCOL 371, PHYSL 372.

NEURO 451 Honors Research Project in Neuroscience
★3 *(fi 6)* (first term, 0-0-3). Research project involving laboratory experimentation done under the supervision of a member of the Centre for Neuroscience. Laboratory projects may involve current topics and methodologies encountered in specific areas of cellular, molecular, systems, or cognitive neuroscience. Completion of this course requires a written report of the project and an oral presentation to an examining committee. Restricted to students in the Honors program in Neuroscience. Prerequisites: PMCOL 371, PHYSL 372.

NEURO 452 Honors Research Project in Neuroscience
★3 *(fi 6)* (second term, 0-0-3). Research project involving laboratory experimentation done under the supervision of a member of the Centre for Neuroscience. Laboratory projects may involve current topics and methodologies encountered in specific areas of cellular, molecular, systems, or cognitive neuroscience. Completion of this course requires a written report of the project and an oral presentation to an examining committee at the end of the course. Restricted to students in the Honors program in Neuroscience. Prerequisites: PMCOL 371, PHYSL 372.

NEURO 472 Autonomic Nervous System
★3 *(fi 6)* (either term, 3-0-0). Lectures presented by members of the Centre for Neuroscience on neurophysiological, anatomical, clinical, pharmacological and cellular aspects of the autonomic nervous system. Topics include neural regulation of homeostasis and reproduction, disorders of autonomic function, sympathetically maintained pain, effects of spinal cord injury and current research issues. Prerequisites: PHYSL 210 or 211 or ZOOL 241 or equivalent and PMCOL 371 or 342 and/or consent of the course coordinator.

Graduate Courses

NEURO 500 Research in Neuroscience
★6 *(fi 12)* (two term, 0-0-6). A practical course in the neurosciences where students spend two months in each of at least three research laboratories approved by the Centre for Neuroscience Graduate Committee. Students are expected to complete a small research project, supervised by a member of the Centre, in each of the research areas chosen. Students are evaluated on both their performance in the laboratory and reports written. Prerequisite: consent of the Centre for Neuroscience.

NEURO 603 Graduate Colloquium in Neuroscience
★3 *(fi 6)* (second term, 0-2s-0). Graduate students present review seminars or lead discussions based on required readings in the neurosciences. Coordinated by a member of the Centre for Neuroscience. Centre members are invited to attend.

201.151 Norwegian, NORW

Department of Modern Languages and Cultural Studies: Germanic, Romance, Slavic
Faculty of Arts

Notes
(1) The Department reserves the right to place students in the language course appropriate to their level of language skill.
(2) Placement tests may be administered in order to assess prior background. Students with a Norwegian language background should consult a Department advisor. Such students may be granted advanced placement and directed to register in a more advanced course more suitable to their level of ability, or they may be encouraged to seek "Credit by Special Assessment" (see §44.5) where appropriate.
(3) The Department will withhold credit from students completing courses for which prior background is deemed to make them ineligible. For example, 100-level courses are normally restricted to students with little or no prior knowledge in that language. Should a student with matriculation standing, or those possessing prior background (such as native speakers or those for whom it is their first language) register in the 100-level course, credit may be withheld.
(4) See also Scandinavian (SCAND) listings.

Undergraduate Courses

O NORW 100 Beginners' Norwegian
★6 *(fi 12)* (two term, 5-0-0). Designed to give basic practical skill in everyday spoken and written Norwegian. The oral approach, using the laboratory, is followed. Note: Not open to students with native or near native proficiency or to students with Norwegian 30 or its equivalents in Canada and other countries.

O NORW 200 Second-Year Norwegian
★6 *(fi 12)* (two term, 4-0-0). Reading and study of selected texts in Norwegian literature and culture. Composition and conversation. Prerequisite: NORW 100 or consent of Department.

201.152 Nursing, NURS

Faculty of Nursing

Undergraduate Courses

NURS 140 Anatomy
★3 *(fi 6)* (first term, 3-0-0). Introduction to the structure of the human body. Must be completed prior to year 3 of the Nursing program.

NURS 150 Physiology
★4 *(fi 8)* (first term, 4-0-0). An introduction to human physiology. Available only to Nursing students. Must be completed prior to year 3 of the Nursing program.

NURS 151 Physiology
★2 *(fi 4)* (two term, 1-0-0). Continuation of the study of human physiology. Available only to Nursing students. Must be completed prior to year 3 of the Nursing program.

NURS 190 Nursing in Context A
★5 *(fi 10)* (first term, 0-6s-3 in 7 weeks). Introduction to the professional discipline of nursing, communication theory, and context-based learning. The primary health care emphasis is on health promotion and disease prevention across the life span. Restoration and rehabilitation are introduced. Health assessment and basic nursing skills are introduced.

NURS 191 Nursing Practice I
★5 *(fi 10)* (second term, 0-4s-21c in 7 weeks). Beginning nursing practice with a focus on health promotion and interaction with clients across the life span in a variety of non-traditional settings. Corequisite: NURS 190.

NURS 194 Nursing in Context A1
★5 *(fi 10)* (first term, 0-6s-3 in 7 weeks). A continuation of the study of concepts introduced in NURS 190 with a focus on teaching and learning principles and increased health assessment and basic nursing skills. Prerequisites: NURS 190, 191.

NURS 195 Nursing Practice II
★6 *(fi 12)* (second term, 0-3s-24c in 7 weeks). Practice includes health status assessment of clients and appropriate health promotion and disease prevention interventions. Practice occurs in settings where clients live or in community agencies (non-acute) where services to clients are offered. Prerequisites: NURS 190, 191.

NURS 244 Integrated Medical Microbiology
★3 *(fi 6)* (two term, 1.5-0-0). Relevant medical microbiology concepts integrated into nursing through context-based learning.

NURS 290 Nursing in Context B
★5 *(fi 10)* (first term, 0-6s-3 in 7 weeks). Within the context of primary health care, the focus shifts to restoration, rehabilitation and support of clients experiencing chronic and less acute variances in health. Discussion related to health promotion and disease prevention continues. Intermediate health assessment and nursing skills are introduced. Prerequisites: NURS 194, 195.

NURS 291 Nursing Practice III
★7 *(fi 14)* (either term, 0-3s-28c in 7 weeks). Practice focuses on restoration, rehabilitation and support (including health promotion and disease prevention) of clients with chronic and less acute variances in health across the life span. Practice occurs primarily in primary-level acute care centres and continuing care agencies. (See Note at end of section.) Prerequisites for Collaborative students: NURS 194, 195. Prerequisites for Post-RPN students: NURS 293, 295.

NURS 293 Nursing in Context and Practice of Families in Transition
★5 *(fi 10)* (either term, 0-6s-3c in 7 weeks). Theory and practice related to health promotion of childbearing/child-rearing families with a focus on primary health care with families in transition. Pre- or corequisite: NURS 213. Note: This course is available to Post-RPN students only.

NURS 294 Nursing in Context B1
★5 *(fi 10)* (second term, 0-6s-3 in 7 weeks). Continuation of NURS 290 with increasing situational complexity. Prerequisites: NURS 290, (NURS 291 or 295).

NURS 295 Nursing Practice IV
★7 *(fi 14)* (either term, 0-3s-28c in 7 weeks;0-1.5s-15c). Practice focuses on restoration, rehabilitation and support (including health promotion and disease prevention) of clients with chronic and less acute variances in health across the life span. Practice occurs in homes or in community-based settings. (Note: Focus for post-RPN students will be on childbearing/child-rearing families.) Prerequisites: for Collaborative students: NURS 194, 195. Pre- or corequisites for Post-RPN students: NURS 213, 293.

NURS 301 Nursing Research
★3 *(fi 6)* (either term, 3-0-0 or 6-0-0 in 7 weeks). Introduction to the process of research through a comparative analysis of selected studies exemplifying different theoretical, methodological, and analytical approaches. Emphasis is on the communicability of research, the needs of the research consumer, and the development of skills of critical appraisal. Pre- or corequisite: Statistics elective. Note: (NURS 301 and STAT [★3]) and (NURS 397 and 497) may not both be taken for credit.

NURS 315 Community Nursing for Post-RN Students
★5 *(fi 10)* (first term, 0-6s-3 in 7 weeks; 1-2s-1.5). Focus is on concepts related to family and community health. Community nursing management and interventions consistent with the principles of primary health care will be examined.

NURS 340 Advanced Interpersonal Communication Skills: The Process for Promoting Health
★4 *(fi 8)* (either term, 3-0-1). Development of advanced interpersonal communication skills for the teaching and health counselling roles assumed by health professionals. The students will have the opportunity to relate course

content to their own area of interest through discussion and practice. Prerequisite: PSYCO 104 or equivalent.

NURS 368 Health Assessment
★4 *(fi 8)* (either term, 3-0-3). Focus is on the health assessment of the well adult, with normal aging modifications. The course provides a beginning foundation of assessment skills and technologies necessary for determining client health status within the context of a nursing framework. Factors influencing lifestyles and personal health practices are included. For Post-RN students only.

NURS 385 Community Practice for Post-RNs
★7 *(fi 14)* (second term, 0-3s-28c in 7 weeks;0-1.5s-15c). Nursing practice focuses on health promotion and disease prevention of clients across the life-span. Practice occurs in homes or community-based settings. Pre- or Corequisite: NURS 315.

NURS 390 Nursing in Context C
★5 *(fi 10)* (first term, 0-6s-3 in 7 weeks). Within the context of primary health care focus is on restoration, rehabilitation and support of clients experiencing more acute variances in health. Discussion related to health promotion and disease prevention continues. Advanced health assessment and nursing skills are introduced. Prerequisites for Collaborative students: NURS 150, 151, 291, 294, 295. Pre- or corequisite for Post-RPN students: NURS 291.

NURS 391 Nursing Practice V
★7 *(fi 14)* (either term, 0-3s-28c in 7 weeks). Practice focuses on restoration, rehabilitation, and support (including health promotion and disease prevention) of clients experiencing more acute variances in health across the life-span. Practice occurs in primary-, secondary-, and tertiary-level acute care settings. Prerequisites for Collaborative students: NURS 150, 151, 291, 294, 295. Prerequisites for Post-RPN students: NURS 291.

NURS 393 Transition to Post RN Program I
★4 *(fi 8)* (first term, 0-3s-3 in 7 weeks). Introduction to the Post-RN program, with a focus on primary health care, family, community, nursing research and statistics, and concepts from physical sciences, medical sciences, social sciences, and humanities. Note: Course is for Program-1 Post-RN students only.

NURS 394 Nursing in Context C1
★5 *(fi 10)* (second term, 0-6s-3 in 7 weeks). Continuation of NURS 390 with increasing situational complexity. Prerequisites for Collaborative students: NURS 150, 151, 390, 391, 395. Prerequisite for Post-RPN students: NURS 390 and pre- or corequisite of NURS 391. Prerequisites for Program-1 Post-RN students; NURS 393, 397. Prerequisites for Program-2 Post-RN students: NURS 390, 391.

NURS 395 Nursing Practice VI
★7 *(fi 14)* (either term, 0-3s-28c in 7 weeks). Practice focuses on restoration, rehabilitation and support (including health promotion and disease prevention) of clients across the life-span who are experiencing more acute variances in health. Practice occurs in homes, acute care settings, or in community-based settings. Prerequisites: NURS 150, 151, 291, 294, 295.

NURS 396 Transition to Post-RN Program II
★4 *(fi 8)* (first term, 0-3s-3 in 7 weeks;0-1.5s-1.5). Focus is on additional concepts related to primary health care, family, community, nursing research and statistics, and concepts from physical sciences, medical sciences, social sciences, and humanities. Pre- or corequisite for Program-1 Post-RN students: NURS 393. Note: Course is for Program-1 Post-RN students only.

NURS 397 Nursing Research and Statistics I
★2 *(fi 4)* (first term, 2-1.5s-0.5 in 7 weeks). Introduction to the process of research through critical appraisals of selected quantitative and qualitative studies. Emphasis is on understanding the research process and knowing how to critically read, analyze, and begin to apply the knowledge gained from research in practice. Focus is on the planning phase of the research process and descriptive statistics. Corequisite for Collaborative and Post-RPN students: NURS 390; Corequisites for Post-RN Program-1 students: NURS 393, 396; Corequisite for Post-RN Program-2 students: NURS 394. Note: NURS 397 and 497, and NURS 301 and STAT [★3] may not both be taken for credit.

NURS 401 Nursing Management
★4 *(fi 8)* (either term, 3-0-3). Introduction to the theory and practice of management applied to settings where nurses work. Emphasis will be placed on theories of organization, management, and leadership, as well as on selected nursing systems and worklife issues. The practice component will include a variety of learning experiences in health care settings or in seminars and simulations. Prerequisites for Collaborative students: NURS 300, 301, 302, 303. Prerequisites for Post-RN students: NURS 300, 301, 302. Prerequisites for RPN to BScN students: NURS 300, 302. Prerequisite or corequisite: NURS 301.

NURS 402 Nursing Trends and Issues
★2 *(fi 4)* (either term, 0-2s-0). A variety of current professional, social, political, and global trends and issues affecting the nursing profession and health care system within Canada will be addressed. Students will have the opportunity to examine, analyze, and evaluate selected trends and issues. Prerequisites: NURS 300, 302. Additional prerequisite for Collaborative students: NURS 303.

NURS 409 Leadership and Issues in Nursing
★3 *(fi 6)* (second term, 0-3s-0). Using the primary health care framework, a variety of current professional, social, political and global issues affecting the nursing profession and the Canadian health care system will be addressed. Key principles of leadership and management will also be addressed within the context of these issues.

NURS 420 Cross-Cultural Colloquium
★3 *(fi 6)* (either term, 0-3s-0). Focus is on the development of cross-cultural, cross-national communication and collaboration skills among students. Students gain insight into their own cultural beliefs, assumptions, and values, and how these influence their nursing practice as well as the cultural beliefs and values of students in the partner countries. Computer-mediated communication will aid students in forming a collaborative network for the exchange of ideas and resources to address common problems and issues, such as, the global effects of technology; health, sociopolitical, and economic policies; restructuring of health care systems; and urban/rural health care delivery.

NURS 453 Nursing Care of the Normal and High Risk Newborn
★3 *(fi 6)* (first term, 3-6c-0). Application of physiological principles to the nursing care of the newborn, preterm and sick infant. The effect of ongoing psychological and social needs in relations with the mother and father. The management of life-support systems in the care of the immature or sick newborn. Prerequisite: consent of Instructor.

NURS 490 Nursing in Context D
★5 *(fi 10)* (either term, 0-6s-3 in 7 weeks; 0-3s-1.5). A comprehensive approach to primary health care components in the care of clients in complex, ambiguous situations. Case management and multidisciplinary leadership skills are emphasized. Students may have the opportunity to lead a multidisciplinary student group. Prerequisites for Collaborative students: NURS 391, 394, 395. Prerequisites for Post-RPN students: NURS 391, 394. Pre- or Corequisite for Post-RN students: NURS 315.

NURS 491 Nursing Practice VII
★7 *(fi 14)* (either term, 0-3s-28c in 7 weeks). Management and care of clients in ambiguous, complex, situations occurring over a variety of settings. Pre- or corequisite: NURS 490.

NURS 492 Nursing Practice VII for Post RN Students
★7 *(fi 14)* (either term, 0-3s-28c in 7 weeks). Comprehensive approach to professional practice of nursing in an area of special interest to the student. Pre- or corequisite: NURS 494. Note: Course is for Post RN students only.

NURS 493 Nursing Intervention in Neonatal Intensive Care
★3 *(fi 6)* (second term, 3-6c-0). Nursing care of the high risk infant in a neonatal intensive care unit. Trends and issues in neonatal care will be examined with emphasis on the impact of acute and chronic illness on the physical and psycho-social well-being of the family. Prerequisite: NURS 453 or consent of Instructor.

NURS 494 Nursing in Context D1
★3 *(fi 6)* (either term, 0-7s-3 in 4 weeks). Synthesis and focus of nursing knowledge and application of nursing research in a specific area of practice. Prerequisites for Collaborative students: NURS 391, 394, 395. Prerequisites for Post-RPN students: NURS 391, 394.

NURS 495 Nursing Practice VIII
★9 *(fi 18)* (either term, 0-1s-34c in 10 weeks). Comprehensive approach to professional practice of nursing in an area of special interest to the student. Prerequisite: NURS 491. Pre- or corequisite: NURS 494.

NURS 497 Nursing Research and Statistics II
★4 *(fi 8)* (either term, 2-5s-1 in 7 weeks). Students continue to develop their skills to critically read, analyze, and begin to use knowledge gained from research in their practice. Building on the knowledge from NURS 397, this course focuses on understanding the implementation phase of research and inferential statistics. Students also examine trends and issues in developing evidenced-based practice for the profession of nursing. Prerequisite: NURS 397. Corequisite: NURS 490. Note: NURS 397 and 497, and NURS 301 and STAT [★3] may not both be taken for credit.

NURS 498 Special Studies in Nursing
★1-12 *(variable)* (either term, variable).

Graduate Courses

NURS 502 Nature and Development of Nursing Knowledge
★3 *(fi 6)* (either term, 0-3s-0). Enquiry into the nature, scope, and object of nursing knowledge; the distinct contribution of nursing art, philosophy, history, and science. Includes exploration of nursing theories/frameworks. Prerequisite: consent of Instructor.

NURS 503 Design and Conduct of Nursing Research
★3 *(fi 6)* (either term, 0-3s-1). Overview of research approaches to the investigation of nursing phenomena. The principles and process of quantitative and qualitative methods are emphasized. Opportunities are provided for critique and application of the research process. Pre- or corequisite: graduate-level Statistics course (★3) and consent of Instructor.

NURS 510 Advanced Health Assessment and Applied Pathophysiology (Adult)
★4 *(fi 8)* (either term, 0-3s-6c). The focus of this course is on developing advanced assessment skills for diagnostic reasoning and clinical decision making in relation to common variations in the health status of adults. Students will focus on specialized assessment and applied pathophysiology in relation to specific adult populations. Opportunities to apply diagnostic reasoning skills and formulate clinical decisions required for the development of specific health care management strategies is provided through seminars, laboratory practice, and a clinical practicum in a range of health care settings.

NURS 512 Assessment for Community and Population Health
★4 *(fi 8)* (either term, 0-3s-6c). The focus of this course is nursing assessment of communities and other populations as a foundation for program planning in health promotion and disease prevention. The content includes use of data about community capacity, health status characteristics, and the causes and distribution of disease. Emphasis will be placed on a socio-environmental approach to health, including the social determinants of health and disease.

NURS 513 Advanced Health Assessment and Applied Pathophysiology (Child)
★4 *(fi 8)* (either term, 0-3s-6c). The focus of this course is to develop advanced assessment skills for diagnostic reasoning and clinical decision making in relation to health promotion and common variations in the health status of children from infancy to 16 years of age. Students will focus on specialized assessment and applied pathophysiology in relation to specific pediatric populations. The opportunity to apply diagnostic reasoning skills and formulate clinical decisions required for the development of specific health care management strategies is provided in a range of health care settings in which children and their families are the primary focus.

NURS 521 Advanced Perinatal Physiology
★3 *(fi 6)* (either term, 0-3s-0). Basic and clinical lectures on research on neonatal physiology and health problems of the infant with reference to current therapeutics including pharmacology. Prerequisite: PAEDS 501 or consent of Instructor.

NURS 524 Advanced Neonatal Intensive Care Nursing
★3 *(fi 6)* (either term, 0-3s-1). Students will have the opportunity to integrate theory from physiological and psychological perspectives and to learn advanced clinical skills through case-management of high-risk infants and their families. This will take place through a series of hands-on labs and seminars focusing on patient scenarios. Clinical placement will be in a Level III nursery with follow-up after discharge of the infant. Prerequisites: NURS 521 or equivalent and consent of Instructor.

NURS 529 Advanced Neonatal Intensive Care Nursing Practicum
★6 *(fi 12)* (Spring/Summer, 0-40c-0). During this experience in Spring/Summer the students will acquire skill and experience in functioning in an advanced role under the preceptorship of selected nurses and neonatologists working in an expanded role. Prerequisite: NURS 524.

NURS 531 Community Health: Practice and Research Perspectives
★3-4 *(variable)* (either term, variable). Concepts and research in health promotion and disease prevention in community settings will be addressed. Emphasis will be given to implications for multidisciplinary practice related to community development, program planning and evaluation, and knowledge utilization. Only MN students are eligible to register in the clinical practicum. Prerequisite for MN students: NURS 512.

NURS 532 Family Health and Wellness
★3 *(fi 6)* (either term, 0-3s-0). This course is focused on models of family health and related research. Both the health of families and the family's influence on health will be examined. Measurement and assessment issues will be discussed. Applications to nursing and other health-related disciplines will be explored. Co-taught by Faculty of Nursing and Department of Human Ecology.

NURS 534 Advanced Practice in Community Health Nursing
★4 *(fi 8)* (either term, 0-3s-6c). Concepts and research concerning nursing and health promotion in community settings will be addressed with emphasis given to implications for the nursing role. Theoretical content will pertain to multiple client groups in the community. Students will select one level of client (population, group, aggregate, or families) for nursing practice within a community health model. Pre- or corequisite: NURS 512.

NURS 535 Promoting Health-enhancing Public Policy
★3-4 *(variable)* (either term, variable). The policy process, including context, strategies, and impact of policies on health. Emphasis on public policy related to the broad social determinants of health and approaches such as intersectoral collaboration, partnerships, coalitions, and public participation. Prerequisite: consent of Instructor.

NURS 542 Living with Chronicity: Issues and Concepts
★3 *(fi 6)* (either term, 0-3s-0). Students explore how persons with a chronic disease or disability and their families adapt to live with this disease or disability, how society influences that adaptation, and how that adaptation affects the integration of persons with a chronic disease or disability into society. Frameworks consistent with a health promotion perspective will also be examined.

NURS 545 Pharmacotherapeutics in Advanced Nursing Practice
★3 *(fi 6)* (either term, 0-3s-0). Graduate seminar on the principles of clinical pharmacology and their relevance to the promotion of health across the lifespan through advanced nursing practice. The psychotropics will be used as a model for the clinical application of these principles. Focus will be on the selection, prescription, and management of pharmacotherapy as adjunct to advanced nursing practice. Simulated and actual patient situations will be used to stimulate discussion and provide students with an opportunity to apply the basic principles of clinical pharmacology.

NURS 550 Professional Issues in Advanced Nursing Practice
★3 *(fi 6)* (either term, 0-3s-0). Advanced analysis of trends, problems and issues of the nursing profession, with emphasis on interdisciplinary and intersectorial components of the health care system and society. Prerequisite: consent of Instructor.

NURS 554 Leadership in Health and Nursing Services
★3 *(fi 6)* (either term, 0-3s-0). Theoretical concepts and research issues relative to leadership behavior in the health care system will be addressed as a basis for practice in senior position responsible for nursing services. Relevant leadership and administrative topics will be examined, including organization design, health services, integration, information and project management, fiscal accountability, consumer and stakeholder relations, and health policy development. Prerequisite: Undergraduate course in management or consent of Instructor.

NURS 560 Topics in Advanced Study in Nursing
★1-12 *(variable)* (either term, variable). An elective course aimed at developing in-depth knowledge regarding a topic(s) related to advanced-level nursing. Learning experiences may include clinical experience. Prerequisite: consent of Instructor.

NURS 561 Guided Individual Study in Nursing
★1-12 *(variable)* (either term, variable). A course designed for in-depth, individual study of a topic related to advanced-level nursing. Learning experiences may include clinical experience.

NURS 562 Special Topics in Nursing
★1-12 *(variable)* (two term, variable). An elective course aimed at developing in-depth knowledge regarding a special topic related to advanced-level nursing. Learning experiences may include clinical experience. Prerequisite: consent of Instructor.

NURS 565 Selected Topics in Individual Family Health Nursing (Adult)
★1-12 *(variable)* (either term, variable). Selected topics in a variety of advanced nursing practice specialty areas for case management of adults and their family in complex health care situations are emphasized. The role of the advanced practice nurse is examined from the perspective of assessing, managing, monitoring, coordinating, and evaluating health status over time. Sections with a practicum component provide opportunities to assist adults and their family within the context of the health care team. Prerequisite: consent of Instructor.

NURS 570 Advanced Practice in Individual/Family Health Nursing (Adult)
★4 *(fi 8)* (either term, 0-3s-6c). The focus of this course is acquisition of knowledge and skills essential for clinical decision making for management of the individual and their family in various health care situations. Opportunities are provided to implement and evaluate preventative and therapeutic interventions, as well as health promotion strategies. Appropriate community, agency, and treatment resources that may assist in managing emergent to chronic health care situations are utilized. Prerequisite: NURS 510; pre- or corequisite NURS 545.

NURS 571 Advanced Practice in Individual/Family Health Nursing (Child)
★4 *(fi 8)* (either term, 0-3s-6c). The focus of this course is acquisition of the knowledge and skills essential for clinical decision making for the management of infants to children 16 years of age and their families in various health care situations. Opportunities are provided to implement and evaluate preventative and therapeutic interventions, as well as health promotion strategies. Appropriate community, agency, and treatment resources that may assist in managing emergent to chronic health care situations will be utilized. Prerequisite: NURS 513.

NURS 573 Advanced Practice in Mental Health/Psychiatric Nursing
★8 *(fi 16)* (either term, 0-6s-12c). The focus of this course is advanced practice in PMH nursing domains: helping role, diagnostic and monitoring function, administering and monitoring therapeutic interventions, management of rapidly changing situations, teaching-coaching functions, monitoring and ensuring the quality of health care practices, and organizational and work role competencies.

NURS 580 Advanced Theory and Practicum in Individual/Family Health Nursing (Adult)
★6 *(fi 12)* (either term, 0-2s-20c). The focus of this course is to provide a culminating practicum experience in the role of the advanced practice nurse in the student's selected specialty area. Integration of theory and research in relation to practice is facilitated by course seminars. Opportunity is provided to discuss issues relevant to the advanced nursing practice role. Prerequisite: NURS 570.

NURS 581 Advanced Theory and Practicum in Individual/Family Health Nursing (Child)
★6 *(fi 12)* (either term, 0-2s-20c). The focus of this course is practice of advanced nursing skills in the student's selected child health specialty area. Integration of theory and research in relation to practice is facilitated by course seminars Opportunity is provided to discuss issues relevant to the advanced nursing practice role. Prerequisite: NURS 571.

NURS 582 Advanced Theory and Practicum in Community/Public Health Nursing
★4 *(fi 8)* (either term, 0-2s-10c). The focus of this course is practice of advanced nursing skills in community/public health nursing with a selected population related to program and policy development, program evaluation, and/or knowledge utilization. Prerequisite: NURS 531.

NURS 583 Advanced Theory and Practicum in Mental Health/ Psychiatric Nursing
★6 *(fi 12)* (either term, 0-2s-20c). In this course the student is supervised in assuming an advanced practice role in psychiatric and mental health nursing. Settings for practice may include mental health clinics, outpatient departments, psychiatric practices, specialized treatment programs, health centres, crisis teams. Prerequisite: NURS 573.

NURS 584 Advanced Theory and Practicum in Management
★6 *(fi 12)* (either term, 0-2s-20c). This practicum is designed to enhance contextual knowledge and skills relevant to leadership roles in the health system. Each student will be matched with a mentor who occupies a senior position in a health policy or delivery organization. Seminars will provide a forum for application of theory. Prerequisite: NURS 554 or equivalent.

NURS 599 Thesis Seminar
★1 *(fi 2)* (either term, 0-2s-0). Required for one academic year (two terms) of the Master of Nursing program. Prerequisite: consent of Instructor.

NURS 600 Theory Development in Nursing
★3 *(fi 6)* (either term, 0-3s-0). Exploration of influence and implications of various nursing models, paradigms, and conceptualizations of nursing practice on the development and structure of the discipline of nursing. Prerequisite: consent of Instructor.

NURS 610 Contemporary Views of Nursing Science
★3 *(fi 6)* (either term, 0-3s-0). Enquiry into contemporary philosophic views of the nature of nursing science including natural science, human science, practical science, interpretive, and postmodern views. Prerequisite: consent of Instructor.

NURS 660 Topics in PhD Studies in Nursing
★1-12 *(variable)* (either term, variable). A course aimed at developing in-depth knowledge regarding a topic(s) related to PhD-level nursing. Learning experiences may include clinical experience.

NURS 661 Guided Individual Study in Nursing
★1-12 *(variable)* (either term, variable). A course designed for in-depth, individual study of a topic related to PhD-level nursing. Learning experiences may include clinical experience.

NURS 683 Design Problems in Nursing Research
★3 *(fi 6)* (either term, 0-3s-0). Appraisal of laws of scientific inquiry and designs used in nursing research. Prerequisite: consent of Instructor.

NURS 684 History and Politics of Nursing
★3 *(fi 6)* (either term, 0-3s-0). Exploration of the roots of nursing through analysis of the development of the profession within the larger social context. Examines developments at individual and collective levels including selected organizations, events, and individuals central to the evolution of the profession. Prerequisite: consent of Instructor.

NURS 699 Dissertation Seminar
★1 *(fi 2)* (either term, 0-1s-0). For PhD in Nursing students, registration required for two terms. Opportunity for discussion of proposed and ongoing research.

NURS 900 Guided Scholarly Project
★3 *(fi 6)* (either term, unassigned). A guided scholarly project which will focus on such areas as clinical outcomes, evidence-based practice, quality improvement, or knowledge diffusion.

201.153 Nutrition, NUTR

Department of Agricultural, Food and Nutritional Science
Faculty of Agriculture, Forestry, and Home Economics

Note: See also Agricultural, Food and Nutritional Science (AFNS), Animal Science (AN SC), Interdisciplinary (INT D), Nutrition and Food Sciences (NU FS) and Plant Science (PL SC) listings for related courses.

The following courses were renumbered effective 1995/96.

Old	New	Old	New
NU FS 301	NUTR 301	NU FS 302	NUTR 302

Undergraduate Courses

O NUTR 100 Nutrition and Wellbeing
★3 *(fi 6)* (first term, 3-0-0). Principles of nutrition. The need for and functions of the major nutrients for humans. Cannot be taken by students with credit in any Biochemistry or other Nutrition course.

O NUTR 260 Introductory Animal Nutrition
★3 *(fi 6)* (first term, 3-0-3). Principles of nutrition. The need for and functions of the major nutrients for animals. Laboratory will involve diet formulation and discussion of feeds and feeding practices. Prerequisite: ★3 in university-level biology or chemistry. Cannot be taken by students with credit in NUTR 301 or equivalent.

NUTR 301 Energy, Carbohydrates, Lipids and Proteins
★3 *(fi 6)* (second term, 3-0-0). Fundamentals of nutrition, emphasizing energy, carbohydrates, lipids, and proteins. Students cannot obtain credit in both NUTR 301 and NUTR 303. Prerequisite: ★3 in Biochemistry.

O NUTR 302 Vitamins and Inorganic Elements
★3 *(fi 6)* (first term, 3-1s-0). Fundamentals of nutrition with emphasis on vitamins and inorganic elements. Prerequisite: ★3 in Biochemistry.

O NUTR 365 Applied Animal Nutrition
★3 *(fi 6)* (second term, 3-0-3). Feeds and feeding of swine, poultry, and ruminants. Laboratories will involve feeding projects in applied animal nutrition. Prerequisites: NUTR 260, 301 or 302.

L NUTR 440 Nutrition and Metabolism
★3 *(fi 6)* (second term, 0-3s-3). Integrated exploration of issues pertaining to nutrition and metabolism. Capstone experience. Open to fourth-year students only.

Graduate Courses

Notes
(1) 400-level courses in NUTR may be taken for credit by graduate students under certain circumstances with approval of the student's supervisor or supervisory committee. A 300-level course may be taken for credit by graduate students under certain circumstances with approval of the AFNS Graduate Program Committee. (See §174.1.1(1))
(2) See Agricultural, Food and Nutritional Science (AFNS) listing for related courses.

201.154 Nutrition and Food Sciences, NU FS

Department of Agricultural, Food and Nutritional Science
Faculty of Agriculture, Forestry, and Home Economics

Note: See also Agricultural, Food and Nutritional Science (AFNS), Animal Science (AN SC), Interdisciplinary (INT D), Nutrition (NUTR) and Plant Science (PL SC) listings for related courses.

Undergraduate Courses

O NU FS 100 Introduction to Food Science and Technology
★3 *(fi 6)* (first term, 3-0-0). An introduction to the nature of food, food technology, food safety. Not open to third- and fourth-year students in the Faculty of Agriculture, Forestry, and Home Economics.

O NU FS 200 Introduction to Functional Foods and Nutraceuticals
★3 *(fi 6)* (second term, 3-0-0). Principles of functional food concepts, health claims, regulations, consumer trends, value added food production, and processing technology, and marketing strategies in the food industry. Prerequisite: NU FS 100 or NUTR 100 or consent of Instructor.

NU FS 209 Chemistry of Culinary Systems I
★3 *(fi 6)* (Spring/Summer, variable). Also available in French through the University of Laval. Offered by home study only. Review of basic chemical principles relating to food preparation. Detailed consideration of the chemical behavior of water and proteins in food preparation processes. Contact the teaching department for more information. Note: Not available to students with credit in NU FS 372 or 373. (Agricultural, Food and Nutritional Science)

NU FS 210 Chemistry of Culinary Systems II
★3 *(fi 6)* (Spring/Summer, variable). Also available in French through the University of Laval. Offered by home study only. The chemistry of fats and carbohydrates in food preparation processes. Visual appeal of foods and the role of pigments in cuisine. Prerequisite: NU FS 209. Contact the teaching department for more information. Note: Not available to students with credit in NU FS 372 or 373. (Agricultural, Food and Nutritional Science)

O NU FS 283 Introduction to Food Engineering
★3 *(fi 6)* (second term, 3-0-3). Mass and heat balances, thermodynamics. Fluid mechanics, heat and mass transfer in food systems. Prerequisites: MATH 113 or 114 and ★6 of chemistry or physics, or consent of Instructor.

O NU FS 300 Fundamentals of Dairy Science
★3 *(fi 6)* (second term, 3-2s-0). Physiology of lactation, Biosynthesis and properties of milk components. Physical, chemical, microbiological, technological and nutritional aspects of milk. Prerequisite: ★3 in Biochemistry. Credit cannot be obtained for NU FS 300 and DAIRY 300.

O NU FS 312 Quality Assurance
★3 *(fi 6)* (second term, 3-0-1.5). Statistical methods in quality assurance, sampling plans, control charts, sensory evaluation and risk management in the food industry, HACCP, good manufacturing practices, food regulations, labelling requirements, and ISO 9000 standards. Prerequisite: Introductory Statistics.

NU FS 323 Trends and Traditions Influencing Dietary Patterns
★3 *(fi 6)* (second term, 3-0-3). Food habits as influenced by historical, geographical, religious, cultural, and economic factors. Implications of these on food selection, menu planning, food purchasing, preparation, and intake. Corequisite: NU FS 374 or prerequisite: ★60 including a ★3 NUTR or NU FS course.

O NU FS 353 Unit Operations in Food Processing
★3 *(fi 6)* (first term, 3-0-3). Processes used in food manufacturing. Refrigeration, evaporation, sedimentation, centrifugation, filtration, and contact-equilibrium separation methods. Prerequisite: NU FS 283.

NU FS 361 Food Microbiology
★3 *(fi 6)* (first term, 3-0-3). Environmental factors affecting the growth, activity, and destruction of microorganisms in food and their application to control foodborne illness and spoilage in the food processing and food service industries. Given concurrently with NU FS 363, not open to students with credit in NU FS 363. Limited registration. Preference will be given to students in the Food Science and Technology major. Prerequisite: BIOL 107 or 108 or ★3 in Microbiology.

O NU FS 363 Food Microbiology
★3 *(fi 6)* (first term, 3-0-0). Environmental factors affecting the growth, activity, and destruction of microorganisms in food and their application to control foodborne illness and spoilage in the food processing and food service industries. Given concurrently with NU FS 361, not open to students with credit in NU FS 361. Prerequisite: BIOL 107 or 108 or ★3 in Microbiology.

O NU FS 372 Food Chemistry
★3 *(fi 6)* (first term, 3-0-3). Chemistry of food constituents. Laboratory emphasizes analytical techniques. Given concurrently with NU FS 373. Not open to students with credit in NU FS 373. Prerequisites: CHEM 161 and 163.

O NU FS 373 Food Chemistry
★3 *(fi 6)* (first term, 3-0-0). Chemistry of food constituents. Prerequisite: CHEM 161/163. Given concurrently with NU FS 372. Not open to students with credit in NU FS 372.

L NU FS 374 Food Fundamentals and Quality
★3 *(fi 6)* (either term, 3-0-3). Chemical, physical, and sensory properties of food products and factors affecting food quality in relation to preparation, processing, and storage of foods in the home and institution. Prerequisite or Corequisite: NU FS 372 or 373.

O NU FS 393 Dairy Product Analysis
★3 *(fi 6)* (second term, 1-0-3). Biochemical, chemical, and microbiological analyses of milk and dairy products. Prerequisites: NU FS 300, 361, and 372, or DAIRY 300. Credit cannot be obtained for NU FS 393 and DAIRY 393.

O NU FS 400 Undergraduate Reading Project
★3 *(fi 6)* (either term, 3-0-0). Individual study. Critical reviews of selected literature under the direction of a staff member. Note: For third- and fourth-year students only. Students must obtain approval from Department before registration. May be taken more than once provided topic is different.

NU FS 401 Undergraduate Research Project
★3 *(fi 6)* (either term, 0-0-6). Directed laboratory study under supervision of a staff member. Note: For third- and fourth-year students only. Students must obtain approval from Department before registration. May be taken more than once provided that topic is different.

O NU FS 402 Brewing, Enology, and Food Fermentations
★3 *(fi 6)* (second term, 3-1s-0). Biological, biochemical, and technical aspects of microbial and fungal fermentations used in the food and beverage industries, especially the lactic acid and alcohol fermentations. Intended for undergraduate students. Graduate students may not register for credit (see AFNS 502). Prerequisites: MICRB 265 or NU FS 361 or 363.

O NU FS 403 Processing of Milk and Dairy Products
★3 *(fi 6)* (first term, 3-1s-0). Technological principles of milk treatment and processes for fluid milk products; concentrated, dried, sterilized, and fermented dairy products; cheese, butter and ice cream. Intended for undergraduate students. Graduate students should take AFNS 503. Prerequisite: NU FS 374.

O NU FS 404 Meat and Meat Products
★3 *(fi 6)* (second term, 3-0-3/2). Biological, biochemical, chemical, and technological aspects of the processing of meat and meat products. Prerequisite: ★3 in Biochemistry.

O NU FS 405 Postharvest Physiology and Processing of Fruits and Vegetables
★3 *(fi 6)* (first term, 3-0-3/2). Physiological, biochemical, and biophysical changes associated with maturation, ripening, and senescence of fruits and vegetables. Design, selection, and use of handling, storage, and transport facilities. Biological, biochemical, chemical, and technological aspects of processing. Offered in alternate years commencing in 1998/99. Intended for undergraduate students. Graduate students may not register for credit (see AFNS 505). Prerequisite: ★3 in introductory Biochemistry.

O NU FS 406 Processing and Storage of Cereals and Oilseeds
★3 *(fi 6)* (first term, 3-0-3/2). Biological, biochemical, chemical, and technological aspects of the processing of cereals and oilseeds. Prerequisite: ★3 in introductory Biochemistry or Biological Science or NU FS 374 or consent of Instructor.

O NU FS 427 Nutritional Toxicology and Food Safety
★3 *(fi 6)* (first term, 3-0-0). Provides students with an understanding of the principles of risk: benefit evaluations related to the metabolic consequences of exposure to foodborne chemicals and therapeutic agents, and to microbiological concerns about foods. Intended for undergraduate students. Graduate students may not register for credit (see AFNS 527). Prerequisites: ★3 in Biochemistry and ★3 in Microbiology or consent of Instructor.

L NU FS 428 Recent Advances in Nutraceuticals
★3 *(fi 6)* (second term, 0-3s-0). A seminar course involving critical evaluations of the current literature on food components, including functional foods and nutraceuticals. Students learn to interrelate the chemistry, health potential and toxological implications of the components. Intended for undergraduate students. Graduate students should take AFNS 528. Prerequisite: NU FS 200 or consent of Instructor.

L NU FS 430 Principles of Sensory Evaluation of Foods
★3 *(fi 6)* (either term, 3-0-3). Principles and methods of analysis of the sensory properties of foods; appearance, texture, aroma, and taste. Physiology of sensory receptors. Applications, advantages, and limitations of sensory methods. Prerequisites: Introductory statistics and NU FS 372 or 373.

O NU FS 440 Dairy Science and Nutrition
★3 *(fi 6)* (either term, 0-3s-0). Integrated final project including laboratory or field word. Exploration of dairy systems, technological processes or issues pertaining to quality and nutritive value of dairy products. Open to fourth-year students only. Prerequisite: consent of Instructor. Credit cannot be obtained for NU FS 440 and DAIRY 440.

L NU FS 450 Food Product Development
★3 *(fi 6)* (either term, 3-0-3). Design of concept, formulation, processing, packaging and labeling of a new food product and development of quality assurance and marketing strategies. Prototype development in the laboratory and testing of consumer acceptability. Open to fourth-year students in the Nutrition and Food Science, Food Processing Business Management and Food Service Business Management Programs.

L NU FS 452 Nutritional Aspects of Chronic Human Diseases
★3 *(fi 6)* (second term, 3-0-0). A lecture and reading course for senior undergraduate students which will address the scientific basis for nutritional intervention in chronic human disease. Intended for undergraduate students. Graduate students may not register for credit (see AFNS 552). Prerequisites: NUTR 301 (or 303) and 302, or consent of Instructor.

O NU FS 454 Unit Operations in Food Preservation
★3 *(fi 6)* (second term, 3-0-3). Processes used in food preservation. Dehydration, refrigeration and freezing, sterilization and canning, irradiation. Effect of processing on food properties. Intended for undergraduate students. Graduate students may not register for credit (see AFNS 554). Prerequisites: NU FS 283, NU FS 361 (or 363) and 372 (or 373), or consent of Instructor.

L NU FS 456 Nutrition Across the Lifespan
★3 *(fi 6)* (either term, 3-0-0). A lecture and reading course for senior undergraduate students. This course will examine our understanding of how nutrients act on a cellular, tissue and whole organism level to influence human growth, development and aging. Prerequisites: NUTR 301 or 303 and NUTR 302.

L NU FS 461 Foodservice Systems Management
★3 *(fi 6)* (first term, 3-0-4). Operational techniques and special problems encountered during the preparation and service of food in quantity, in both commercial operations and foodservice establishments. The laboratory sessions will provide experience in quantity food production. Prerequisites: NU FS 374 and 323. AG EC 323 is recommended.

L NU FS 463 Foodservice and Hospitality Project
★3 *(fi 6)* (second term, 0-1s-3). Directed foodservice research project or critical reviews of selected literature, under supervision of a staff member. Prerequisite: NU FS 461.

L NU FS 468 Clinical Nutrition
★3 *(fi 6)* (first term, 3-0-3). Basic principles of nutrition in clinical situations. The role of diet in the management of various diseases. The laboratory sessions include practical experience in providing individualized nutritional care for clients from various cultural backgrounds. Intended for undergraduate students. Graduate students may not register for credit (see AFNS 568). Prerequisite: NUTR 301 (or 303). Corequisite: NUTR 302.

NU FS 472 Coordinated Practical Program
★3 *(fi 6)* (either term, 0-1s-8). Supervised practical experience in selected areas of interest. For senior Foods and Nutrition majors with consent of Instructor.

L NU FS 476 Advanced Clinical Nutrition
★3 *(fi 6)* (either term, 3-0-3). The principles of diet therapy in selected areas of current interest. Emphasis on case studies, research, and practical problems in clinical dietetics. Intended for undergraduate students. Graduate students may not register for credit (see AFNS 578). Prerequisite: NU FS 468.

L NU FS 477 Nutrition in the Community
★3 *(fi 6)* (second term, 3-0-3). Examination of nutrition problems in contemporary communities. The application of basic concepts of food and nutrition to community nutrition problems. Discussion of nutrition programs and resources. Intended for undergraduate students. Graduate students may not register for credit (see AFNS 577). Prerequisites: NUTR 301 (or 303) and NUTR 302. Preference given to BSc NU FS students.

L NU FS 478 Advanced Nutrition: Energy, Carbohydrates, Lipids, and Proteins
★3 *(fi 6)* (either term, 3-0-0). Scientific literature and current issues in the areas of carbohydrates lipids, and proteins. A major integrative group project is also required. Prerequisite: NUTR 301 (or 303). NUTR 302 is recommended.

L NU FS 479 Advanced Nutrition: Vitamins and Inorganic Elements
★3 *(fi 6)* (second term, 3-0-0). A lecture and reading course in vitamins and inorganic elements. Introduction to seminar presentation and critical evaluation of current literature. Students will also learn the skill of writing a scientific paper. Intended for undergraduate students. Graduate students may not register for credit (see AFNS 579). Prerequisite: NUTR 302. NUTR 301 (or 303) is recommended.

L NU FS 480 Foodborne Pathogens
★3 *(fi 6)* (second term, 3-1s-0). Established and emerging causative agents of microbial foodborne illness, their significance and control in the food chain. Rationale for regulatory intervention to enhance the microbiological safety of foods. Offered in alternate years. Intended for undergraduate students. Graduate students may not register for credit (see AFNS 580). Prerequisite: MICRB 265 or NU FS 361 or 363.

L NU FS 481 Advanced Foods
★3 *(fi 6)* (second term, 3-0-0). Critical evaluation of current literature on the effects of ingredients and processing on quality characteristics of foods. Intended for undergraduate students. Graduate students may not register for credit (see AFNS 581). Prerequisites: NU FS 374 and ★3 in Biochemistry or consent of Instructor.

Graduate Courses

Notes
(1) 400-level courses in NU FS may be taken for credit by graduate students under certain circumstances with approval of the student's supervisor or supervisory committee. A 300-level course may be taken for credit by graduate students under certain circumstances with approval of the AFNS Graduate Program Committee. (See §174.1.1(1))
(2) See also Agricultural, Food and Nutritional Science (AFNS) listing for related courses.

NU FS 502 Coordinated Practical Program
★3 *(fi 6)* (second term, 0-1s-8). Supervised practical experience in selected areas of interest. Note: For senior Foods and Nutrition majors.

201.155 Obstetrics and Gynaecology, OB GY

Department of Obstetrics and Gynecology
Faculty of Medicine and Dentistry

Undergraduate Courses

OB GY 546 Obstetrics and Gynaecology Student Internship
★6 *(fi 12)* (either term, 6 weeks). Student internship in obstetrics and gynaecology for students registered in the MD program.

201.156 Occupational Therapy, OCCTH

Department of Occupational Therapy
Faculty of Rehabilitation Medicine

Note: All OCCTH courses are open to Occupational Therapy students only except OCCTH 106 and 107 which are open to all students.

Undergraduate Courses

O OCCTH 106 Communication Theory and Helping Relationship
★3 *(fi 6)* (either term, 3-0-0). Interpersonal communication theory and application to health care. Exploration of values and attitudes as they affect professional/client relationships.

OCCTH 307 Core I: Occupational Therapy Practice Delivery
★3 *(fi 6)* (either term, 39 hours in 9 weeks). Fundamental concepts of occupational therapy and their applications in health care delivery. Students will be oriented to specific conceptual models and theoretical approaches used in the practice of occupational therapy. Corequisites: OCCTH 309, 362.

OCCTH 308 Psychosocial Assessment and Intervention in Occupational Therapy
★4 *(fi 8)* (either term, 4-0-0). Introduction to the assessment of clinical disorders in psychiatry and the impact of psychosocial issues on mental health. Taught from an applied holistic approach through case studies, it links clinical conditions to assessment and intervention in the practice of occupational therapy. Prerequisites: OCCTH 307, 309. Corequisite: OCCTH 310.

OCCTH 309 Core 2: Therapeutic Occupation, Assessment and Intervention
★3 *(fi 6)* (either term, 39 hours in 9 weeks). Theory and practical classes in assessment and intervention. Practical experience in the therapeutic use of activities with emphasis on task analysis. Corequisites: OCCTH 307, 362.

OCCTH 310 Core 3: Application of Occupational Therapy Principles
★4 *(fi 8)* (either term, 0-4s-0). Application of occupational therapy principles through the use of intervention media and modalities for various physical and psychosocial domains. Prerequisites: OCCTH 307, 309. Corequisites: OCCTH 308, REHAB 383.

OCCTH 312 Introduction to Assistive Technology
★3 *(fi 6)* (either term, 1-0-2). Discusses the role of the occupational therapist within a multidisciplinary service system. This includes an introduction to accessible architectural design, computer applications environmental controls, light/daily living technologies, and wheeled mobility equipment.

OCCTH 313 Orthotics
★3 *(fi 6)* (either term, 1-0-2). Lectures and practical classes in the principles of design and methods of fabrication of orthotic devices. Prerequisite: OCCTH 211.

OCCTH 323 Professional Portfolios
★1 *(fi 2)* (either term, 13 hours). This practical course, underpinned by theoretical perspectives, provides the structure for students to organize materials that provide evidence of competency achievement.

OCCTH 324 Fieldwork Project
★1.5 *(fi 3)* (either term, 4 weeks). Credit. Practical application of Fall term courses. Students will be expected to complete specific projects designed to integrate the core knowledge of occupational therapy theory. Prerequisites: OCCTH 323 and attendance at Fieldwork Orientation. Corequisites: All Year 3 Fall Term OCCTH courses.

OCCTH 328 Fieldwork
★4.5 *(fi 9)* (either term, 8 weeks). Credit. Practical experience in approved facilities and community agencies. Prerequisites: consent of Department; OCCTH 324 and completion of all Year 3 academic courses; attendance at Professional Development Seminar.

OCCTH 362 Introduction to Research and Clinical Reasoning
★3 *(fi 6)* (either term, 39 hours in 9 weeks). Introduction to research for the critical evaluation of the occupational therapy and related literature to facilitate the learning of specific strategies of clinical reasoning used in occupational therapy practice. Corequisites: OCCTH 307, 309.

OCCTH 403 Occupational Therapy, Theory and Practice in Neurology
★3 *(fi 6)* (either term, 0-3L-0). Occupational Therapy principles, patient evaluation, and treatment procedures in a variety of neurological conditions. Prerequisites: REHAB 351, 353.

OCCTH 404 Group Dynamics and Community Leadership
★3 *(fi 6)* (either term, 0-3s-0). Principles of group therapy in rehabilitation as related to the practice of Occupational Therapy specifically aimed at social and community issues. Prerequisite: OCCTH 308.

OCCTH 407 Sexuality in Rehabilitation Workshop
★1 *(fi 2)* (either term, 20 hours). Sexuality as related to the practice of Occupational Therapy. Prerequisite: OCCTH 308. Corequisite: OCCTH 404.

OCCTH 408 Occupational Therapy Theory
★3 *(fi 6)* (either term, 0-3s-0). Selected conceptual models of occupational therapy are examined in terms of their philosophical base, conceptualization, and application to practice. Open only to post-diploma degree completion students unless department consent is granted.

OCCTH 413 Special Fieldwork
★3 *(fi 6)* (either term, 0-3s-3c). A course designed to allow undergraduates to pursue the practical application of occupational therapy techniques in a specialized setting. These settings depend on the student's stated objectives for pursuing an area of interest, as well as the consent of the agency where the fieldwork is to be done. Enrolment is limited. Prerequisite: consent of Department after completion of OCCTH 328. Note: May not be used for credit as an elective or to replace OCCTH 328, 428, 431, 432. This course is extra to the requirements for the BScOT degree.

OCCTH 414 Core 4: Advanced Application of Occupational Therapy Principles
★3 *(fi 6)* (either term, 39 hours in 8 weeks). Application of occupational therapy principles and evidence-based practice, focusing on children and older adults, through the use of complex integrated case studies. Prerequisites: OCCTH 310, 328. Corequisites: REHAB 419, 455.

OCCTH 415 Core 5: Integration in Specialty Practice Areas
★6 *(fi 12)* (either term, 78 hours in 8 weeks). Application of assessment and intervention strategies in the areas of psychiatry, neurology and work evaluation. Prerequisites: all clinical and completion of academic course work in Year 3 and Fall Term of Year 4. Corequisites: REHAB 454, INT D 410.

OCCTH 428 Fieldwork
★3 *(fi 6)* (either term, 5 weeks). Credit. Practical experience in approved facilities and community agencies. Prerequisites: consent of Department; attendance at Professional Development Seminar; OCCTH 328 and completion of Year 4 Fall Term academic courses.

OCCTH 431 Fieldwork
★4.5 *(fi 9)* (either term, 7 weeks). Credit. Practical experience in approved facilities and community agencies. Prerequisites: consent of Department and completion of OCCTH 428.

OCCTH 432 Fieldwork
★4.5 *(fi 9)* (either term, 7 weeks). Credit. Practical experience in approved facilities and community agencies. Prerequisites: consent of Department, completion of OCCTH 431 and completion of all course work.

OCCTH 433 Fieldwork
★3 *(fi 6)* (either term, 5 weeks). Credit. Practical experience in approved facilities and community agencies. Prerequisites: consent of Department, OCCTH 428 and completion of Year 4 academic courses.

OCCTH 434 Fieldwork
★3 *(fi 6)* (either term, 5 weeks). Credit. Practical experience in approved facilities and community agencies. Prerequisites: consent of Department, OCCTH 433 and completion of Year 4 academic courses.

OCCTH 435 Advanced Psychosocial Rehabilitation
★3 *(fi 6)* (either term, 0-3s-0). A review of psychosocial factors influencing occupational performance. Psychiatric and psychosocial disorders, their diagnosis, classification, and treatment, with specific emphasis on the role of the occupational therapist in assessment, intervention, and consultation. Particular emphasis on case management and counselling strategies as they apply to psychosocial rehabilitation. Prerequisite: OCCTH 308.

OCCTH 456 Occupational Therapy in Work
★3 *(fi 6)* (either term, 3-0-0). Current developments and OT practice in physical rehabilitation, in particular work assessment and task analysis.

OCCTH 486 Student Selected Modules
★1 *(fi 2)* (either term, 13 hours). Students must successfully complete a minimum of two modules from a variety of topics.

OCCTH 496 Student Selected Modules
★1 *(fi 2)* (either term, 13 hours). Students must successfully complete a minimum of three modules from a variety of topics. Note: Course title is variable; course may be repeated.

OCCTH 498 Special Seminars
★3 *(fi 6)* (either term, 0-3s-0). Content varies from year to year. Topics will be announced prior to registration period. Prerequisite: consent of Department.

OCCTH 499 Individual Study
★3 *(fi 6)* (either term, 0-3s-0). A course intended to allow the senior undergraduate student to pursue a topic of interest in more depth than the classroom structure permits. This may take the form of directed reading, laboratory or clinical experience. Prerequisite: Departmental consent.

Graduate Courses

Note: Open only to graduate students in Occupational Therapy program unless departmental consent is granted.

OCCTH 505 Theory and Instrumentation in Occupational Therapy Practice
★3 *(fi 6)* (either term, 0-3s-0). The theory of occupational therapy and its relationship to client assessment. Pre- or corequisite: EDPY 500 or equivalent.

OCCTH 506 Instrumentation Theory in Occupational Therapy
★2 *(fi 4)* (either term, 13 hours in 5 weeks). Measurement principles and their application to occupational therapy. Restricted to students registered in the MSc in OT course-based route. Corequisite: EDPY 500.

OCCTH 512 Core 5: Integration in Speciality Practice Areas
★6 *(fi 12)* (either term, 78 hours in 8 weeks). Application of assessment and intervention strategies in the areas of psychiatry, neurology and work evaluation. Corequisites: REHAB 454, INT D 410.

OCCTH 521 Program Evaluation in Occupational Therapy
★3 *(fi 6)* (either term, 0-3s-0). Designed to equip the student with the resources and skills to evaluate occupational therapy program delivery.

OCCTH 538 Counselling in Rehabilitation
★3 *(fi 6)* (either term, 0-3s-0). Discussions on specific issues related to counselling handicapped persons. Opportunity to practice and apply communication and counselling skills. Prerequisite: OCCTH 532 or consent of Department.

OCCTH 570 Evaluation of Occupational Performance
★3 *(fi 6)* (either term, 0-3s-3). Presentation of resources and techniques necessary for work evaluation, work adjustment and work samples used in rehabilitation.

OCCTH 586 Student Selected Modules
★1 *(fi 2)* (either term, 13 hours). Students must complete a minimum of three modules from a variety of topics. Note: Course title is variable; course may be repeated.

OCCTH 596 Project Design
★3 *(fi 6)* (either term, 0-1s-2). Preparation of directed research project. Open to students in the course-based Master's route only.

OCCTH 597 Research and Directed Studies
★3 *(fi 6)* (either term, 0-0-3). Work on a specific project under the supervision of a faculty member. Prior approval of the supervisor and the student's advisor required.

OCCTH 599 Individual Study
★3 *(fi 6)* (either term, 0-3s-0). Designed to allow a student to pursue a topic of interest in more depth than permitted by existing courses. Prerequisite: Departmental approval of plan of study. May be repeated.

OCCTH 900 Directed Research Project
★6 *(fi 12)* (variable, unassigned). Open to students in the course-based Master's route only.

201.157 Oncology, ONCOL

Department of Oncology
Faculty of Medicine and Dentistry

Graduate Courses

Note: See also PMCOL 505, MED 573, PHYS 475 and PHYS 477.

ONCOL 510 Issues in Psychosocial Oncology
★3 *(fi 6)* (first term, 3-0-0). The general objective of the course is to explore specific clinical and research issues in psychosocial oncology. The course is primarily designed to fit into masters and doctoral programs in a range of disciplines including psychology, educational psychology, social work, family studies, nursing, and pastoral care. It is also open to students in other: disciplines who are considering a career in oncology. Issues in psychosocial oncology such as the mind-body connection, children with cancer, cancer and its impact on the family, grief and loss issues, and many other related topics will be explored. Course assignments will allow students from different disciplines to investigate their own areas of particular interest. Prerequisite: consent of Department.

ONCOL 520 Tumor Biology
★3 *(fi 6)* (second term, 3-0-0). The course will provide an introduction to the basic science of oncology. Topics to be covered comprise: the genetic basis of cancer, including the role of proto-oncogenes and tumor suppressor genes; mechanisms of carcinogenesis and radiation-sensitivity, including DNA repair and cell cycle control; the molecular basis of tumor metastasis, including cell motility, tumor cell invasion, and extravasation; tumor immunology and angiogenesis. Course offered in alternate years. Prerequisites: BIOCH 203 and 205 or equivalent.

ONCOL 521 Structural Organization of the Cell and Cancer
★3 *(fi 6)* (second term, 0-3s-0). This course explores the relationship between the structural organization of the cell and neoplastic behavior through in-depth evaluation of both original and review literature. The objective of the course is to make students aware of how concepts in structural organization affect

understanding of cancer and to show students how to critically evaluate, organize and present scientific information. Students are evaluated through seminar presentations, intensive discussion, and a term paper. Course offered in alternate years. Prerequisite: BIOCH 203 and 205 or equivalent.

ONCOL 535 Clinical Radiobiology
★1.5 *(fi 3)* (either term, 1.5-0-0). An introduction to the physics, chemistry, and biology of radiation effects on cells and tissues. Concepts discussed are focused on those of relevance to the treatment of cancer with ionizing radiation. Prerequisite: consent of Department.

ONCOL 550 Medical Radiation Physics
★3 *(fi 6)* (first term, 3-0-0). Fundamentals of radiation physics, production and properties of ionizing radiation and their interactions with matter and tissue. Interactions of photons and of charged particles with matter. Concepts of Radiation dosimetry (theoretical and experimental, cavity theory and ionization chambers). Consent of Department required.

ONCOL 552 Fundamentals of Applied Dosimetry
★3 *(fi 6)* (second term, 3-0-0). This course covers the theory and fundamental techniques for teletherapy and brachytherapy. Topics include dose distributions and scatter analysis for single and multiple photon beams, photon beam shaping, dose distributions for electron beams, radiotherapy of particle beams, dosimetry of small sealed sources (brachytherapy). Prerequisite: ONCOL 550.

ONCOL 554 Laboratory in Medical Radiation Physics
★2 *(fi 4)* (second term, 0-0-2). Practical aspects of medical physics as applied to radiation therapy. Exposure to the operation of various therapy units and dose measuring devices and techniques to measure various physical parameters of radiation beams. Practical experience in radiation treatment planning with techniques for specific tumor sites. Prerequisite: ONCOL 550. Corequisite: ONCOL 552.

ONCOL 556 Laboratory in Imaging
★2 *(fi 4)* (second term, 0-0-2). Provides clinical and practical experience with diagnostic imaging equipment, to adequately provide consultative support required of a clinical medical physicist in imaging. Perform calibration and quality assurance procedures on medical imaging modalities. Prerequisites: ONCOL 550 and 562. Corequisites: ONCOL 568 and 564.

ONCOL 558 Health Physics
★2 *(fi 4)* (first term, 2-0-0). Discussion of the hazards of ionizing and non-ionizing radiation. Basics of radiation safety and sources of radiation. Techniques for the safe handling and use of radiation sources; safety codes, laws and regulations. Consent of Department required.

ONCOL 560 Medical Electronics/Computers in Medicine
★2 *(fi 4)* (first term, 2-0-0). Exploration of digital and analog electronics, microprocessor architecture, for instrumentation used in medical physics. The use of and interface of computers in the data acquisition of medical imaging systems and in the control of instrumentation in the delivery of radiation treatment. Consent of Department required.

ONCOL 562 Theory of Medical Imaging
★3 *(fi 6)* (first term, 3-0-0). A system theory approach to the production, analysis, processing and reconstruction of medical images. An extensive use of Fourier techniques is used to describe the processes involved with conventional radiographic detectors, digital and computed radiography. Review and application of image processing techniques used in diagnostic and therapeutic medicine. Consent of Department required.

ONCOL 564 Physics of Nuclear Medicine
★3 *(fi 6)* (second term, 3-0-0). Discussion of the fundamental physics of radioactivity, the use of unsealed sources in medical diagnosis and treatment. Statistics of counting, nuclear measurement instrumentation, spectrometry. Design and function of gamma cameras, single photon emission tomography and positron emission tomography. Prerequisites: ONCOL 550 and 562.

ONCOL 566 Radiation Biophysics
★3 *(fi 6)* (first term, 3-0-0). Theories and models of cell survival, survival and curve and its significance, modification of radiation response. Radiobiology of normal and neoplastic tissue systems. Late effects of radiation on normal tissue and radiation carcinogenesis, genetic effects of ionizing radiation. Consent of Department required.

ONCOL 568 Physics of Diagnostic Radiology
★3 *(fi 6)* (second term, 3-0-0). Rigorous development of the physics of x-ray production, interaction and detection in diagnostic radiology. In-depth analysis of analog and digital systems in radiography and fluoroscopy is given. The description and design of computed tomographic systems as well as the associated reconstruction algorithms from single to multislice helical systems are studied. Prerequisites: ONCOL 550, 562.

ONCOL 570 Directed Reading in Experimental Oncology
★3 *(fi 6)* (either term, 0-3s-0). Reading and discussion of current research literature on selected topics in experimental oncology under the direction of one or more faculty members. Topics presently available include cell adhesion mechanisms, cell cycle regulation, DNA repair, radiotherapy susceptibility and resistance, oncogenes/tumor suppressor genes, and tumor cell metastasis. Notes: (1) Grades will be based on participation in group discussions and/or written reports from assigned readings with emphasis on critical evaluation of the subject matter. (2) Students in other graduate programs may register with the consent of Instructors. Prerequisite: consent of Department.

ONCOL 600 Graduate Medical Physics Seminar
★2 *(fi 4)* (two term, 0-1s-0). Weekly seminars given by faculty on topics of interest to the medical physics community that are not formally included with the other didactic courses. Includes medical statistics, anatomy/physiology for medical physics, site-specific cancer, experience in clinic, inverse treatment planning optimization, photodynamic therapy, proton and neutron therapy, and image fusion. No prerequisite.

ONCOL 620 Recent Advances in Cancer Research
★3 *(fi 6)* (first term, 0-3s-0). A directed reading and seminar course based on recent developments in the cellular and molecular biology of cancer. The students will critically review papers selected from the recent literature and give oral presentations. Prerequisite: ONCOL 520 or consent of Department. Offered in alternate years.

ONCOL 660 Current Topics in Cancer Research
★3 *(fi 6)* (two term, 0-1.5s-0). A general seminar/discussion course on recent advances in a wide range of topics related to cancer development and management. Selected topics include experimental therapeutics, molecular oncogenetics, tumour immunobiology, DNA repair, and cell cycle regulation. Notes: (1) All graduate students within the Division of Experimental Oncology are expected to attend and contribute to the discussion whether or not they are registered in the course. (2) All graduate students within the Division of Experimental Oncology must register in the course in their second year (MSc or PhD students), or their third year (PhD students) and present a seminar based upon their research results or research plan. (3) All graduate students within the Division of Experimental Oncology will write a paper on their selected presentation topic. Consent of Department required.

201.158 Ophthalmology, OPHTH

Department of Ophthalmology
Faculty of Medicine and Dentistry

Graduate Courses

OPHTH 600 Seminar in Ophthalmology
★6 *(fi 12)* (two term, 0-3s-0). Open to graduate students, particularly those in the Medical Sciences (Ophthalmology) program. Seminars are given by Residents in the Postgraduate Medical Education program in Ophthalmology. Tutorials are presented by staff or by visiting speakers. Topics covered include; pediatric ophthalmology/strabismus, contact lens/cornea/external eye disease, neuro-ophthalmology, orbit/oculoplastics, retina, principles of ocular surgery, glaucoma, ocular genetics. Specific topics will not be repeated more often than once each four years so that four consecutive enrolments are possible. Prerequisite: consent of Department.

OPHTH 601 Ocular Genetics
★3 *(fi 6)* (either term, 3-0-0). This course provides a comprehensive overview of various aspects of eye genetics including both basic science studies and clinical conditions. Clinical case studies and their investigation will form part of the course. Offered in alternate years. Format includes didactic lectures supplemented by brief student presentations and guest speakers. Grades are assigned according to participation and a final exam. Prerequisite: Familiarity with medical genetics and ophthalmology and the consent of the Department.

201.159 Oral Biology, OBIOL

Department of Dentistry
Faculty of Medicine and Dentistry

Undergraduate Courses

OBIOL 202 Oral Biology I
★4.5 *(fi 9)* (two term, 70 hours). Basic microscopic anatomy pertinent to the main body systems and a more detailed treatment of the structure and development of oral tissues, with special reference to the teeth and their supporting structures. The head and neck portion of the Oral Biology course will stress anatomy as it pertains to Dental Hygiene. Clinical examples and a demonstration lab will be used to enhance the teaching of basic anatomy.

OBIOL 302 Oral Biology II
★3 *(fi 6)* (first term, 45 hours). A multidisciplinary course that examines the unique physiology, biochemistry and nutrition of oral structures. Topics will include functions of the periodontal tissues, the termporomandibular joint, mastication, deglutition, speech, special reflexes involving cranial nerves, receptors of the

stomatognathic system, and salivary glands and relevance of saliva to caries. Oral manifestations of metabolic disease, the physiology of pain, and the role of nutrition in the development of oral tissues and the maintenance of oral health will also be discussed.

OBIOL 305 Pathology
★3 *(fi 6)* (two term, 42 hours). Introduction to the principles of pathology with consideration of the more common diseases affecting the human body. Visual differentiation between normal and abnormal tissues; the physiological and pathological changes which affect the teeth, their supporting structures and the oral mucosa, including oral manifestations of selected systemic disturbances.

Graduate Courses

OBIOL 500 Oral Biology I
★3 *(fi 6)* (first term, 3-0-0). Functional anatomy of head and neck. Development, structure, function and biochemistry of connective tissues associated with the jaws. (For graduate students in Orthodontics.)

OBIOL 501 Oral Biology II
★3 *(fi 6)* (second term, 3-0-0). A continuation of Oral Biology I. Growth and development of skull. Anthropology. Selected topics in physiology.

OBIOL 503 Advanced Oral Pathology
★3 *(fi 6)* (first term, 3-0-0). A review of diseases that affect the oral tissues and an exploration of recently acquired knowledge pertaining to them.

OBIOL 504 Oral Medicine
★3 *(fi 6)* (second term, 3-0-0). A study of the mechanisms of oral disease as a basis for rationale of treatment.

OBIOL 601 Seminars in Oral Biology
★2 *(fi 4)* (two term, 0-1s-0). Seminars will include the major areas of research in the Department of Oral Biology. Students will present one seminar.

OBIOL 607 Conference Seminars in Oral Biology I
★3 *(fi 6)* (first term, 0-3s-0). This course will include seminars and conferences on selected aspects of oral biology. Continuous evaluation of student preparation and participation throughout the course will be used for assessment. This is an optional course open to students outside the Faculty of Dentistry by consent of the Chair, Department of Oral Biology.

OBIOL 608 Conference Seminars in Oral Biology II
★3 *(fi 6)* (second term, 0-3s-0). This is a continuation of DENT 607.

OBIOL 609 Connective Tissue Research
★2 *(fi 4)* (two term, 0-1s-0). This course will critically survey recent research on connective tissues and will aim to provide students practice in communicating research data.

OBIOL 900 Directed Research Project
★6 *(fi 12)* (variable, unassigned).

201.160 Organizational Analysis, ORG A

Department of Strategic Management and Organization
Faculty of Business

Note: Enrolment in all ORG A courses is restricted to students registered in the Faculty of Business, or to students registered in specified programs that require Business courses to meet degree requirements and who have obtained prior approval of their Faculty.

The following table lists courses renumbered effective 1997/98:

Old	New	Old	New
BUS 379	ORG A 441	ORG T 420	ORG A 437
BUS 424	ORG A 431	ORG T 404	ORG A 403
HRM 301	ORG A 311	ORG T 405	ORG A 404
HRM 402	ORG A 412	ORG T 412	ORG A 429
HRM 403	ORG A 413	ORG T 413	ORG A 406
HRM 422	ORG A 414	ORG T 414	ORG A 433
HRM 423	ORG A 415	ORG T 415	ORG A 436
HRM 424	ORG A 416	ORG T 403	ORG A 402
HRM 443	ORG A 417	ORG T 421	ORG A 434
HRM 496	ORG A 418	ORG T 432	ORG A 405
ORG T 301	ORG A 301	ORG T 444	ORG A 435
ORG T 311	ORG A 321	ORG T 492	ORG A 432
ORG T 402	ORG A 409	ORG T 495	ORG A 495

Undergraduate Courses

Note: The following course, normally offered in Spring/Summer is available to students in other faculties. It is not available for credit in the BCom or in Business Minor programs.

ORG A 200 Introduction to Management for Non-Business Students
★3 *(fi 6)* (either term, 3-0-0). Provides an understanding of the behavior of individuals and groups within the context of the business organization. Topics covered include organizational structure, culture, individual differences, personality, motivation, leadership, groups, decision making, power, politics, conflict, careers, stress, and organizational change. Not for credit in the Bachelor of Commerce program. Not to be taken by students with credit in ORG A 101.

ORG A 201 Introduction to Management
★3 *(fi 6)* (either term, 3-0-0). Introduces students to the behavioral, political and organizational dynamics of managerial practice. Reviews how managers make decisions on corporate and competitive strategy. Topics include power, decision making, motivation, leadership, and team management.

ORG A 301 Behavior in Organizations
★3 *(fi 6)* (either term, 3-0-0). Provides an understanding of the behavior of individuals in organizations. Draws from psychology, sociology, organization theory and covers topics such as personality, motivation, leadership, communication, conflict, and group dynamics. Prerequisite: Not open to students in the Faculty of Business. Open only to students from other faculties where the course is a requirement.

ORG A 311 HRM: Managing the Work Force in Canada
★3 *(fi 6)* (either term, 3-0-0). This course is a general overview of human resource management issues in organizations. It focuses on reward systems, the design of work, legal issues, union-management relationships, staffing, and training and development. Prerequisite: Open to third- and fourth-year students.

ORG A 321 Introduction to Strategic Management and Organization Design
★3 *(fi 6)* (either term, 3-0-0). Explores why organizations such as McDonalds, Northern Telecom, Bennetton, Wal-Mart and the University of Alberta use different patterns of organization. Examines the political and behavioral dynamics of management decision making. Prerequisite: Open to third- and fourth-year students.

ORG A 322 Perspectives on Organizations
★3 *(fi 6)* (either term, 3-0-0). This course emphasizes the multiple ways of viewing organizations and that these different perspectives have important implications for the description and evaluation of organizational action. An understanding of alternative approaches will help students develop more comprehensive organizational analyses, while enabling them to work with others with differing views. After learning about prominent perspectives, their strengths and weaknesses, and their implications for managerial action, students then have the opportunity to practically apply these perspectives to diagnose an organization and its challenges.

ORG A 402 Management Skills for Supervisors and Leaders
★3 *(fi 6)* (either term, 3-0-0). The purpose of this course is to increase understanding of leadership roles and skill in exercising those roles. These include team building, mentoring, managing conflict, delegating, managing participative decision making, creative problem solving, and time and stress management. Prerequisite: Open to third- and fourth-year students.

ORG A 403 Organizational Leadership Concepts
★3 *(fi 6)* (either term, 3-0-0). This is a seminar course in applied behavioral science that emphasizes the indepth analysis of leadership. The purpose of the course is to increase our effectiveness and skill in understanding leadership in organizations, analyzing leadership and to become better leaders in organizations. To accomplish this objective, we will use leadership theories and concepts as tools to understand the leadership and leadership thinking of great leaders/ leadership thinkers form the past. Some representative examples from history are Sun Tzu. Machiavelli, Winston Churchill, Mahatma Gandhi, Themistocles, Aristotle and Cleopatra. Classes will be a mix of small group and large group discussion, lecture, and student group discussion.

ORG A 404 Interpersonal Communication and Team Management
★3 *(fi 6)* (either term, 3-0-0). This course provides an understanding of interpersonal (or face-to-face) communication process and presents opportunities for personal skill development. Students should expect to engage in role play and to receive feedback on their personal style of communication. Topics include team communication, supervisory-subordinate relationships, influence and persuasion, conflict management, and performance appraisal. Prerequisite: Open to third- and fourth-year students.

ORG A 405 Gender Issues in Organizations
★3 *(fi 6)* (either term, 3-0-0). This course examines the ways in which gender, personal characteristics and organizational practices interact in influencing women's and men's experiences in work settings. Among the issues discussed are gender differences in career motivation and commitment, leadership skills and ability, and conflicts between professional and personal responsibilities. Prerequisite: Open to third- and fourth-year students.

ORG A 406 Ethical Issues in Business
★3 *(fi 6)* (either term, 3-0-0). This course assists students in developing and refining their personal ethical frameworks by examining issues commonly facing members of business and government organizations. A wide range of issues will

be explored including discrimination, product and worker safety, environmental impacts, insider trading, and employee privacy and rights. Prerequisite: Open to third- and fourth-year students.

ORG A 411 Alternative Dispute Resolution
★3 *(fi 6)* (either term, 3-0-0). Conflict is a part of life which we all encounter. Disagreements occur naturally between friends, co-workers, spouses, employer and employees, organizations, and nations. Conflict is both natural and positive if handled well, but can be destructive if handled badly. This course provides detailed hands-on practical experience with various methods of conflict resolution, especially mediation (third-party assistance) and negotiation. The course concentrates as well on the interpersonal communication skills, including assertiveness, which make effective conflict resolution possible.

ORG A 412 Effective Negotiations
★3 *(fi 6)* (either term, 3-0-0). This is a comprehensive study of negotiation theory and practice. A negotiation simulation is conducted to provide an understanding of how theory translates into practice. Prerequisite: Open to third- and fourth-year students.

ORG A 413 Rights in the Work Place
★3 *(fi 6)* (either term, 3-0-0). This is a comprehensive study of rights in the work place. It examines principles of human resource management as guided by statutes and case law by courts and administrative tribunals. Prerequisite: Open to third- and fourth-year students.

ORG A 414 Work Force Planning
★3 *(fi 6)* (either term, 3-0-0). This Human Resource Management course examines how a company interacts with the labor market to ensure that it has the right number and skill mix of employees. Part of the course involves a field research project in which students critique the work force plan of a local company. Prerequisite: Open to third- and fourth-year students.

ORG A 415 Staffing
★3 *(fi 6)* (either term, 3-0-0). This Human Resource Management course is focused on the philosophy and procedures used in obtaining and maintaining an efficient work force. Topics include recruitment, selection and training. Prerequisite: Open to third- and fourth-year students.

ORG A 416 Performance Management and Rewards
★3 *(fi 6)* (either term, 3-0-0). This Human Resource Management course focuses on how organizations create and operate a performance management system. It presents an overview of current issues in the field, such as performance evaluation, compensation planning, internal consistency, external competitiveness, individual equity, and benefits. Prerequisite: Open to third- and fourth-year students.

ORG A 417 Managing the Work Force: International Perspectives
★3 *(fi 6)* (either term, 3-0-0). This course comparatively explores different techniques of human resource management (HRM) used in Canada, the USA, Japan, Sweden, Germany, and France. Prerequisite: Open to third- and fourth-year students.

ORG A 418 Public Sector Employee Relations
★3 *(fi 6)* (either term, 3-0-0). This Human Resource Management course examines public sector employee relations in the context of governments, public service commissions, trade unions, and administrative tribunals. It highlights public sector/private sector differences and includes a simulation of public sector labor contract negotiations. Prerequisite: Open to third- and fourth-year students.

ORG A 419 Human Resource Management for Small Business
★3 *(fi 6)* (either term, 3-0-0). This course will cover issues relevant to managing human resources in a small business, a family owned enterprise, or an entrepreneurial firm, or organizations that typically are smaller, growing companies at the early stages of their life cycle. These firms are unique in that they embrace innovations and change and often lack the support systems available in larger organizations. Consequently, the entrepreneur/owner typically will perform all of the human resource functions him/herself. This course will provide the information that small business owners must have in order to manage and grow a business. Prerequisite: Open to third- and fourth year-students.

ORG A 420 Labour Relations Law and Legislation
★3 *(fi 6)* (either term, 3-0-0). An examination of the legal framework within which collective bargaining takes place in Canada. Prerequisite: Open only to third- and forth-year students. Not to be taken by students with credit in HMR 432.

ORG A 422 Critical Review of Management Thought
★3 *(fi 6)* (either term, 3-0-0). This course reviews the thinking of management theorists from classical management onward, examining the context of their ideas and, where relevant, how these have been taken up and adapted. Contemporary issues and ideas in management would also be examined in a critical fashion.

ORG A 423 Power and Organization
★3 *(fi 6)* (either term, 3-0-0). An introduction to aspects of organizational life often omitted in business courses - the role of humor, gossip, emotion and sex; the organization of time and space; the nature of the body and the construction of organizational identities - and consider their significance for understanding contemporary organizational and human resources practices. Prerequisite: Open to third- and fourth-year students only.

ORG A 428 Managing Family Enterprise
★3 *(fi 6)* (either term, 3-0-0). Designed to improve managerial knowledge and practice through improved recognition and understanding of the significance of family firms and of the unique challenges they face. The course is designed primarily for individuals who a) are members of a family with established business interests; b) might find themselves working for family controlled firms; c) might find themselves working in a professional capacity with family controlled firms in roles such as accountant, lawyer, banker or consultant.

ORG A 429 Advanced Seminar: Organization Theory
★3 *(fi 6)* (either term, 3-0-0). Individual instructors will cover topics in the field of organization theory that relate to their particular research interests. Prerequisite: ORG A 201 or ORG A 321.

ORG A 430 Introduction to Small Business Management
★3 *(fi 6)* (either term, 3-0-0). Focus is specifically on issues related to the establishment of small business enterprises and particular issues related to managing them. This course employs the knowledge already acquired in the Undergraduate Program disciplines (OA, Marketing, Finance, Accounting, etc.) and applies it to case analysis and to the study of existing small businesses in Alberta. Students should be prepared to visit small business sites and to prepare case analyses of their management systems. Prerequisites: Open to third- and fourth-year students.

ORG A 431 New Venture Creation and Organization
★3 *(fi 6)* (either term, 3-0-0). This course explores how small businesses are created and operated. Topics include the entrepreneurial process, opportunity recognition, business planning, mobilizing resources and organization creation. Prerequisite: FIN 301.

ORG A 432 Managing for Quality
★3 *(fi 6)* (either term, 3-0-0). This course examines what quality management is, how it is used to improve performance, and how an organization can transform itself to a quality management orientation. In addition the history of management thought related to quality management including that of prominent figures such as Taylor, Deming, and Juvan is explored. Prerequisite: Open to third- and fourth-year students.

ORG A 433 Managing Organizational Change
★3 *(fi 6)* (either term, 3-0-0). This course examines organization change, e.g. how organizations make transitions from one state to another. There is also a focus on understanding how management goes about changing corporate culture, organization structure and management systems. Prerequisite: Open to third- and fourth-year students.

ORG A 434 Managing Professional Service Firms
★3 *(fi 6)* (either term, 3-0-0). The course examines the managerial practices of professional service firms, with particular reference to accounting, law, engineering, and management consultancy firms. The course explores the distinctive tasks and governance structures of professional service firms and how these influence the strategic and functional (e.g. marketing, human resource management, quality control) areas of management behavior. Particular attention is given to the problem of innovation and creativity of management practice. Prerequisite: Open to third- and fourth-year students.

ORG A 435 Managing International Business
★3 *(fi 6)* (either term, 3-0-0). This course explores issues related to managing businesses that operate in an international content. Prerequisite: Open to third- and fourth-year students.

ORG A 436 Management and the Natural Environment
★3 *(fi 6)* (either term, 3-0-0). This course is an introduction to global environment issues and their impact on managers and organizations. It explores the key issues of the day including atmospheric issues, biodiversity, hazardous waste, and energy consumption. It also explores solution spaces including the concept of sustainable development, economic instruments, regulatory systems, full cost accounting, and international governance. Prerequisite: Open to third- and fourth-year students.

ORG A 437 Managing Culture
★3 *(fi 6)* (either term, 3-0-0). This course has two aims: 1) to explore how organizational and work group cultures affect the management of an organization; and 2) to explore how national culture impacts management practice and 'doing business' in foreign settings. Prerequisite: Open to third- and fourth-year students.

ORG A 438 Managing Public, Not-for-Profit Organizations
★3 *(fi 6)* (either term, 3-0-0). Many management ideas and practices are derived from private, for-profit organizations. This course examines some of the issues confronting management in the public, voluntary and not-for-profit sectors, for example, health, education, charities, churches, cultural organization and the arts, community groups, aid agencies, etc. It addresses the issues of to what extent and how management in these types of organizations is different from the dominant private sector view of management; the extent to which practices from one sector may be adopted by another, and pressures which lead in this

direction, through, for example, funding agencies. Specific issues such as the management of volunteers will also be considered.

ORG A 441 Business Strategy
★3 *(fi 6)* (either term, 3-0-0). This course examines top management decisions and emphasizes the development of business and corporate strategy. It integrates the management principles studied in the business core using a series of business cases. Guest Faculty members and executives will participate. Prerequisites: FIN 301; MARK 301; and ORG A 201.

ORG A 450 Internet Strategy for Small Business
★3 *(fi 6)* (either term, 3-0-0). This course focuses on how consultants prepare client organizations (especially small businesses and not-for-profit, volunteer organizations) for a decision as to how to include the Internet as part of their business strategy. In the initial part of the course students will familiarize themselves with the Internet as it pertains to e-business and not-for-profit uses. In the second part, students will prepare advisory reports for a real business or a not-for-profit organization. Basic Internet skills (e-mail, browsers, using search engines, creating simple web pages) are important although tutorials will be offered for students lacking these skills. Prerequisite: MIS 311 or permission of Instructor.

ORG A 488 Selected Topics in Organization Theory
★3 *(fi 6)* (either term, 3-0-0). Normally restricted to third- and fourth-year Business students. Prerequisites: ORG A 201, 301 or consent of Department. Additional prerequisites may be required.

ORG A 490 Organizational Analysis Competition Part I
★1.5 *(fi 3)* (either term, 0-1.5s-0). Preparation for Student Competition in Organizational Analysis. Prerequisite: consent of Instructor.

ORG A 491 Organizational Analysis Competition Part II
★1.5 *(fi 3)* (either term, 0-1.5s-0). Completion of Student Competition in Organizational Analysis. Prerequisite: ORG A 490 and consent of Instructor.

ORG A 495 Individual Research Project I
★3 *(fi 6)* (either term, 3-0-0). Special study for advanced undergraduates. Prerequisites: consent of Instructor and Assistant Dean, Undergraduate Program.

ORG A 496 Individual Research Project II
★3 *(fi 6)* (either term, 3-0-0). Special Study for advanced undergraduates. Prerequisites: ORG A 495, consent of the Instructor and Assistant Dean, Undergraduate Program.

ORG A 497 Individual Research Project III
★3 *(fi 6)* (either term, 3-0-0). Special Study for advanced undergraduates. Prerequisites: ORG A 496, consent of the Instructor and Assistant Dean, Undergraduate Program.

Graduate Courses

ORG A 501 Organization Strategy
★1.5 *(fi 3)* (either term, 18 hours). The first part of this course examines the formation of business strategy. It recognizes the complexities and messiness of strategy formation and explores how organizations actually develop strategies. The second part examines the evolution, determinants, and relevance of alternative ways of organizing. Contemporary ideas (e.g. reengineering, the learning organization, virtual organizations) are critically reviewed. Offered in a six-week period.

ORG A 503 Strategic Human Resource Management
★1.5 *(fi 3)* (either term, 18 hours). This Human Resource Management course looks at options relevant to staffing, performance management, reward systems, and labor relations in relation to organizational strategy. It addresses current issues such as workforce diversity, worker empowerment, incentive schemes, and labor-management partnerships. Offered in a six-week period.

ORG A 504 Leadership & Management Systems
★1.5 *(fi 3)* (either term, 18 hours). This course examines how supervisory leadership and an organization's human resource management systems affect employee behavior. Topics include job design, delegation, decision making, performance management, performance appraisal, rewards, communication, conflict management, and team management.

ORG A 515 Fundamentals of Technological Innovation and Commercialization
★1.5 *(fi 3)* (either term, 18 hours). This course examines the nature of technological innovation within different industrial settings. Early sessions focus upon theories of technological discontinuities and patterns of industry transformation. Later sessions examine the different stages of technology commercialization in selected industries.

ORG A 520 Introduction to Management Consulting
★1.5 *(fi 3)* (either term, 18 hours). This course introduces students to the industry of management consulting. Particular attention is given to the regulatory context and changing dynamics of the industry, the distinctive characteristics and challenges of consulting firms, and the skills and characteristics of the successful consultant. Registration in this course must be approved by the Instructor.

ORG A 543 Business Ethics
★1.5 *(fi 3)* (either term, 18 hours). This course will address ethical aspects of business situations and relationships. It will be emphasized that virtually all business decisions have significant ethical content.

ORG A 560 New Ventures Management
★1.5 *(fi 3)* (either term, 18 hours). This course will address problems commonly associated with the commercialization of knowledge-based Research and Development.

ORG A 586 Selected Topics in Organizational Analysis
★1.5 *(fi 3)* (either term, 3-0-0). Topics in this seminar may vary from year to year and are chosen at the discretion of the Instructor.

ORG A 611 Current Issues in Human Resource Management
★3 *(fi 6)* (either term, 3-0-0). This course is relevant to managers who want to learn about current critical issues and the questions with which they will have to deal in designing HRM systems in the 1990s and beyond.

ORG A 612 Effective Negotiations
★3 *(fi 6)* (either term, 3-0-0). This Human Resource Management course is a comprehensive study of negotiation theory and practice. A negotiation simulation is conducted to provide an understanding of how theory translates into practice.

ORG A 616 Performance Management and Rewards
★3 *(fi 6)* (either term, 3-0-0). This Human Resource Management course focuses on how organizations design and manage a performance management system. It presents an overview of current issues in the field, such as performance evaluation, compensation planning, internal consistency, external competitiveness, individual equity and benefits.

ORG A 617 Managing the Work Force: International Perspectives
★3 *(fi 6)* (either term, 3-0-0). This Human Resource Management course comparatively explores different systems of human resources management (HRM) that are used in Canada, the USA, Japan, Sweden, Germany, and France, and their implications for firm competitiveness. Throughout the course, the North American experience serves as the backdrop or frame of reference for analytical discussions.

ORG A 618 Public Sector Employee Relations
★3 *(fi 6)* (either term, 3-0-0). This Human Resource Management course examines the role and functions in public sector employee relations of governments, public service commissions, trade unions, and administrative tribunals. It highlights public sector/private sector differences and includes a simulation of public sector labor contract negotiations.

ORG A 619 Power and Organization
★3 *(fi 6)* (either term, 3-0-0). This course introduces students to aspects of organizational life often omitted in business courses-the roles of humor, gossip, emotion and sex; the organization of time and space; the construction of the body and organizational identities-and considers their significance for understanding contemporary organizational practices.

ORG A 631 New Venture Creation and Organization
★3 *(fi 6)* (either term, 3-0-0). This course concentrates on the development of a new enterprise and the management of an existing small business. Casework and projects enable students to assess the opportunities, risks, and capabilities necessary for entrepreneurial success. The course emphasizes managerial and strategic problems during the early years of business formation and growth, including business planning. The course emphasizes the interface between theory and practice.

ORG A 632 Managing for Quality
★3 *(fi 6)* (either term, 3-0-0). This course examines what quality management is, how it is used to improve performance, and how an organization can transform itself to a quality management orientation. In addition, the history of management thought related to quality management including that of prominent figures such as Taylor, Deming, and Juran is explored.

ORG A 633 Managing Organizational Change
★3 *(fi 6)* (either term, 3-0-0). This course examines organization change, e.g. how organizations make transitions from one state to another. There is also a focus on understanding how management goes about changing corporate culture, organization structure and management systems.

ORG A 634 Managing Professional Service Firms
★3 *(fi 6)* (either term, 3-0-0). The course examines the managerial practices of professional service firms, with particular reference to accounting, law, engineering, and management consultancy firms. The course explores the distinctive tasks and governance structures of professional service firms and how these influence the strategic and functional (e.g. marketing; human resource management; quality control) areas of management behavior. Particular attention is given to the problem of innovation and creativity of management practice.

ORG A 635 Managing International Business
★3 *(fi 6)* (either term, 3-0-0). This course examines selected topics in managing an international business. It provides an overview of the primary issues. Additional selected topics will be chosen in consultation with the students.

ORG A 638 Strategic Management of Technology and Innovation
★3 *(fi 6)* (either term, 3-0-0). This advanced course helps the student to understand the management of new product or production process development and change in existing products or processes in firms and industries. Major issues discussed are: 1) competitiveness and technology assessment in managing the introduction of new product or process technology; 2) diffusion of innovations among firms and the technological evolution of industries; and 3) strategies of how to manage technological innovation within the firm.

ORG A 639 The Process of Making Public Policy
★3 *(fi 6)* (either term, 3-0-0). Emphasizes a systematic and comprehensive approach to the study of developing and implementing public policy within the context of Canadian society. This course explores both the decision-making process, and such factors as the separation of powers between levels of government, electoral politics, interest groups, media and government bureaucracy as they influence the making of public policy.

ORG A 641 Business Strategy
★3 *(fi 6)* (either term, 3-0-0). This course examines top management decisions and emphasizes the development of business and corporate strategy. It integrates the management principles studied in the business core using a series of business cases. Guest Faculty members and executives will participate. Prerequisite: All required Year one MBA core courses.

ORG A 652 Leadership Skills
★3 *(fi 6)* (either term, 3-0-0). The purpose of this course is to increase the student's understanding of leadership roles and skill in exercising those roles. These include team building, mentoring, managing conflict, delegating, managing participative decision making, creative problem solving, and time and stress management.

ORG A 655 Gender Issues in Organizations
★3 *(fi 6)* (either term, 3-0-0). This course examines the ways in which gender, personal characteristics and organizational practices interact in influencing women's and men's experiences in work settings. Among the issues discussed are gender differences in career motivation and commitment, leadership skills and ability, and conflicts between professional and personal responsibilities.

ORG A 656 Ethical Issues in Business
★3 *(fi 6)* (either term, 3-0-0). This course assists students in developing and refining their personal ethical frameworks by examining issues commonly facing members of business and government organizations. A wide range of issues will be explored including discrimination, product and worker safety, environmental impacts, insider trading, and employee privacy and rights.

ORG A 657 Interpersonal Communication and Team Management
★3 *(fi 6)* (either term, 3-0-0). This course provides the understanding of interpersonal (or face-to-face) communication process and presents opportunities for personal skill development. Students should expect to engage in role plays and to receive feedback on their personal style of communication. Topics include team communication supervisory-subordinate relationships, influence and persuasion, conflict management, and performance appraisal.

ORG A 660 Introduction to Intellectual Property and New Technology Commercialization
★3 *(fi 6)* (either term, 3-0-0). This course provides an understanding of intellectual property in the context of technology transfer and commercialization. Key topics include intellectual property, product development, valuation of technology, capturing value, and securing the deal. It also examines how exploitation of intellectual property is a corporate strategy.

ORG A 686 Selected Topics in Behavioral Sciences
★3 *(fi 6)* (either term, 3-0-0).

ORG A 701 Seminar in Organization Theory
★3 *(fi 6)* (either term, 3-0-0). This course introduces students to the major schools of thought in organization and management theory. It considers the development of the field, major and foundational works in particular areas or schools of thought, and provides a cognitive map with which to evaluate contemporary research and debates. At the end of the course the student will have an understanding of the strengths and weaknesses of each major paradigm or perspective.

ORG A 702 Seminar in Human Behavior in Organization
★3 *(fi 6)* (either term, 3-0-0). Dealing with the integration of individuals into the organization, the course reviews pertinent theories and research findings that relate to motivation, social influence process, organization roles, leadership and inter-and intra-group dynamics. Issues of job design, conflict resolution, communications processes and problem solving are also covered. This seminar attempts to develop insights into the social psychology of human behavior as it occurs within the boundaries of complex organizations.

ORG A 703 Seminar in Strategic Management
★3 *(fi 6)* (either term, 3-0-0). This course examines the current state of knowledge in strategic management. Topics include the resource-based view of the firm, industry evolution and technology, managerial decision making, managerial cognition, and organizational ecology. The course introduces students to alternative theoretical perspectives and available empirical evidence related to these topics.

ORG A 704 Individual Research
★3 *(fi 6)* (either term, 3-0-0).

ORG A 705 Seminar in Contemporary Issues
★3 *(fi 6)* (two term, 3-0-0). This seminar introduces students to the most recent research in the area of organizational analysis, examining current issues and trends. Students have an opportunity to present and discuss their own research and actively engage in the analysis and discussion of the work of others. The seminar is a single term course offered over two terms.

ORG A 810 The Manager as Strategist
★1.5 *(fi 16)* (first term, 18 hours). A week-long intensive course. Identifying and developing the human resources, leadership, and strategy skills essential for today's successful executive. Restricted to Executive MBA students only.

ORG A 820 Managing Human Resources
★3 *(fi 32)* (first term, 3-0-0). Understanding interpersonal behavior within organizations; assessing and developing interpersonal effectiveness both as a leader and a team member. Restricted to Executive MBA students only.

ORG A 860 Management of Technology/Innovation
★3 *(fi 32)* (first term, 3-0-0). Understanding basic science and technology; integrating new technology into operations; managing research and development. Restricted to Executive MBA students only.

ORG A 870 Corporate Strategy
★3 *(fi 32)* (second term, 3-0-0). Understanding corporate strategy and processes to mobilize resources to achieve corporate objectives; industry and competitive analysis. Restricted to Executive MBA students only.

ORG A 875 Leadership
★3 *(fi 32)* (second term, 3-0-0). Understanding the unique perspectives, tasks, and responsibilities of the executive in providing leadership to the organization; dynamic processes of organizations; and developing leadership skills. Restricted to Executive MBA students only.

201.161 Paediatrics, PAED

Department of Paediatrics
Faculty of Medicine and Dentistry

Undergraduate Courses

PAED 546 Paediatrics Student Internship
★6 *(fi 12)* (either term, 6 weeks). Student internship in paediatrics for students registered in the MD program.

PAED 556 Paediatrics Student Internship
★3 *(fi 6)* (either term, 3 weeks). An elective for student internship in paediatrics for students registered in the MD Program.

201.162 Paleontology, PALEO

Departments of Biological Sciences, and Earth and Atmospheric Sciences
Faculty of Science

The following course was renumbered effective 1997/98:

Old	New
PALEO 314	PALEO 414

Undergraduate Courses

O PALEO 318 Paleobiology of the Lower Vertebrates
★3 *(fi 6)* (first term, 3-0-3). Evolution of fish-like vertebrates, amphibians, reptiles and birds, with emphasis on systematics, major adaptive shifts and subsequent evolutionary radiation. Prerequisite: EAS 230 or ZOOL 225 or ZOOL 200.

O PALEO 319 Paleobiology of the Higher Vertebrates
★3 *(fi 6)* (second term, 3-0-3). The Mesozoic history of mammals as illustrative of the origin and evolution of a higher taxon; adaptive radiation of Tertiary mammals, with special emphasis on insectivores, primates, carnivores, proboscidians, and ungulates. Prerequisite: EAS 230 or ZOOL 225 or ZOOL 200.

O PALEO 414 Paleontology
★3 *(fi 6)* (second term, 3-0-3). Morphology, paleoecology and evolution, with emphasis on both the theoretical aspects and practical techniques of paleontology. Concentration on invertebrate paleontology, but examples from vertebrate paleontology and paleobotany included. Prerequisite: EAS 230. Not available to students with credit in PALEO 314.