



University of Alberta  
Edmonton

# 1997/98 Calendar

## Course Listings

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# Course Listings

## 210 Details of Courses

Courses taught at the University of Alberta are listed here in alphabetical order. 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 which requires 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, would normally be at the 100-level. Designed typically for students in the Second Year of a program.
300-399	Undergraduate. Prerequisites, if any, would normally be at the 200-level. Designed typically for students in the Third Year of a program.
400-499	Advanced Undergraduate. Prerequisites, if any, would normally be 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 will be designated as Junior Courses and courses numbered 200-499 will be 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 Oral Health Sciences.

### 210.1 Course Description Symbols and Figures

In the course descriptions, several symbols and figures are used to indicate the type, duration, and weight of each course.

- (1) ★—This symbol stands for “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 normal full-session course is weighted ★6; a half-session course is weighted ★3. There are certain courses, offered over the full-session, or in a half-session, with weights of ★1, ★2, and ★4. These courses are considered as one-sixth, one-third, and two-thirds of a full-session 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.”

In the case of courses offered by the Faculty of Engineering, the ★ symbol is given at the end of the course description and the accompanying number indicates the weight of the course as used in computing grade point averages for students who are registered in a Faculty other than the Faculty of Engineering.

- (2) □—This symbol stands for “course units” and is used with courses offered by the Faculty of Engineering only. The number following the symbol indicates the units of the course as used in computing grade-point averages for students registered in the Faculty of Engineering. The number of units is based on the number of hours of lectures, seminars, and laboratories.
- (3) *f*—Stands for “Fee Index” and is 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; hence, a course with ★3 will normally have *f* 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, some graduate programs, etc.) are assessed on a program fee basis for all or certain years. In these cases, the fee index calculation does not apply.

- (4) (**x term, a-b-c**)—These figures, enclosed 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*). In the case of a full-session course, this information is omitted. 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. In the case of a full-session course, 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) means a course taught in first term with 3 hours lecture, no seminar, and 3 hours lab per week.

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

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

(3-0-3) means 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) means a course may be taught in either first or second term or over the full session with three lecture hours per week, no seminar, and no lab.

- (5) **Prerequisite**—This provides information on courses which must be successfully completed prior to 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 being 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 as stated in the course description in this Calendar.

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

- (7) **Restricted Enrolment Courses:** Classes in some courses must for academic reasons be restricted in size. Such courses will be labelled “restricted enrolment” courses in the timetable. If such a course is found to be oversubscribed, students whose programs do not require that course may be required to delete it from their registration.

- (8) **Open Studies** **S** indicates that a course is available to students of Open Studies. **D** indicates that a course is available to Open Studies Students on a delayed registration basis only (see §200.2.2).

### 210.2 Course Renumbering

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

### 210.3 Course Availability

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

## 210.4 Courses on Reserve List

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Courses not offered in the past four years have been removed from this Calendar and placed on an unpublished Reserve Course Listing. 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. A copy of the unpublished Reserve Course Listings can be found in the Registrar's Office, the University Secretariat, and Faculty Offices.

## 210.5 Faculty Specific Regulations Regarding Courses

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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.

## 210.6 Physical Requirements for University Courses

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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.

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

## 211 Course Listings

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### 211.1 Accounting

Department of Accounting and  
Management Information Systems  
Faculty of Business

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#### Notes

- (1) Enrolment in all ACCTG courses, except ACCTG 300 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.
- (2) See also Management Information Systems listing.

#### 211.1.1 Undergraduate Courses

##### ACCTG 300 Financial Accounting

★3 (*fi 6*) (either term, 3-0-0). Accounting and reporting to persons outside of the organization. Note: Not open to students registered in the Faculty of Business.

##### ACCTG 311 Introductory Accounting

★3 (*fi 6*) (either term, 3-1.5s-0). Postulates, principles, the accounting cycle, capital, and income measurement, financial statement preparation, and analysis; emphasis on reporting to shareholders, creditors, and other external decision makers. Note: Students are expected to have basic familiarity with microcomputer applications. Prerequisites: ECON 101 and 102.

##### ACCTG 322 Managerial Information and Control Systems

★3 (*fi 6*) (either term, 3-0-0). Corporate goals, planning and control concepts, cost accumulation for pricing purposes, and product costing. Note: Students are expected to have basic familiarity with microcomputer applications. Prerequisite: ACCTG 311.

##### ACCTG 413 Financial Information and Capital Markets

★3 (*fi 6*) (either term, 3-0-0). This course is concerned with the use of financial accounting information for the purpose of financial decision making. The four main topics in the course consist of the nature of the demand for financial information, the properties of the financial statement numbers, the use of the information in decision making, and the structure of the environment in which the decisions are made. The financial decision makers envisioned include investors, bankers, regulators, competitors, suppliers, unions, managers, and purchasers. Prerequisites: ACCTG 311, FIN 301 and MGTSC 312.

##### ACCTG 414 Intermediate Financial Accounting I

★3 (*fi 6*) (either term, 3-0-0). The first of a two-course sequence covering

the theory, methods, strengths, and weaknesses of current Generally Accepted Accounting Principles (GAAP). Prerequisites: ACCTG 311, 322.

##### ACCTG 415 Intermediate Financial Accounting II

★3 (*fi 6*) (either term, 3-0-0). The second of a two-course sequence covering the theory, methods, strengths, and weaknesses of current generally accepted accounting principles (GAAP) in Canada. See ACCTG 414. Prerequisite: ACCTG 414. Corequisite: FIN 301.

##### ACCTG 416 Accounting Theory

★3 (*fi 6*) (either term, 3-0-0). An examination of the structure of accounting theory, including a thorough study of theories of income and value relevant to accounting. A framework for evaluating these theories, including the theories supporting generally accepted accounting principles, is considered. Other current topics in financial accounting may be included from time to time. Prerequisites: ACCTG 414, FIN 301. Open only to fourth-year Business students, or by consent of the Department Chair.

##### ACCTG 418 Advanced Financial Accounting

★3 (*fi 6*) (either term, 3-0-0). Analysis of complex accounting problems with emphasis on current issues in accounting practice. Prerequisites: ACCTG 414, FIN 301. Open only to fourth year Business students or by consent of the Department Chair.

##### ACCTG 424 Intermediate Managerial Control Concepts

★3 (*fi 6*) (either term, 3-0-0). Accounting for managerial decision-making. Emphasis on cost and revenue accumulation for control and pricing problems as well as on product costing. Linear programming and regression are used in the analysis. Prerequisites: ACCTG 322 and MGTSC 312. There is a consolidated exam for ACCTG 424.

##### ACCTG 426 Advanced Managerial Control Concepts

★3 (*fi 6*) (either term, 3-0-0). Current research and cases in managerial accounting. Prerequisite: ACCTG 424. Open only to fourth year Business students or by consent of the Department Chair.

##### ACCTG 442 International Accounting

★3 (*fi 6*) (either term, 3-0-0). To operate effectively in an international business environment, managers need to understand the accounting implications of international operations. The course covers how international business transactions are reflected in a company's financial statements as well as how to manage international operations 'by the numbers.' Managers will develop the tools necessary to understand foreign partners'/competitors' financial statements. Prerequisites: ACCTG 311, 322.

##### ACCTG 456 Auditing History, Theory, and Current Thought

★3 (*fi 6*) (either term, 3-0-0). Internal and external auditing history and philosophy. Functional or operational auditing, the nature of evidence, ethics, and independence. Prerequisite: ACCTG 414.

##### ACCTG 468 Corporate Taxation

★3 (*fi 6*) (either term, 3-0-0). A study of the major tax concepts and ideas in the taxation of corporations, corporate distributions and transactions between corporations and their shareholders. Prerequisite: BUEC 466 or ECON 353.

##### ACCTG 488 Selected Topics in Accounting

★3 (*fi 6*) (either term, 3-0-0). Prerequisites: ACCTG 311, ACCTG 322.

##### ACCTG 494 Individual Research Projects

★3 (*fi 6*) (either term, 3-0-0). Special study for advanced undergraduates. Prerequisite: consent of Instructor and Associate Dean. (When a student registers in this course for a second or third time subsequent higher course numbers are to be used: ACCTG 495, 496.)

#### 211.1.2 Graduate Courses

##### ACCTG 501 Introduction to Financial Reporting and Analysis

★1.5 (*fi 3*) (either term, 18 hours). This course introduces accounting information's role in recording and reporting on economic and business events including the primary financial statements: balance sheet, income statement, and cash flow. Students will become familiar with the concepts and purposes underlying financial reporting. The course begins to develop students' abilities to evaluate and interpret financial information through basic financial analysis. Offered in a six-week period.

##### ACCTG 511 Accounting Information and Decision Making

★1.5 (*fi 3*) (either term, 18 hours). This course introduces students to accounting concepts that are used by management in planning and decision making. It covers the role and importance of budgeting as a tool in planning and controlling operations, and relates budgeting to the financial statements introduced in ACCTG 501. The concepts and applications of relevant costs for decision-making are introduced, with particular emphasis on the relationships of cost, volume, and profit. The course also provides the basic concepts underlying the design of accounting systems for measuring performance. Cases are used to provide the context within which accounting

information is generated and decisions are made. Offered in a six-week period. Prerequisite: ACCTG 501.

#### **ACCTG 521 Accounting and Business Management**

★1.5 (*fi 3*) (either term, 18 hours). This course introduces new material in both financial reporting and managerial accounting as an aid to integrating the material covered in the first two courses. Consideration is given to topics that integrate with marketing, finance, and economics. The course examines factors affecting the selection of accounting policies and their informational effects for external users. Similar issues are then approached from an internal management perspective including an analysis of those factors that influence the design of accounting systems. Offered in a six-week period. Prerequisite: ACCTG 511.

#### **ACCTG 616 Seminar in Financial Accounting Theory**

★3 (*fi 6*) (either term, 3-0-0). This course will deal in depth with the theory and propositions underlying current financial accounting practices and with alternative theories of accounting measurement as proposed in the literature. The function of accounting in relation to the decision processes of the principal external users of accounting data will be considered.

#### **ACCTG 618 Seminar in Current Accounting Issues**

★3 (*fi 6*) (either term, 3-0-0). The course will concentrate on the application of accounting theory to controversial areas in financial reporting. The topics covered will represent an extension of the content of ACCTG 616 and will vary according to the changing importance of current accounting issues. Prerequisite: ACCTG 616.

#### **ACCTG 624 Seminar in Management Accounting**

★3 (*fi 6*) (either term, 3-0-0). The seminar will consist of a set of topics concerned at an advanced level with the generation and use of accounting and related data in the planning and control functions of organizations.

#### **ACCTG 626 Seminar in Managerial Control**

★3 (*fi 6*) (either term, 3-0-0). Current research and cases in managerial accounting. Prerequisite: ACCTG 522.

#### **ACCTG 631 Accounting for the Public Sector**

★3 (*fi 6*) (either term, 3-0-0). An examination of the concepts and practices of accounting as they relate to organizations in the public sector such as governments and Crown or similar corporations. This examination includes appropriate references to the accounting concepts and practices used in the private sector and the relevance of them to the public sector. Prerequisite: ACCTG 512 or equivalent.

#### **ACCTG 666 Financial Information and Capital Markets**

★3 (*fi 6*) (either term, 3-0-0). Prerequisites: ACCTG 452, FIN 456 and MGTSC 462.

#### **ACCTG 686 Selected Topics in Accounting**

★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.

#### **ACCTG 701 Introduction to Accounting Research**

★3 (*fi 6*) (either term, 3-0-0). Introduction to major research approaches employed in accounting. The role of accounting information is examined from several perspectives, reflecting the wide range of inquiry in the accounting research literature. Students are required to register in two terms, normally in the fall and winter of the second year, and are encouraged to sit in on the seminar during the first year.

#### **ACCTG 702 Topics in Accounting Research**

★3 (*fi 6*) (either term, 3-0-0). In-depth study of specific approaches to accounting research. Topics are chosen from those introduced in Accounting 701 and may differ from term to term. Students are required to register in at least two terms (two different topics.)

#### **ACCTG 703 Accounting Research Workshop**

★3 (*fi 6*) (full session, 3-0-0). Critical examination of alternative research approaches to—and current issues and trends in—accounting research and policy making. Participants are expected to present their own research and to analyze the research of others. This workshop is a single-term course offered over the full session. Students may attend casually in the first year but are required to register for one year, normally the second year, and are expected to attend regularly after the second year.

#### **ACCTG 704 Individual Research**

★3 (*fi 6*) (either term, 3-0-0).

#### **ACCTG 820 Financial Accounting**

★3 (*fi 32*) (first term, 3-0-0). Reporting of financial results of operations and financial positions to investors and managers; the use of accounting information for decision-making. Restricted to Executive MBA students only.

#### **ACCTG 830 Organization Planning and Control**

★3 (*fi 32*) (second term, 3-0-0). Implementing financial performance measurement, evaluation and control systems, and organizational designs that enhance performance; understanding organizational structures and processes. Restricted to Executive MBA students only.

## **211.2 Agricultural Economics**

Department of Rural Economy  
Faculty of Agriculture, Forestry and Home Economics

**Note:** See also Forest Economics, Interdisciplinary Undergraduate Courses and Rural Sociology listings for related courses.

### **211.2.1 Undergraduate Courses**

#### **AG EC 316 Quantitative Methods**

★3 (*fi 6*) (either term, 3-0-2). Introduction to matrix algebra and linear models including linear programming, input-output analysis, and related techniques. Emphasis is placed on the use of these techniques for performing economic analysis in agriculture, forestry, and the environment. Prerequisite: Mathematics 30. Note: Not open to students with credit in MATH 120, 127.

#### **AG EC 323 Introduction to Management for Agri-Food, Environmental, and Forestry Businesses**

★3 (*fi 6*) (either term, 3-0-0). An introduction to principles and practical aspects of business management. These are addressed in terms of their relevance for the management of businesses involved in a variety of industries, including agriculture, environment, food, and forestry. Topics include business planning and organizing and issues related to the management of financial, physical, and human resources. Prerequisite: ECON 101/102.

#### **AG EC 333 Introduction to Farm and Ranch Management**

★3 (*fi 6*) (either term, 3-0-2). Application of economic principles to the organization and operation of a farm business. Introduction to farm records and business analysis; the management process and decision criteria for choice of enterprises, size of business, resource utilization, and timing of production; alternative methods of obtaining farming resources by purchase, leasing and credit. Prerequisite: ECON 101.

#### **AG EC 373 Agricultural Policy**

★3 (*fi 6*) (either term, 3-0-0). Economic policy aspects of the production, marketing, and income problems of farmers. Beliefs, values, institutions and participants in agriculture and their interaction in the development of economic policies for the industry. Prerequisite: ECON 101/102.

#### **AG EC 384 Prices and Markets I**

★3 (*fi 6*) (either term, 3-0-1). Marketing of agricultural, forest and food products: theory and application. Topics include: price determination in cash and futures markets, alternative market structures, domestic and foreign governmental intervention, international trade, product quality and grading. Prerequisite: ECON 101/102.

#### **AG EC 400 Special Topics**

★3 (*fi 6*) (either term, 0-3s-0). Individual study. Study of a selected topic or problem requiring both written and oral reports. Prerequisite: consent of the Department Chair.

#### **AG EC 416 Statistical Analysis**

★3 (*fi 6*) (either term, 3-0-2). Analysis of economic data relating to renewable resource sectors including agriculture, food, forestry, and the environment; collection of data, sampling methods, tests of hypotheses, index numbers, analysis of variance, regression, and correlation; time series analysis. Prerequisite: An introductory course in statistics.

#### **AG EC 420 Mathematical Programming in Agriculture and Forestry**

★3 (*fi 6*) (first term, 3-0-3). Mathematical programming methods applied to the analysis of production systems in agriculture and forestry. Prerequisite: AG EC 316 or MATH 120 or MATH 200.

#### **AG EC 423 Advanced Management Techniques for Agri-Food, Environmental, and Forestry Businesses**

★3 (*fi 6*) (either term, 0-3s-0). Application of principles and techniques in the planning, organizing, and controlling of businesses. A case study approach is used to develop specific management applications to agricultural, environmental, food, and forestry businesses. Not open to students in the Agricultural/Food Business Management program. Prerequisite: AG EC 323 or consent of instructor.

#### **AG EC 433 Advanced Farm and Ranch Management**

★3 (*fi 6*) (either term, 3-0-0). Application of concepts and tools of farm business management in farm planning and farm management extension. Manual and computerized methods of farm accounting, business analysis and planning; interpretation and use of information for decision making in organizing and operating a farm business to achieve goals; planning under risk and uncertainty; farm business arrangements and strategies for growth. Prerequisite: AG EC 333.

#### **AG EC 435 Agriculture and Forestry Law**

★3 (*fi 6*) (either term, 3-0-0). Economic impact of laws and legislation on management of agriculture and forest resources, land tenure and user rights, farm wills and estates, legal implications of agriculture and forest transactions, farm credit legislation and creditor rights, public administrative law affecting farm and forest operations. Prerequisite: One of AG EC 333, 384, FOREC 345, or INT D 365.

**S AG EC 475 Agricultural and Rural Development**

★3 (fi 6) (either term, 3-0-0). Characteristics of underdevelopment in rural economies. Current theories and practices to stimulate agricultural and rural economic growth. Agricultural technology, capital formation, market adjustments and integrated programs. Development planning, project identification, design and appraisal. Principles of coordination, budgeting, public involvement and evaluation: both Canadian and international applications are stressed. Prerequisite: One of INT D 303, INT D 356, or AG EC 373.

**S AG EC 482 Cooperatives and Alternative Business Institutions**

★3 (fi 6) (either term, 3-0-0). Evaluation of the role of alternative institutions to the investor-owned firm (emphasizing cooperatives but including marketing boards and crown corporations). Effects of differing incentive structures in alternative institutions on market prices and quantities. Additional topics include: the role of incentive structures in business organizations, the effects on community development of alternative business organizations, the relationship between market structure and the choice of business organization. Prerequisite: A 300-level AG EC course or ECON 281.

**S AG EC 484 Prices and Markets II**

★3 (fi 6) (either term, 3-0-0). Analysis of the markets for agricultural and food products. Topics may include the economic theory and analysis of alternative market structures, market performance, market regulation, cooperatives, marketing boards, advertising, product quality and grading, food safety, commodity futures markets, empirical price analysis, the role of information in marketing, transportation cost issues, and firm locations. Prerequisite: AG EC 384.

**S AG EC 485 Agricultural Trade Policy**

★3 (fi 6) (either term, 3-0-0). Principles and policies affecting international trade in agricultural and food products. Forms of protection, including tariffs, quotas, and non-tariff barriers, and their consequences. Current and likely trade related institutions, including GATT, regional trade arrangements and customs unions. Effects of changes in trade policy on agriculture and the overall economy. Prerequisite: AG EC 384.

**S AG EC 487 Commodity Futures and Options Markets**

★3 (fi 6) (either term, 3-0-0). Study of the mechanics and economic functions of commodity futures and options markets. Topics include the theory and practice of hedging, intertemporal price formulation and uses in business management. Emphasis on development of a conceptual framework and analytical capability to evaluate the behavior and performance of futures and options markets. Prerequisite: AG EC 384; AG EC 416 and 434 recommended.

## 211.2.2 Graduate Courses

**Notes**

- (1) See also INT D 565 for a course which is offered by more than one department or Faculty and which may be taken as an option or as a course in this discipline.
- (2) The following undergraduate courses may be taken for credit by graduate students: AG EC 406, 416, 423, 433, 435, 475, 484.

**AG EC 500 Research Projects in Agricultural Economics**

★3 (fi 6) (either term, 0-3s-0). Individual study. Investigations of a special problem involving field or library study and preparation of written reports. Note: May be repeated for credit one time. Prerequisite: consent of the Department Chair.

**S AG EC 502 Applied Demand Analysis**

★3 (fi 6) (either term, 3-0-0). Principles of consumer demand analysis including theoretical and empirical approaches to the analysis of consumer choice. Applications include food demand analysis, analysis of consumer choice under uncertainty (food safety, nutrition, health), dynamic consumer choice, advertising and consumer choice, preference shifts in consumer choice, and economic welfare measurement. Prerequisite: ECON 481.

**S AG EC 513 Econometric Applications**

★3 (fi 6) (either term, 3-0-3). Econometric theory, multiple linear regression analysis and interpretation, simultaneous equation estimation, qualitative choice models, time series analysis, applications of econometric techniques to resource and agricultural economic problems. Prerequisite: An intermediate course in statistics or econometrics.

**AG EC 514 Quantitative Techniques**

★3 (fi 6) (either term, 3-0-3). Selected applications of econometrics, operations research, and mathematical programming to economic problems in resource, agriculture, forestry, and food sectors. Prerequisite: consent of Instructor

**S AG EC 533 Production Economics**

★3 (fi 6) (either term, 3-0-3). Static and dynamic firm theory, production principles applied to resource use, resource and product combination, cost structure, uncertainty and expectations. Prerequisite: consent of Instructor; AG EC 502 and 416 recommended.

**S AG EC 534 Agricultural Finance**

★3 (fi 6) (either term, 3-0-0). Capital budgeting and financing issues relating

to farms and small businesses. Risk measurement and management. Agency and information problems and the relation between farm and small business investment and security markets. Cost of capital and valuation of farm and small business assets. Financing alternatives and the choice between them. Evaluation of public programs which affect agricultural and small business financing and risk control. Prerequisite: AG EC 434 or FIN 301.

**S AG EC 573 Agricultural Economics Policy**

★3 (fi 6) (either term, 3-0-0). Goals and instruments of agricultural policy, model constructions with decision and control criteria; national, regional, and provincial agricultural application. Prerequisite: consent of Instructor; AG EC 416 and 502 recommended.

**S AG EC 575 Agriculture in Developing Countries**

★3 (fi 6) (either term, 3-0-0). The role of agriculture in the economic growth of developing countries; influence of international trade and commodity agreements on economic development. Prerequisite: consent of Instructor; AG EC 475 and 502 recommended.

**S AG EC 584 Marketing Economics**

★3 (fi 6) (either term, 3-0-0). Microeconomic theory and analysis of markets for agricultural and food products. Topics will vary with the evolution of the literature but may include: alternative market structures, market regulation, empirical price analysis, advertising, location theories, the role of information in markets, the role of uncertainty in markets, and organization structures. Prerequisite: consent of the instructor. AG EC 502 and 416 recommended.

**S AG EC 585 Agricultural Trade**

★3 (fi 6) (either term, 3-0-0). Concepts and principles underlying international trade and specialization applied to agricultural and food products. Protection and its economic impacts. Agricultural trade policy, institutions and agreements. The role of agricultural trade in developed and less developed countries. Analysis of imperfect markets and alternative approaches to trade liberalization. Prerequisite: consent of Instructor.

**AG EC 600 Directed Studies**

★3 (fi 6) (either term, 0-3s-0). Analysis of selected research problems and design of research projects in production economics, natural resource economics, or marketing economics. Prerequisite: consent of Department Chair.

**AG EC 900**

★3 (fi 6) (variable). Directed Research Project.

211.3 **Agricultural, Food and Nutritional Sciences**

Department of Agricultural, Food and Nutritional Sciences  
Faculty of Agriculture, Forestry and Home Economics

**S AFNS 500 Individual Study**

★3 (fi 6) (either term, variable). Project or reading course under the supervision of a faculty member requiring preparation of a comprehensive report. Prerequisite: consent of Department. Note: May be taken more than once provided the topic is different.

**S AFNS 600 Professional Development**

★1 (fi 2) (first term, 0-3s-0). Provides graduate students with information and experience to achieve high quality scientific presentations and other professional competencies.

**S AFNS 601 Seminar**

★0 (fi 2) (variable, 0-1s-0). Provides a forum in which graduate students prepare and present seminars or papers at both general and technical levels. Attendance is required of all graduate students. Students will participate actively as presenters, discussants and evaluators.

**S AFNS 602 Graduate Reading Project**

★3 (fi 6) (variable, variable). Individual study. Critical reviews of selected literature under the direction of a faculty member. Note: May be taken more than once provided the topic is different. Prerequisite: consent of Department.

**S AFNS 603 Graduate Research Project**

★3 (fi 6) (variable, variable). Directed laboratory study under supervision of a faculty member. Note: May be taken more than once provided the topic is different. Prerequisite: consent of Department.

**AFNS 900 Directed Research Project (Course Based Masters)**

★3 (fi 6) or ★6 (fi 12) (variable). Individual study under the supervision of the student's supervisory committee requiring the preparation of a comprehensive report and presentation of a seminar. Open only to students in the MAG or MEng program.

211.4 **Agriculture and Forestry**

Faculty of Agriculture, Forestry and Home Economics

**AGFOR 100 Global Ecosystems and Human Involvement**

★3 (fi 6) (either term, 3-0-0). An introduction to structure, function,

classification, and dynamics of ecosystems with particular emphasis on interactions between humans and their environment. Topics include resource conservation, sustainability, and economics; land and ecological ethics.

#### **AGFOR 204 Communication Theory and Practice**

★3 (*fi 6*) (either term, 3-0-3). Introduction to the principles of interpersonal, group, and public communication. Practice in oral and visual communication will be emphasized in laboratories. Open only to Faculty of Agriculture, Forestry and Home Economics students.

### **211.5 Anaesthesia**

Department of Anaesthesia  
Faculty of Medicine and Oral Health Sciences

**Note:** Instruction in theoretical aspects of anaesthetic practice is included in PMCOL 421.

#### **ANAES 446 Student Internship**

★1.5 (*fi 3*) (either term, 2 weeks). Student Internship, for Students in Phase III MD program only.

### **211.6 Anatomy and Cell Biology**

Department of Cell Biology and Anatomy  
Faculty of Medicine and Oral Health Sciences

#### **211.6.1 Undergraduate Courses**

##### **ANAT 200 Human Morphology**

★3 (*fi 6*) (either term, 3-0-0). An overview of human structure. Emphasis is placed on the systems of the body and their cooperative role in normal function. A lecture course open to Pharmacy and Dental Hygiene students only.

##### **ANAT 415 Developmental and Molecular Neurobiology**

★3 (*fi 6*) (first term, 0-2s-0). This course will explore nine topics in developmental neurobiology, including cell lineage, nerve growth and guidance, myelination, synapse formation, axonal transport, and response to injury. In particular, the course will emphasize theoretical and experimental aspects, the expanding role of molecular biology in studies in this field, and areas of present and future research. Prerequisite: consent of Department. Note: Offered in odd-numbered years.

##### **ANAT 418 Clinical Anatomy—The Structure of the Human Body**

★12 (*fi 24*) (full session, 223 hours). This is a clinically oriented, integrated course on the structure of the human body at the gross, developmental, and microscopic levels. The course is designed to provide basic information that is necessary for medical practice. Lectures emphasize organ relationships, neurovascular arrangements, normal and abnormal developmental processes, and normal cell and tissue structure. The approach to teaching emphasizes concepts that are important in understanding the spread of disease, the pathogenesis of birth defects, abnormal cell and tissue function, and principles of diagnosis and treatment. Lectures are followed by student dissections of the human body, histology laboratories, patient-attended clinics, and small group case-based problem solving sessions. Open to Medicine and Dentistry students only.

##### **ANAT 419 Neuroanatomy**

★2 (*fi 4*) (either term, 30 hours). A basic course in the main structural and functional aspects of the central nervous system, with emphasis on the clinical importance of major pathways rather than theoretical concepts. Available only to Dental students.

#### **211.6.2 Graduate Courses**

**Note:** First term graduate courses in the Department of Cell Biology and Anatomy commence at the same time as courses in the MD program.

##### **ANAT 510 Human Embryology**

★2 (*fi 4*) (full session, 24 hours). A course in basic human embryology emphasizing normal development, organ relationships, and variations. In addition, the more common congenital defects will be studied to enable the student to recognize and better understand the nature of birth defects. Open to Graduate students upon consent of Department.

##### **ANAT 511 Gross Anatomy**

★6 (*fi 12*) (full session, 180 hours). The course is designed to provide basic information on the structure of the human body which is necessary for medical practice. Lectures emphasize organ relationships that are important for understanding the spread of disease, diagnostic principles, and surgical treatment. Lectures are followed by student dissections of the human body, prosection demonstrations, sessions on radiological anatomy, small group casebased problem solving sessions, and clinics. Open to Graduate students upon consent of Department.

##### **ANAT 516 Cell Biology and Histology**

★6 (*fi 12*) (either term, 90 hours). The goal of the course is to equip students with histological skills and sufficient knowledge of cell structure and function so that normal life processes and diseases can be understood at the cellular level. Topics in modern cell biology as they relate to clinical medicine and dentistry are examined. Histology of human tissues is taught in lectures and laboratories. Open to Graduate students upon consent of Department.

##### **ANAT 612 Research Project**

★3 (*fi 6*) (either term, 0-0-4). Prerequisite: consent of Department.

### **211.7 Andragogie**

Faculté Saint-Jean

##### **ANDR 510 Formation à la méthodologie de l'andragogie**

★3 (*fi 6*) (l'un ou l'autre semestre, 1-2s-0). Les grandes tendances de l'andragogie. Les problèmes de communication interindividuelle et de groupe. La communication pédagogique en tant que processus spécifique. Les attitudes du formateur et leurs effets sur les apprenants. Les grandes familles de méthodes pédagogiques: de la directivité à la créativité. Note: ce cours est destiné aux détenteurs d'un diplôme du premier cycle.

##### **ANDR 520 Formation expérientielle à la dynamique de groupe**

★3 (*fi 6*) (l'un ou l'autre semestre, 1-2s-0). Les concepts de groupe, d'organisation et d'institution. La dynamique de groupe: définition, ses différentes étapes, son utilisation dans le groupe de tâche et d'apprentissage. Prerequis: ANDR 510 ou l'accord du Doyen.

##### **ANDR 551 Sujets choisis en éducation des adultes**

★3 (*fi 6*) (l'un ou l'autre semestre, 3-0-0). Le contenu varie d'une année à l'autre. Note: ce cours est destiné aux détenteurs d'un diplôme du 1er cycle.

### **211.8 Anglais**

Faculté Saint-Jean

#### **Notes**

- (1) Un seul cours complet (ou 2 demi-cours) au niveau 100 peut être crédité pour le BA.
- (2) Prerequis pour les cours au niveau 200: ANGL 101.

##### **ANGL 101 Critical Reading and Writing**

★6 (*fi 12*) (full session, 3-0-0). A critical study of literature in English, concentrating on works written since 1800, with a minimum 30% of class time devoted to writing instruction. Note: Not to be taken by students with credit in ANGL 100 or ANGL 110 or in ENGL 104/105.

##### **ANGL 113 English as a Second Language**

★6 (*fi 12*) (full session, 3-0-1). This course is designed to enable students to communicate in oral and written English. Work in a language laboratory is combined with a review of English grammar and study of English literature and text-book prose to aid students in achieving a greater proficiency in spoken and written English. Students must take a placement test (MELAB) in order to determine their level of proficiency and register in the proper course or section (see Faculté Saint-Jean §172.5.3). The placement test (two hours in duration) will be given at the Faculté Saint-Jean in the first two days of the term. Open only to students enrolled in one of Faculté Saint-Jean's programs. Note: ANGL 113 is not recognized by the Faculty of Arts as an acceptable substitute for ENGL 101. Formerly ANGL 213.

### **211.9 Animal Science**

Department of Agricultural, Food and Nutritional Sciences  
Faculty of Agriculture, Forestry and Home Economics

**Note:** See also Dairy Science, Interdisciplinary Undergraduate Courses, Nutrition, and Nutrition and Food Sciences listings for related courses.

The following table lists a renumbered course effective 1995/96:

Old	New
AN SC 376	ENCS 376

#### **211.9.1 Undergraduate Courses**

##### **AN SC 110 Equine Physiology and Nutrition**

★3 (*fi 6*) (first term, 3-0-0). Principles of digestive, exercise, environmental, and reproductive physiology. Nutrient requirements of the horse; sources of energy and nutrients; feed formulation. Not available to students with credit in 300-level courses in animal physiology and nutrition.

##### **AN SC 200 Principles of Animal Agriculture**

★3 (*fi 6*) (either term, 3-0-3). Principles and practices of modern animal production and management. Brief introduction to the structure of the livestock, poultry, and game ranching industries. Principles of animal management,

breeding and feeding. Current issues in animal agriculture. Students will gain direct experience with animals in production/research environments. Prerequisite: ★3 in university-level biology.

**AN SC 309 Animal Housing**

★3 (*fi 6*) (second term, 3-0-3). Topics include farmstead planning, animal well-being, ventilation, heating, air distribution, control of aerial contaminants, and manure management. Prerequisite: AN SC 200 or ★3 in university-level biology.

**AN SC 310 Physiology of Domestic Mammals and Birds I**

★3 (*fi 6*) (first term, 3-0-3). Fundamental principles of regulation and maintenance of the internal environment. A course of lectures and laboratories devoted to the study of mechanisms providing for homeorhesis and well-being of domestic mammals and birds in response to changes in the external (e.g. light, temperature, social) environment. Prerequisites: ZOOL 120 or BIOL 107 plus ★6 in university-level chemistry.

**AN SC 311 Physiology of Domestic Mammals and Birds II**

★3 (*fi 6*) (second term, 3-0-3). The physiological basis of the productive processes in domestic mammals and birds. A course of lectures and laboratories devoted to the study of the physiological mechanisms of digestion, metabolism, growth, reproduction, and lactation. Prerequisites: ZOOL 120 or BIOL 107 and ★6 in university-level chemistry.

**AN SC 320 Livestock Growth and Meat Production**

★3 (*fi 6*) (first term, 3-2s-0). Concepts of growth and development applied to meat production from farm livestock. Form and function of bone, muscle and fat. Livestock and carcass appraisal. Prerequisite: AN SC 200 or ★3 in university-level biology.

**AN SC 322 Poultry Products and Technology**

★3 (*fi 6*) (first term, 3-0-3). Understanding product concepts, consumer trends, value-added processing technology, marketing strategy and research and development in the poultry industry. Prerequisites: ★3 in university-level biology and ★6 in university-level chemistry.

**AN SC 374 Animal Health and Welfare**

★3 (*fi 6*) (first term, 3-0-0). General principles of disease and disease prevention. Prevention of major reproductive, respiratory, and digestive diseases in farm animals. Promotion of health, welfare, and prevention of disease through proper management. Prerequisite: ★3 in university-level biology.

**AN SC 385 Animal Improvement**

★3 (*fi 6*) (second term, 3-0-2). Application of genetic principles to the improvement of livestock and poultry. Prerequisites: GENET 197 or BIOL 107/207 and third year standing or higher.

**AN SC 391 Metabolism**

★3 (*fi 6*) (second term, 3-0-3). This course will emphasize metabolism of carbohydrates, proteins, amino acids, nucleic acids and lipids. Prerequisite: PL SC 331 or ★3 in Biochemistry.

**AN SC 400 Individual Study**

★3 (*fi 6*) (variable 0-3s-0; 0-0-6). Project or reading course under the supervision of a Faculty member, requiring preparation of a comprehensive report. Prerequisites: Third year standing or higher and consent of Department. Note: May be taken more than once provided that topic is different.

**AN SC 410 Regulation of Reproduction in Domestic Animals**

★3 (*fi 6*) (first term, 0-2s-3). Study of basic physiological mechanisms involved in the control of reproduction in domesticated animals as a basis for developing practical approaches for the regulation of reproductive processes. Prerequisites: AN SC 310 and 311; or ZOOL 343 or equivalent.

**AN SC 461 Ruminant Digestion, Metabolism, and Nutrition**

★3 (*fi 6*) (second term, 3-0-0). Topics in ruminant digestion, metabolism, and nutrition. Prerequisites: (NUTR 260 or NUTR 301 or NUTR 302) and AN SC 311.

**AN SC 471 Applied Poultry Science**

★3 (*fi 6*) (second term, 3-0-3). A study of modern poultry production based on an understanding of avian anatomy, physiology, behavior, health, breeding, and nutrition. Emphasis is placed on the interaction of the above parameters through group research projects with commercial poultry. Prerequisite: AN SC 200 or consent of Instructor.

**AN SC 472 Applied Dairy Science**

★3 (*fi 6*) (first term, 3-0-3). Integration of the nutritional, physiological and biochemical processes involved in the production of quality milk. Structure of the dairy industry and evaluation of management practices to optimize production efficiency and animal well-being. The laboratory will involve analysis of modern dairy production systems with a view to optimizing profitability. Prerequisite: AN SC 200 or consent of Instructor.

**AN SC 474 Applied Beef Cattle Science**

★3 (*fi 6*) (first term, 3-0-3). Examination of current and potential future production and management practices to optimize production efficiency and animal well-being in the Canadian and international beef industry. Prerequisite: AN SC 200 or consent of Instructor.

**AN SC 475 Wildlife Production**

★3 (*fi 6*) (second term, 3-0-3). Biological, technical, legal, and economic basis of the international wildlife farming and ranching industries. Opportunities for livestock diversification with emphasis on elk, bison, and exotics. Prerequisite: AN SC 200 or consent of Instructor.

**AN SC 476 Swine Production and Management**

★3 (*fi 6*) (first term, 3-0-3). Review of functions, production practices, and efficiencies in various sectors of the Swine industry. Evaluation of breeding, feeding, housing management, and disease prevention practices that optimize production efficiency and animal well-being. The laboratory period involves analysis of the production efficiency of a commercial swine unit. Prerequisite: AN SC 200 or consent of Instructor.

**AN SC 484 Animal Molecular Biology**

★3 (*fi 6*) (first term, 2-1s-0). A lecture and discussion course dealing with concepts in gene expression, gene manipulation, and application of molecular biology to animal biotechnology. Prerequisites: BIOCH 203/205 or, PL SC 331 and AN SC 391, or consent of Instructor.

## 211.9.2 Graduate Courses

### Notes

- (1) The following courses may be taken for credit by graduate students:  
AN SC 461, 491, 493.
- (2) See also Agricultural, Food, and Nutritional Sciences listing for related courses.

**AN SC 551 Animal Systems Modelling**

★3 (*fi 6*) (second term, 3-0-3). Application of the techniques of systems analysis and computer simulation in research and management of livestock and wildlife production systems. Prerequisite: consent of Instructor.

**AN SC 580 Biometrical Techniques in Agricultural Science I**

★3 (*fi 6*) (either term, 3-0-3). Application of biometrical techniques to problems in agricultural science. Prerequisite: Fourth year standing or higher. ★3 in introductory statistics recommended.

**AN SC 583 Biometrical Techniques in Agricultural Science II**

★3 (*fi 6*) (second term, 3-0-3). A continuation of AN SC 580 in the application of biometrical techniques to problems in agricultural science. Prerequisite: AN SC 580 recommended.

**AN SC 601 Current Topics in Animal Science**

★3 (*fi 6*) (either term, 0-3s-0). A reading and discussion course consisting of modules selected from areas such as: animal product technology, biochemistry, bioenergetics, biotechnology, genetics, housing and welfare, meat science, modelling of animal systems, nutrition, physiology, production systems, reproduction. May be taken for credit more than once.

**211.10 Reserved**

## 211.11 Anthropologie

Faculté Saint-Jean

**ANTHE 101 Introduction à l'anthropologie**

★3 (*fi 6*) (l'un ou l'autre semestre, 3-0-0). Une introduction à l'anthropologie par l'étude de concepts principaux et d'idées organisatrices tels que l'évolution humaine, l'apparition de la culture, l'organisation sociale, les théories de la culture, les systèmes symboliques, la dynamique de la culture. Note: ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits en ANTHE 202 ou 201. Anciennement ANTHE 201.

**ANTHE 110 Ethnologie du sexe, de l'âge et du pouvoir**

★3 (*fi 6*) (l'un ou l'autre semestre, 3-0-0). Dans toute société, le statut social de l'individu et des groupes change au cours du cycle de la vie. Ce cours examine comment l'âge et le sexe privilégient les rôles et le statut social dans des sociétés différentes. Anciennement ANTHE 210.

**ANTHE 207 Introduction à l'anthropologie sociale et culturelle**

★3 (*fi 6*) (l'un ou l'autre semestre, 3-0-0). Etude comparative de la société et de la culture de l'homme, en particulier dans les communautés nonoccidentales, en insistant sur la famille, la structure sociale, l'économie, les institutions politiques et la religion; les procédures de changement. Prérequis: ANTHE 101.

**ANTHE 208 Introduction à l'anthropologie linguistique**

★3 (*fi 6*) (l'un ou l'autre semestre, 3-0-0). Etude anthropologique du langage et de la communication. Aperçu rapide des méthodes d'enquête sur le terrain et des méthodes analytiques et théorie de l'anthropologie linguistique. Prérequis: ANTHE 101 ou 201.

**ANTHE 320 Ethnologie de la religion**

★3 (*fi 6*) (l'un ou l'autre semestre, 3-0-0). Une introduction à l'étude comparative des religions et des phénomènes qui s'y rattachent; tels la magie, les tabous, le chamanisme et la sorcellerie. Des exemples ethnographiques sont utilisés pour appuyer une analyse des liens entre pensées et rites religieux et autres aspects de la vie sociale.

**ANTHE 484 Choix de sujets en anthropologie**

★3 (fi 6) (l'un ou l'autre semestre, 0-3s-0). Prérequis: accord du Vice-doyen aux affaires académiques.

**211.12 Anthropology**

Department of Anthropology  
Faculty of Arts

**Notes**

- (1) See also INT D 120 and 443 for courses which are offered by more than one department or Faculty and which may be taken as options or as a course in this discipline.
- (2) Students with credit in ANTHR 202 have the equivalent of ANTHR 101 or 201.

The following table lists renumbered courses effective 1990/91:

Old	New	Old	New
ANTHR 201	ANTHR 101	ANTHR 250	ANTHR 150
ANTHR 210	ANTHR 110		

The following table lists renumbered courses effective 1991/92:

Old	New	Old	New
ANTHR 201	ANTHR 101	ANTHR 356	ANTHR 256
ANTHR 210	ANTHR 110	ANTHR 361	ANTHR 261
ANTHR 250	ANTHR 150	ANTHR 362	ANTHR 262
ANTHR 319	ANTHR 219	ANTHR 370	ANTHR 270
ANTHR 325	ANTHR 225	ANTHR 371	ANTHR 271
ANTHR 327	ANTHR 227	ANTHR 378	ANTHR 278
ANTHR 330	ANTHR 230	ANTHR 379	ANTHR 279
ANTHR 346	ANTHR 246	ANTHR 380	ANTHR 280
ANTHR 350	ANTHR 250	ANTHR 385	ANTHR 285

The following table lists renumbered courses effective 1993/94:

Old	New	Old	New
ANTHR 245	ANTHR 344	ANTHR 424	ANTHR 324
ANTHR 306	ANTHR 206	ANTHR 427	ANTHR 328
ANTHR 307	ANTHR 207	ANTHR 447	ANTHR 348
ANTHR 308	ANTHR 208	ANTHR 450	ANTHR 350
ANTHR 309	ANTHR 209	ANTHR 466	ANTHR 366
ANTHR 403	ANTHR 311	ANTHR 467	ANTHR 367
ANTHR 405	ANTHR 312	ANTHR 550	ANTHR 585
ANTHR 406	ANTHR 313	ANTHR 552	ANTHR 584
ANTHR 410	ANTHR 310	ANTHR 554	ANTHR 587
ANTHR 418	ANTHR 318	ANTHR 556	ANTHR 586
ANTHR 423	ANTHR 323		

**211.12.1 Undergraduate Courses****ANTHR 101 Introductory Anthropology**

★3 (fi 6) (either term, 3-0-0). A general introduction to Anthropology through the study of central concepts and key issues. These include human evolution, the appearance of culture, social organization, cultural theory, symbolic systems, culture change. Note: Not open to students with credit in ANTHR 201 or 202.

**ANTHR 110 Gender, Age, and Culture**

★3 (fi 6) (either term, 3-0-0). An anthropological review and comparison of cultures in terms of social positions based on differences in sex and age.

**ANTHR 150 Race and Racism in the Modern World**

★3 (fi 6) (either term, 3-0-0). The challenge of racism in modern societies and the response of anthropology, including the history of the 'race' concept in explaining human variation and the uses of racialist notions in discussions of individual and social differences.

**ANTHR 206 Introduction to Archaeology**

★3 (fi 6) (either term, 2-0-1). Introduction to the nature, purposes, theory and methods of anthropological archaeology. Emphasis is placed upon the principles of reconstruction of past societies from archaeological evidence and the explanation of cultural evolution. Prerequisite: ANTHR 101.

**ANTHR 207 Introduction to Social and Cultural Anthropology**

★3 (fi 6) (either term, 3-0-0). The comparative study of human society and culture, particularly non-Western communities, with special attention to the family, social structure, economics and political institutions, and religion; processes of change. Prerequisite: ANTHR 101.

**ANTHR 208 Introduction to Linguistic Anthropology**

★3 (fi 6) (either term, 3-0-0). The anthropological study of language and communication. A brief survey of field and analytical methods and the theory of linguistic anthropology. Prerequisite: ANTHR 101.

**ANTHR 209 Introduction to Physical Anthropology**

★3 (fi 6) (either term, 2-0-1). Survey of theory and basic data in human evolution and human variation. Topics include primatology, osteology, hominoid paleontology, variation in modern populations. Prerequisite: ANTHR 101.

**ANTHR 219 World Prehistory**

★3 (fi 6) (either term, 3-0-0). A survey of the archaeological evidence for human cultural evolution.

**ANTHR 225 Anthropology and World Problems**

★3 (fi 6) (either term, 3-0-0). An anthropological approach to the culture of capitalism, the social structure of colonial and neocolonial relations, and the emergence of new societies. Offered in alternate years.

**ANTHR 227 Indigenous and Cultural Minorities in the Modern World**

★3 (fi 6) (either term, 3-0-0). The survival of indigenous and minority cultures in various societies. Anthropological perspectives on the relationships among race, class, culture, and politics, and on genocide, ethnocide, and the future of native peoples in the modern state. Offered in alternate years.

**ANTHR 230 Anthropology of Science, Technology, and Environment**

★3 (fi 6) (either term, 3-0-0). The study of science as a cultural practice, the cultural effects and globalization of technology, changing views of nature, gender and science, traditional ecological knowledge, and the evolution of technology.

**ANTHR 246 Peoples and Cultures of the Circumpolar Region**

★3 (fi 6) (either term, 3-0-0). Comparative study of indigenous Arctic and sub-Arctic societies. Archaeological and ethnological considerations of northern societies of the Old and New Worlds. Offered in alternate years.

**ANTHR 250 North American Aboriginal Peoples**

★3 (fi 6) (either term, 3-0-0). A study of aboriginal North American cultures through selected ethnographies and other sources. Offered in alternate years.

**ANTHR 256 Alberta Archaeology**

★3 (fi 6) (either term, 3-0-0). An introduction to Alberta's past as reconstructed by archaeology.

**ANTHR 261 Peoples and Cultures of Middle America**

★3 (fi 6) (either term, 3-0-0). A review of the cultural history of the native peoples of Mexico and Guatemala. Analysis of contemporary Indian communities. Offered in alternate years.

**ANTHR 262 Peoples and Cultures of South America**

★3 (fi 6) (either term, 3-0-0). A review of the cultural history of the native peoples of South America. Analysis of contemporary Indian communities. Offered in alternate years.

**ANTHR 270 Peoples and Cultures of Oceania**

★3 (fi 6) (either term, 3-0-0). Historical, economic, and environmental factors which have helped shape major cultures and subcultures of the central and southern Pacific region (Polynesia, Micronesia, Melanesia, and Australia). Offered in alternate years.

**ANTHR 271 Peoples and Cultures of Southeast Asia**

★3 (fi 6) (either term, 3-0-0). Cultures and societies in Southeast Asia: Burma, Thailand, Malaysia, Cambodia, Laos, Vietnam, Indonesia, and the Philippines; origins and developments, modern forms, trends of change. Offered in alternate years.

**ANTHR 278 Culture and Society of China**

★3 (fi 6) (either term, 3-0-0). The development of Chinese culture and society; social structure, religion, technology, economy, and polity in anthropological perspective.

**ANTHR 279 Culture and Society of Korea**

★3 (fi 6) (either term, 3-0-0). The development of Korean culture and society; social structure, religion, technology, economy, and polity in anthropological perspective. Offered in alternate years.

**ANTHR 280 Culture and Society of Japan**

★3 (fi 6) (either term, 3-0-0). Historical background, ethos and personality, social structure, religion, art, and modernization.

**ANTHR 283 Peoples and Cultures of Western Africa**

★3 (fi 6) (either term, 3-0-0). The cultures of sub-Saharan West Africa and the Zaire basin.

**ANTHR 284 Peoples and Cultures of Eastern and Southern Africa**

★3 (fi 6) (either term, 3-0-0). The indigenous cultures of the eastern portion of Africa from Ethiopia to South Africa.

**ANTHR 310 The Anthropology of Gender**

★3 (fi 6) (either term, 3-0-0). A comparative, cross-cultural, and cross-species perspective on biological and social aspects of sex and gender differences. Prerequisite: ANTHR 110 or 207 or 209 or consent of Department. Offered in alternate years.

**ANTHR 311 North American Prehistory**

★3 (fi 6) (either term, 3-0-0). A survey of prehistory and cultural development in North America. Prerequisite: ANTHR 206 or consent of Department. Offered in alternate years.

**ANTHR 312 Lower Paleolithic Prehistory**

★3 (fi 6) (first term, 3-0-0). The development of prehistoric culture in Europe,



Africa and Asia during the lower Paleolithic. Prerequisite: ANTHR 206 or consent of Department. Offered in alternate years.

### **ANTHR 313 Middle and Upper Paleolithic Prehistory**

★3 (*fi 6*) (second term, 3-0-0). The development of prehistoric culture in Europe, Africa, and Asia during the middle and upper Paleolithic. Prerequisite: ANTHR 206 or consent of Department. Offered in alternate years.

### **ANTHR 318 Political Anthropology**

★3 (*fi 6*) (either term, 3-0-0). An introduction to modern political anthropology with emphasis on the origins of state structure, the relations between non-state and state societies, and the problems of pluralism and stratification. Prerequisite: ANTHR 207 or consent of Department. Offered in alternate years.

### **ANTHR 320 Anthropology of Religion**

★3 (*fi 6*) (either term, 3-0-0). A survey of anthropological approaches to religions and related phenomena, including magic, taboo, shamanism and witchcraft. Emphasis is on the connection between religious ideas and practices and other aspects of social life in a variety of cultures. Prerequisite: ANTHR 207 or consent of Department. Note: Not open to students with credit in ANTHR 420.

### **ANTHR 322 Anthropological Perspectives on Human Communication**

★3 (*fi 6*) (either term, 3-0-0). This course will examine cultural constructions of narrative and discourse; interethnic communication, including discourse in the courtroom, classroom, and work settings; code choice; and communication via electronic media. Prerequisite: ANTHR 208 or consent of Department. Offered in alternate years.

### **ANTHR 323 Ecological Anthropology**

★3 (*fi 6*) (either term, 3-0-0). A consideration of the relationships between culture and the environment. Problems involving the application of basic ecological concepts and principles to human societies and evaluation of various explanatory frameworks regarding cultural adaptations. Prerequisite: ANTHR 206 or 207 or consent of Department.

### **ANTHR 324 Economic Anthropology**

★3 (*fi 6*) (either term, 3-0-0). An introduction to the literature and controversies within the field, with special emphasis on systems of exchange. Prerequisite: ANTHR 207 or consent of Department. Offered in alternate years.

### **ANTHR 328 Creative Expression**

★3 (*fi 6*) (first term, 3-0-0). The role of aesthetic expression in human evolution; general theories of aesthetic expression; and the relation between aesthetic expression, personality, and culture. Prerequisite: ANTHR 207 or consent of Department. Offered in alternate years.

### **ANTHR 331 Anthropology of Technology**

★3 (*fi 6*) (either term, 2-1s-0). An investigation into the character of contemporary technology, emphasizing theories and field methods used in the interpretation of technological change. The course will focus on a different setting each term, such as the workplace, the internet, industrial sites, video arcades. Prerequisite: ANTHR 230, or one of 206 to 209, or consent of Department. Offered in alternate years.

### **ANTHR 332 Anthropology of Science**

★3 (*fi 6*) (either term, 3-0-0). Contemporary views of the nature of science, including debates about science's universalism, objectives, and culture-bound epistemologies. Prerequisite: ANTHR 230, or one of 206 to 209, or consent of Department. Offered in alternate years.

### **ANTHR 340 Anthropological Perspectives on North American Aboriginal Peoples**

★3 (*fi 6*) (either term, 3-0-0). Topics and issues in North American aboriginal studies. Consult the Department and/or University timetable for the specific topic offered in any particular year. Prerequisite: ANTHR 207 or 250 or consent of Department. Offered in alternate years.

### **ANTHR 344 Holocene Prehistory of Europe**

★3 (*fi 6*) (either term, 3-0-0). A survey of the prehistory of Europe (excluding the areas of classical civilizations) from the Mesolithic through the Iron Age: ca. 10,000 to 400 BC. Prerequisite: ANTHR 206.

### **ANTHR 348 Culture and the Individual**

★3 (*fi 6*) (first term, 3-0-0). A cross-cultural examination of the individual in society and culture and of the development of personality. Prerequisite: ANTHR 207 or consent of Department. Offered in alternate years.

### **ANTHR 350 Kinship and Social Structure**

★3 (*fi 6*) (either term, 3-0-0). Anthropological approaches to kinship systems and other concepts of social organization, with emphasis on non-western societies. Prerequisite: ANTHR 207 or 213 or consent of Department. Note: Not open to students with credit in ANTHR 351 or 413. Offered in alternate years.

### **ANTHR 366 Theories of Culture Change**

★3 (*fi 6*) (either term, 3-0-0). Theories of the nature of socio-cultural systems and the processes of change. Prerequisite: ANTHR 207 or consent of Department. Offered in alternate years.

### **ANTHR 367 Applied Anthropology**

★3 (*fi 6*) (either term, 3-0-0). The application of anthropologists' theory and method to contemporary problems of development. Prerequisite: ANTHR 207 or consent of Department. Offered in alternate years.

### **ANTHR 370 Women in East Asian Societies**

★3 (*fi 6*) (either term, 3-0-0). A comparative examination of women's positions and roles in East Asian societies. Effects of law, social practice, and Confucian ideology on familial and economic structures. Prerequisite: ANTHR 278, 279, or 280, or consent of Department. Offered in alternate years.

### **ANTHR 390 Human Osteology**

★3 (*fi 6*) (first term, 3-0-3). Lecture and laboratory study of human skeletal biology, emphasizing the identification of bones and an understanding of human functional anatomy. Prerequisite: ANTHR 209 or consent of Department.

### **ANTHR 391 Hominid Evolution**

★3 (*fi 6*) (either term, 3-0-0). A survey of the fossil evidence for human evolution. Prerequisite: ANTHR 209 or consent of Department.

### **ANTHR 392 Primate Behavior**

★3 (*fi 6*) (either term, 3-0-0). Emphasis on field studies of non-human primates. Topics to include: social organization, behavior and ecology, territorial behavior communication, reproductive behavior, and other relevant topics. Formerly ANTHR 292.

### **ANTHR 393 Health and Healing**

★3 (*fi 6*) (either term, 3-0-0). A cross-cultural study through time of the beliefs and social activities associated with health, illness and healing. Prerequisite: ANTHR 101 or consent of Instructor.

### **ANTHR 396 Archaeological Field Training**

★6 (*fi 12*) (Intersession, 3-0-3). Instruction in all practical aspects of archaeological field techniques, including excavation, survey, recording, photography, and conservation. Held at a selected location in Alberta during Intersession. Prerequisites: ANTHR 206 or equivalent, and consent of Department. Offered in alternate years.

### **ANTHR 401 Ethnographic Methods**

★3 (*fi 6*) (either term, 0-3s-0). A discussion of issues in methodology and field methods. Restricted to senior undergraduate students. Prerequisite: ANTHR 207 or consent of Department. Offered in alternate years.

### **ANTHR 407 Paleopathology**

★3 (*fi 6*) (either term, 3-0-0). A detailed survey of disease processes in antiquity as expressed in skeletal and preserved tissues. Prerequisite: ANTHR 390 or consent of Department. Offered in alternate years.

### **ANTHR 415 History of Anthropological Theory**

★3 (*fi 6*) (either term, 3-0-0). An investigation of the theory and method of anthropology from the nineteenth century to the present, with a focus on sociocultural and linguistic anthropology. The course will trace the development of both idealist and materialist approaches to the cross-cultural understanding of society. Prerequisites: ANTHR 207 or 208 and a 300- or 400-level anthropology course, or consent of Department.

### **ANTHR 422 Anthropological Approaches to Verbal Art**

★3 (*fi 6*) (either term, 3-0-0). A review of anthropological approaches to verbal performances in various cultures. Special attention will be given to narrative forms, including myth, folklore and oral history, and to ritual language, including oratory and prayer. Prerequisite: ANTHR 207 or 208 or consent of Department. Offered in alternate years.

### **ANTHR 425 Anthropology of Work and Production**

★3 (*fi 6*) (either term, 3-0-0). The organization of work and production, with emphasis on the effects of development on subsistence economies. Prerequisite: ANTHR 207 or consent of Department. Offered in alternate years.

### **ANTHR 430 Anthropological Approaches to Symbolism**

★3 (*fi 6*) (either term, 3-0-0). A review of symbolic approaches in anthropology as applied to classification, ideology, ceremonial usages, forms of social action and social relationships. Prerequisite: ANTHR 207 or 320 or consent of Department. Offered in alternate years.

### **ANTHR 433 The Ethnographic Study of Meaning**

★3 (*fi 6*) (either term, 3-0-0). An exploration of the theory and practice of 'writing culture' through consideration of classic and contemporary ethnographic monographs, together with recent contributions to contemporary cultural theory. Prerequisites: ANTHR 207 or 208 and a 300- or 400-level anthropology course, or consent of Department. Offered in alternate years.

### **ANTHR 437 Language, Ethnicity, and Nationalism**

★3 (*fi 6*) (either term, 0-3s-0). The course will explore the impact of nationalism on language and culture in a variety of societies. Topics will include the development of national cultures and national languages; bilingualism and the creolization of language and culture; the status of ethnic minorities; linguistic and cultural grounds for separatist movements; the maintenance of transnational linkages in diaspora communities. Prerequisites: ANTHR 207, or 208 or consent of Department. Offered in alternate years.

**ANTHR 441 Archaeometry**

★3 (*fi 6*) (first term, 3-0-0). Analytical methodology for interpreting the material record of the past; the structures of materials at the microscopic and macroscopic levels; raw materials and production technologies; provenance; dating; prospection; sampling and measure. Archaeological case studies are used throughout. Prerequisite: ANTHR 206 or consent of Department. Offered in alternate years.

**ANTHR 442 Applications of Archaeometry**

★3 (*fi 6*) (second term, 0-0-3). A project course concerned with the interpretation of the material record of the past. Exposure to archaeometric laboratory techniques, and to the interpretation of results. A specific research project is to be undertaken. Prerequisite: ANTHR 441 or consent of Department. Offered in alternate years.

**ANTHR 445 Circumpolar Prehistory**

★3 (*fi 6*) (either term, 3-0-0). A critical examination of archaeological method and theory applied to circumpolar regions. Prerequisites: ANTHR 246, one other course in anthropology, or consent of Department. Offered in alternate years.

**ANTHR 446 Circumpolar Ethnology**

★3 (*fi 6*) (either term, 3-0-0). A critical examination of anthropological models applied to traditional societies in the circumpolar regions. Prerequisites: ANTHR 246, one other course in anthropology, or consent of Department. Offered in alternate years.

**ANTHR 455 Aboriginal Rights**

★3 (*fi 6*) (either term, 3-0-0). Topics related to the concept of aboriginal rights; questions about 'special' political rights of aboriginal peoples in Canada. Prerequisite: An introductory course in social or cultural anthropology, or history, or political science, or sociology, or consent of Department.

**ANTHR 463 The Origins of Food Production**

★3 (*fi 6*) (either term, 0-3s-0). Archaeological evidence for the development of food production in the Old and New Worlds, discussed in the context of the major explanatory theories advanced. Prerequisite: ANTHR 206 or consent of Department.

**ANTHR 465 Cultural Transmission**

★3 (*fi 6*) (either term, 3-0-0). The ethnographic study of enculturation, education, and cultural change. Prerequisite: ANTHR 207 or EDPS 411 or consent of Department. Offered in alternate years.

**ANTHR 471 Readings in Anthropology**

★3 (*fi 6*) (either term, 0-3s-0). Individual research project conducted under the direction of a Department faculty member. Prerequisite: consent of Department.

**ANTHR 472 Independent Research**

★3 (*fi 6*) (either term, 0-0-3). Individual research project involving significant laboratory work conducted under the direction of a Department faculty member. Prerequisite: consent of Department.

**ANTHR 473 Dene Society in Anthropological Perspective**

★3 (*fi 6*) (either term, 3-0-0). A critical examination of anthropological perspectives on Dene society, culture, and ethnohistory. Prerequisite: ANTHR 101 or 207 or consent of Department. Offered in alternate years.

**ANTHR 474 Northwest Coast Societies from an Anthropological Perspective**

★3 (*fi 6*) (either term, 0-3s-0). This course will survey the cultures of the Northwest Coast from Yakutat Bay to the Columbia River. Cultures will be examined from the perspectives of the ethnographic present, historical change, and current developments. Focal areas include: Social structure, kinship, economic systems, material culture, ethnoaesthetics, winter dance ceremonial complexes, and language. Prerequisite: ANTHR 207 or 250 or consent of Department. Offered in alternate years.

**ANTHR 479 Geoarchaeology**

★3 (*fi 6*) (first term, 3-0-3). Application of earth science methods to archaeological research. Prerequisites: ANTHR 206 and one of GEOL 102/103, 201/204, 292, GEOG 130/131, or 330. Not open to students who have taken ANTHR 498. Offered in alternate years.

**ANTHR 481 Development of Archaeological Method and Theory**

★3 (*fi 6*) (either term, 3-0-0). A survey of the approaches and practices used in archaeology prior to 1960; concepts and models used for interpreting archaeological data and cultural history; the relation of culture historical explanations to general anthropological theory. Prerequisites: ANTHR 206 and a 300- or 400-level anthropology course, or consent of Instructor. Offered in alternate years.

**ANTHR 484 Topics in Archaeology and/or Physical Anthropology**

★3 (*fi 6*) (either term, 0-3s-0). Consult the Department and/or the University timetable for the specific topic offered in any particular year. Prerequisite: consent of Department.

**ANTHR 485 Topics in Social and Cultural Anthropology**

★3 (*fi 6*) (either term, 0-3s-0). Consult the Department and/or the University

timetable for the specific topic offered in any particular year. Prerequisite: consent of Department.

**ANTHR 486 Seminar in Archaeology and/or Physical Anthropology**

★3 (*fi 6*) (either term, 0-3s-0). Consult the Department and/or the University timetable for the specific topic offered in any particular year. Prerequisite: consent of Department.

**ANTHR 487 Seminar in Social and Cultural Anthropology**

★3 (*fi 6*) (either term, 0-3s-0). Consult the Department and/or the University timetable for the specific topic offered in any particular year. Prerequisite: consent of Department.

**ANTHR 488 Quaternary Pollen Analysis**

★3 (*fi 6*) (second term, 3-0-3). Prerequisite: consent of Department. Offered in alternate years.

**ANTHR 490 Human Osteoarchaeology**

★3 (*fi 6*) (either term, 0-3s-0). Seminar study of the analysis and interpretation of data obtained from human skeletal and dental remains from archaeological sites. Prerequisite: ANTHR 390 or consent of Department. Offered in alternate years.

**ANTHR 491 Stone Tools**

★3 (*fi 6*) (either term, 3-0-3). A methodological and theoretical introduction to the analysis of stone tools. Prerequisites: ANTHR 206 and one other 400-level course in Anthropology or consent of Department. Offered in alternate years.

**ANTHR 492 Problems in Primate Behavior**

★3 (*fi 6*) (either term, 3-0-0). Examines kin selection in primates, sexual differentiation of behavior, evolution of primate behavior patterns, appropriateness of infraprimate analogies to human behavior. Prerequisite: ANTHR 392 or consent of Department. Offered in alternate years.

**ANTHR 494 Forensic Anthropology**

★3 (*fi 6*) (either term, 0-3s-0). Human skeletal individualization and its application to human death investigation. Prerequisite: ANTHR 390 or 490 or consent of Department. Offered in alternate years.

**ANTHR 495 Archaeological Methods**

★3 (*fi 6*) (either term, 3-0-3). The application of archaeological theory and methods to field and laboratory problems. Prerequisites: ANTHR 206 and one other 400-level course in Anthropology, or consent of Department. Offered in alternate years.

**ANTHR 498 History of Physical Anthropology**

★3 (*fi 6*) (either term, 3-0-0). A survey of the development of theory and method in physical anthropology. Prerequisites: ANTHR 209 and a 300- or 400-level anthropology course, or consent of Department. Offered in alternate years.

**ANTHR 499 Fourth-Year Honors Seminar and Honors Paper**

★6 (*fi 12*) (full session, 0-3s-0). Prerequisite: consent of Department.

**211.12.2 Graduate Courses****Notes**

- (1) See also INT D 594 for a course which is offered by more than one department or Faculty and which may be taken as an option or as a course in this discipline.
- (2) The following undergraduate courses may be taken for credit by graduate students: ANTHR 407, 414, 415, 419, 422, 425, 426, 428, 433, 435, 441, 442, 446, 455, 463, 465, 470, 471, 472, 473, 478, 479, 481, 484, 485, 486, 487, 488, 490, 491, 492, 494, 495, 497.

**ANTHR 508 Methods in Linguistic Anthropology**

★3 (*fi 6*) (either term, 0-3s-3). Selected topics in field methods and analytic techniques used by linguistic anthropologists, and their extensions in socio-cultural anthropology. Prerequisite: consent of Department. Offered in alternate years.

**ANTHR 509 Symbolic and Cognitive Analysis**

★3 (*fi 6*) (either term, 0-3s-0). Note: Not open to students with credit in ANTHR 504.

**ANTHR 511 Ethnographic Field Methods I**

★3 (*fi 6*) (first term, 0-3s-0). Prerequisite: consent of Department. Note: Not open to students with credit in ANTHR 401 or 505. Offered in alternate years.

**ANTHR 512 Ethnographic Field Methods II**

★3 (*fi 6*) (second term, 0-3s-0). Prerequisite: ANTHR 511 or consent of Department. Note: Not open to students with credit in ANTHR 505. Offered in alternate years.

**ANTHR 513 The Transmission of Culture**

★3 (*fi 6*) (either term, 0-3s-0). Note: Not open to students with credit in ANTHR 515. Prerequisite: consent of Department. Offered in alternate years.

**ANTHR 521 Topics in Medical Anthropology**

★3 (*fi 6*) (second term, 0-3s-0). Prerequisite: ANTHR 393 or 407; or consent of Department.

**ANTHR 531 Traditions, Technology and Knowledge**

★3 (*fi 6*) (either term, 0-3s-0). An examination of the relationships among technology, social practices and belief systems; the role of technology in mediating societies' relationship with nature; and changes occurring in valued practices resulting from external perturbations. Comparison of local- and state-level systems of environmental management.

**ANTHR 532 Science and Culture**

★3 (*fi 6*) (either term, 0-3s-0). An examination of how science is perceived in contemporary society and how these perceptions have been formed. A review of debates concerning the theoretical positions of positivism, postmodernism, and the impact that feminist and postcolonial critiques have had on the formation of scientific thought. New directions within anthropology concerning cultures of science and science as culture are highlighted.

**ANTHR 535 Anthropology and the Nation-state**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisite: consent of Department. Restricted to graduate students in Anthropology, Sociology, Political Science, or Economics. Offered in alternate years.

**ANTHR 571 Advanced Readings in Anthropology**

★3 (*fi 6*) (either term, 0-3s-0). Individual research project conducted under the direction of a Department faculty member. Prerequisite: consent of Department.

**ANTHR 581 Contemporary Archaeological Method and Theory**

★3 (*fi 6*) (either term, 0-3s-0). A survey of the approaches and practices used in archaeology since 1960. Prerequisite: ANTHR 481, or consent of Department. Offered in alternate years.

**ANTHR 584 Advanced Topics in Archaeology and/or Physical Anthropology**

★3 (*fi 6*) (either term, 0-3s-0). Consult the Department and/or the University timetable for the specific topic offered in any particular year. Prerequisite: consent of Department.

**ANTHR 585 Advanced Topics in Social and Cultural Anthropology**

★3 (*fi 6*) (either term, 0-3s-0). Consult the Department and/or the University timetable for the specific topic offered in any particular year. Prerequisite: consent of Department.

**ANTHR 586 Advanced Seminar in Archaeology and/or Physical Anthropology**

★3 (*fi 6*) (either term, 0-3s-0). Consult the Department and/or the University timetable for the specific topic offered in any particular year. Prerequisite: consent of Department.

**ANTHR 587 Advanced Seminar in Social and Cultural Anthropology**

★3 (*fi 6*) (either term, 0-3s-0). Consult the Department and/or the University timetable for the specific topic offered in any particular year. Prerequisite: consent of Department.

**ANTHR 593 Evolution and Social Life**

★3 (*fi 6*) (either term, 0-3s-0). Theories of the origin and evolution of the human phenotype and ecological niche, the sexual division of labor, kinship and the family, language and self-awareness. Prerequisite: consent of Department. Offered in alternate years.

**ANTHR 598 Landscape and Culture**

★3 (*fi 6*) (either term, 0-3s-0). An examination of cultural experiences and representations of landscape. Topics may include the reconstruction of ancient environments, cultural ecology, environmental anthropology, ecological management and restoration, and the emerging field of landscape theory.

**211.13 Arabic**

(Division of Comparative Studies in Literature, Film, and Religion)  
Department of Modern Languages and Comparative Studies  
Faculty of Arts

**ARAB 100 Beginner's Arabic**

★6 (*fi 12*) (full session, 3-0-2). An introduction to pronunciation, reading, writing, and conversation for those with no previous knowledge of Arabic.

**ARAB 301 Intermediate Arabic I**

★3 (*fi 6*) (first term, 3-0-0). A continuation of ARAB 100, with emphasis on building an extensive vocabulary in everyday situations. Continued efforts to improve oral skills. Prerequisite: ARAB 100 or consent of Department. Note: Not open to students with credit in ARAB 300.

**ARAB 302 Intermediate Arabic II**

★3 (*fi 6*) (second term, 3-0-0). Selected readings in ancient and modern literature. Exercises in comprehension, translation and composition. Further study of grammar. Prerequisite: ARAB 301 or consent of Department. Note: Not open to students with credit in ARAB 300.

**ARAB 499 Problems and Topics in Arabic Language and/or Literature**

★3 (*fi 6*) (either term, 0-3s-0) or ★6 (*fi 12*) (full session, 0-3s-0). Prerequisite: consent of Department.

**211.14 Art**

Department of Art and Design  
Faculty of Arts

**Note:** Since presence at lectures and seminars, participation in classroom discussion, and the completion of assignments are important components of most courses, students will serve their best interest by regular attendance.

This applies particularly to studio courses where attendance will be a factor in grading.

The following table lists renumbered courses effective 1990/91:

Old	New	Old	New
ART 231	ART 131	ART 233	ART 133
ART 232	ART 132	ART 368	ART 268

The following table lists renumbered courses effective 1992/93:

Old	New	Old	New
ART 312	ART 310/311	ART 414	ART 418/419
ART 313	ART 316/317	ART 512	ART 510/511
ART 412	ART 410/411	ART 513	ART 516/517
ART 413	ART 416/417	ART 514	ART 518/519

**211.14.1 Undergraduate Courses****ART 131 Visual Fundamentals**

★6 (*fi 12*) (full session, 0-6L-0). A studio based introduction to the exploration and production, in two and three dimensions, of visually expressed information. Note: Not open to students with credit in ART 132.

**ART 132 Visual Fundamentals**

★6 (*fi 12*) (full session, 0-12L-0). A studio based course that provides BFA and BDesign students with an introduction to the exploration and production, in two and three dimensions, of visually-expressed information. Note: Restricted to BFA and BDesign students. Full course offered in the first term.

**ART 133 Visual Fundamentals**

★6 (*fi 12*) (full session, 0-12L-0). A studio based course that provides BFA and BDesign students with a further concentration in the exploration and production, in two and three dimensions, of visually expressed information. Prerequisites: ART 132 and consent of Department. Note: Full course offered in the second term.

**ART 140 Drawing I**

★3 (*fi 6*) (either term, 0-6L-0). Study of the principles and techniques of drawing. Note: Restricted to BFA and BDesign students.

**ART 268 Introduction to Studio**

★3 (*fi 6*) (first term, 0-6L-0). Directed study in one subject embraced by ART 322. Prerequisites: ART 131, or 132, and consent of Department. Note: Restricted to students in the Faculty of Education only.

**ART 308 Introduction to Basic Principles of Mural Design/Painting**

★3 (*fi 6*) (either term, 0-6L-0). Prerequisite: ART 131 or 132, and/or consent of Department.

**ART 309 Further Studies in the Principles of Mural Design/Painting**

★3 (*fi 6*) (either term, 0-6L-0). Transcription methods and methodologies in monumental composition. Prerequisite: ART 308 or 310, and/or consent of Department.

**ART 310 Painting: Introductory Studies I**

★3 (*fi 6*) (first term, 0-6L-0). Introduction to the principles, concepts, and techniques of painting, exploring both historical and contemporary modes of expression, in acrylic and/or oil. Prerequisites: ART 131 or 132 and consent of Department. Note: Not open to students with credit in ART 312.

**ART 311 Painting: Introductory Studies II**

★3 (*fi 6*) (second term, 0-6L-0). Continued exploration of the principles, concepts and techniques of painting. Prerequisites: Normally ART 310 and consent of Department. Note: Not open to students with credit in ART 312.

**ART 316 Painting: Introductory Studies III**

★3 (*fi 6*) (first term, 0-6L-0). Additional exploration in painting for students wishing a more in-depth study at the introductory level. Prerequisites or corequisites: Normally ART 310 and consent of Department. Note: Not open to students with credit in ART 313.

**ART 317 Painting: Introductory Studies IV (Life Painting)**

★3 (*fi 6*) (second term, 0-6L-0). Introduction to painting the figure with emphasis on working from the life model. Prerequisites: Normally ART 310 and consent of Department. Note: Not open to students with credit in ART 313.

**ART 322 Printmaking: Introductory Studies I**

★6 (fi 12) (full session, 0-6L-0). Introduction to the principles and technical applications of printmaking through the study of screen printing, intaglio and relief process. Prerequisites: ART 131 or 132 and consent of Department.

**ART 323 Printmaking: Introductory Studies II**

★6 (fi 12) (full session, 0-6L-0). Further study of the principles and technical applications of screen printing, relief and intaglio processes with an emphasis on the use of color. Prerequisites or corequisites: ART 322 and consent of Department.

**ART 337 Special Projects in Studio Disciplines**

★6 (fi 12) (full session, 0-6L-0). Special projects in studio disciplines not normally available under existing courses. Normally offered in Intersession. Prerequisites: ART 131 or 132 and consent of Department.

**ART 338 Special Projects in Studio Disciplines**

★3 (fi 6) (either term, 0-6L-0). Special projects in studio disciplines not normally available under existing courses. Prerequisites: ART 131 or 132 and consent of Department.

**ART 339 Special Projects in Drawing**

★6 (fi 12) (full session, 0-6L-0). Special drawing projects not normally available under existing courses. Note: BFA and BDesign students may use ART 339 in lieu of ART 140/340 upon consent of Department. To be offered in Intersession only. Prerequisites: ART 131 or 132 and consent of Department.

**ART 340 Drawing II**

★3 (fi 6) (either term, 0-6L-0). Development and application of techniques and concepts of drawing. Note: Restricted to BFA and BDesign students. Prerequisite: ART 140.

**ART 361 Sculpture: Introductory Studies in Abstract Sculpture**

★3 (fi 6) (either term, 0-6L-0). Foundation studies in abstract sculpture. Prerequisites: ART 131 or 132, and consent of Department. Corequisite: Normally ART 362, to be taken in the same academic year. Not open to students with credit in ART 362 (★6) offered prior to 1992/93.

**ART 362 Sculpture: Introductory Studies in Figurative Sculpture**

★3 (fi 6) (either term, 0-6L-0). Foundation studies in figurative sculpture. Prerequisites: ART 131 or 132, and consent of Department. Corequisite: Normally ART 361, to be taken in the same academic year. Not open to students with credit in ART 362 (★6) offered prior to 1992-93.

**ART 363 Sculpture: Introductory Studies III**

★6 (fi 12) (full session, 0-6L-0). Further foundation studies in sculpture. Prerequisites or corequisites: ART 361 and 362 and consent of Department.

**ART 408 Advanced Studies in Mural Design/Painting**

★3 (fi 6) (either term, 0-6L-0). Studies in the architectonics of form. Prerequisite: ART 309 and/or consent of Department.

**ART 409 Further Advanced Studies in Mural Design/Painting**

★3 (fi 6) (either term, 0-6L-0). Studies in the dynamics of color. Prerequisites: ART 309 and/or consent of Department.

**ART 410 Painting: Intermediate Studies I**

★3 (fi 6) (first term, 0-6L-0). A project based course exploring principles, concepts and techniques of painting. Prerequisites: Normally ART 310 and one of ART 311, 317 and consent of Department. Note: Not open to students with credit in ART 412.

**ART 411 Painting: Intermediate Studies II**

★3 (fi 6) (second term, 0-6L-0). Further study of advanced principles, concepts and techniques of painting, leading to self-initiated projects. Prerequisites: Normally one of ART 410, 416, 418 and consent of Department. Note: Not open to students with credit in ART 412.

**ART 416 Painting: Intermediate Studies III**

★3 (fi 6) (first term, 0-6L-0). A project based course exploring advanced principles, concepts and techniques of painting. Prerequisites: Normally ART 310, one of ART 311, 317 and consent of Department. Note: Not open to students with credit in ART 413.

**ART 417 Painting: Intermediate Studies IV**

★3 (fi 6) (second term, 0-6L-0). Further study of advanced principles, concepts and techniques of painting. Prerequisites: Normally one of ART 410, 416, 418 and consent of Department. Note: Not open to students with credit in ART 413.

**ART 418 Painting: Intermediate Figure Studies I**

★3 (fi 6) (first term, 0-6L-0). Further study in painting the figure with emphasis on painting from the life model. Prerequisites: Normally ART 310 and one of ART 311, 317 and consent of Department. Note: Not open to students with credit in ART 414.

**ART 419 Painting: Intermediate Figure Studies II**

★3 (fi 6) (second term, 0-6L-0). Further study in painting the figure with emphasis on painting from the life model. Prerequisites: One of ART 410, 416, 418 and consent of Department. Note: Not open to students with credit in ART 414.

**ART 422 Printmaking: Intermediate Studies I**

★6 (fi 12) (full session, 0-6L-0). Study of the principles and technical applications of printmaking with an emphasis on lithography and etching. Prerequisites: ART 322 and consent of Department.

**ART 423 Printmaking: Intermediate Studies II**

★6 (fi 12) (full session, 0-6L-0). Further study of the principles and technical applications of lithography and etching with an emphasis on the use of color. Prerequisites or corequisites: ART 422 and consent of Department.

**ART 425 Word and Image: Intermediate Projects in Printmaking for Artists and Designers**

★6 (fi 12) (full session, 0-6L-0). Exploration of the multiple relationships between word and image generated through consideration of text. Prerequisite: ART 322. Corequisite: ART 422. Note: ART 425 and DES 425 will be taught in conjunction. Registration priority will be given to BDesign Printmaking Route students registering in DES 425. Not open to students who have successfully completed DES 425.

**ART 437 Special Projects in Studio Disciplines**

★6 (fi 12) (full session, 0-6L-0). Special projects in studio disciplines not normally available under existing courses. Normally offered in Intersession. Prerequisite: consent of Department.

**ART 438 Special Projects in Studio Disciplines**

★3 (fi 6) (either term, 0-6L-0). Special projects in studio disciplines not normally available under existing courses. Prerequisite: consent of Department.

**ART 439 Special Projects in Drawing**

★6 (fi 12) (full session, 0-6L-0). Projects not normally available under existing courses. Note: BFA and BDesign students may use ART 439 (Drawing) in lieu of ART 440 and ART 441 upon consent of Department. Normally offered in Intersession. Prerequisites: ART 140 and 340, or 339 and consent of Department.

**ART 440 Drawing: Intermediate Studies**

★3 (fi 6) (first term, 0-6L-0). Further study and application of the techniques and concepts of drawing. Note: Restricted to BFA and BDesign students. Prerequisite: ART 339 or ART 340.

**ART 441 Drawing: Intermediate Studies**

★3 (fi 6) (second term, 0-6L-0). Further study and application of techniques and concepts of drawing. Note: Restricted to BFA and BDesign students. Prerequisite: ART 339 or 340. Not open to students with credit in ART 440 (★6) offered prior to 1995/96.

**ART 462 Sculpture: Intermediate Studies I**

★6 (fi 12) (full session, 0-6L-0). Intermediate studies in sculpture. Prerequisites: ART 361 and 362 and/or consent of Department.

**ART 463 Sculpture: Intermediate Studies II**

★6 (fi 12) (full session, 0-6L-0). Further intermediate studies in sculpture. Prerequisite or corequisite: ART 462 and/or consent of Department.

**ART 464 Sculpture: Intermediate Studies III**

★6 (fi 12) (full session, 0-6L-0). Additional intermediate studies in sculpture. Prerequisite or corequisite: ART 463 and/or consent of Department.

**ART 508 Senior Studies in Mural Design/Painting**

★3 (fi 6) (either term, 0-6L-0). Studies in monumental figure composition. Prerequisites: ART 309 and one of ART 410, 416, 418 and/or consent of Department.

**ART 509 Further Senior Studies in Mural Design/Painting**

★3 (fi 6) (either term, 0-6L-0). Simulated mural commission. Prerequisites: ART 408 or 409 or 508 and consent of Department.

**ART 510 Painting: Advanced Studies I**

★3 (fi 6) (first term, 0-6L-0). Individual directed study in a studio/workshop environment. Prerequisites: Normally one of ART 410, 416, 418, one of ART 411, 417, 419 and consent of Department. Note: Not open to students with credit in ART 512.

**ART 511 Painting: Advanced Studies II**

★3 (fi 6) (second term, 0-6L-0). Individual directed study in a studio/workshop environment. Prerequisites: Normally one of ART 510, 516, 518 and consent of Department. Note: Not open to students with credit in ART 512.

**ART 516 Painting: Advanced Studies III**

★3 (fi 6) (first term, 0-6L-0). Individual directed study in a studio/workshop environment. Prerequisites: Normally one of ART 410, 416, 418 and one of ART 411, 417, 419 and consent of Department. Note: Not open to students with credit in ART 513.

**ART 517 Painting: Advanced Studies IV**

★3 (fi 6) (second term, 0-6L-0). Individual directed study in a studio/workshop environment. Prerequisites: Normally one of ART 510, 516, 518 and consent of Department. Note: Not open to students with credit in ART 513.

**ART 518 Painting: Advanced Studies V**

★3 (*fi 6*) (first term, 0-6L-0). Individual directed study in a studio/workshop environment. Prerequisites: Normally one of ART 410, 416, 418 and one of ART 411, 417, 419 and consent of Department. Note: Not open to students with credit in ART 514.

**ART 519 Painting: Advanced Studies VI**

★3 (*fi 6*) (second term, 0-6L-0). Individual directed study in a studio/workshop environment. Prerequisites: Normally one of ART 510, 516, 518 and consent of Department. Note: Not open to students with credit in ART 514.

**ART 522 Printmaking: Advanced Studies I**

★6 (*fi 12*) (full session, 0-6L-0). Advanced study of the principles and technical applications of printmaking with an emphasis on mixed media and photographic techniques. Prerequisites: ART 422 and consent of Department.

**ART 523 Printmaking: Advanced Studies II**

★6 (*fi 12*) (full session, 0-6L-0). Continued advanced study of the principles and technical applications of printmaking with an emphasis on individual development. Prerequisites or corequisites: ART 522 and consent of Department.

**ART 524 Printmaking: Advanced Studies III**

★6 (*fi 12*) (full session, 0-6L-0). Advanced individual study of drawing and other image-making processes and their application in printmaking. Prerequisites or corequisites: ART 523 and consent of Department.

**ART 525 Word and Image: Advanced Projects in Printmaking for Artists and Designers**

★6 (*fi 12*) (full session, 0-6L-0). Exploration of the multiple relationships between word and image generated through consideration of text. Prerequisite: ART 422 and ART 425. Corequisite: ART 522. Note: ART 525 and DES 525 will be taught in conjunction. Registration priority will be given to BDesign Printmaking Route students registering in DES 525. Not open to students who have successfully completed DES 525.

**ART 537 Special Projects in Studio Disciplines**

★6 (*fi 12*) (full session, 0-6L-0). Special projects in studio disciplines not normally available under existing courses. Normally offered in Intersession. Prerequisite: consent of Department.

**ART 538 Special Projects in Studio Disciplines**

★3 (*fi 6*) (either term, 0-6L-0). Special projects in studio disciplines not normally available under existing courses. Prerequisite: consent of Department.

**ART 539 Special Projects in Drawing**

★6 (*fi 12*) (full session, 0-6L-0). Projects not normally available under existing courses. Note: BFA and BDesign students may use ART 539 (Drawing) in lieu of ART 540 and ART 541 upon consent of Department. Normally offered in Intersession. Prerequisites: ART 439 or 440 and consent of Department.

**ART 540 Drawing: Advanced Studies**

★3 (*fi 6*) (first term, 0-6L-0). Prerequisite: ART 439 or 440 or 441. Note: Restricted to BFA and BDesign students.

**ART 541 Drawing: Advanced Studies**

★3 (*fi 6*) (second term, 0-6L-0). Prerequisite: ART 440 or 441 or 439. Note: Restricted to BFA and BDesign students. Not open to students with credit in ART 540 (★6) offered prior to 1995/96.

**ART 562 Sculpture: Advanced Studies I**

★6 (*fi 12*) (full session, 0-6L-0). Advanced studies in sculpture. Prerequisite: ART 462 and/or consent of Department.

**ART 563 Sculpture: Advanced Studies II**

★6 (*fi 12*) (full session, 0-6L-0). Further advanced studies in sculpture. Prerequisite or corequisite: ART 562 and/or consent of Department.

**ART 564 Sculpture: Advanced Studies III**

★6 (*fi 12*) (full session, 0-6L-0). Additional advanced studies in sculpture. Prerequisite or corequisite: ART 563 and/or consent of Department.

**211.14.2 Graduate Courses****ART 612 Painting: Concepts, Analysis, and Criticism**

★10 (*fi 20*) (first term, 0-18L-0).

**ART 613 Painting: Development of Concepts, Analysis, and Criticism**

★10 (*fi 20*) (second term, 0-18L-0).

**ART 622 Printmaking: Concepts, Analysis, and Criticism**

★10 (*fi 20*) (first term, 0-18L-0).

**ART 623 Printmaking: Development of Concepts Analysis and Criticism**

★10 (*fi 20*) (second term, 0-18L-0).

**ART 630 Seminar in Related Disciplines**

★3 (*fi 6*) (full session, 0-1s-0).

**ART 662 Sculpture: Concepts, Analysis, and Criticism**

★10 (*fi 20*) (first term, 0-18L-0).

**ART 663 Sculpture: Development of Concepts, Analysis, and Criticism**

★10 (*fi 20*) (second term, 0-18L-0).

**211.15 Art de la scène**

Faculté Saint-Jean

**ARTSC 300 Appréciation des arts de la scène**

★6 (*fi 12*) (aux deux semestres, 3-0-0). Introduction à l'histoire des arts de la scène, incursion dans les spectacles de: théâtre, mime, masques, ombres, marionnettes, opéra-musical, ballet-danse, cirque, etc. Evaluation critique des spectacles auxquels les étudiants assistent. Anciennement ARTSC 200.

**211.16 Art dramatique**

Faculté Saint-Jean

**ADRAM 101 Introduction à l'art théâtral**

★3 (*fi 6*) (l'un ou l'autre semestre, 2-0-2). Les origines et le développement de l'art théâtral, notions de base sur la production d'un spectacle de théâtre: de la conception à la réalisation. Analyses critiques de pièces auxquelles les étudiants assistent. Anciennement ADRAM 202.

**ADRAM 103 Les procédés dramatiques**

★3 (*fi 6*) (l'un ou l'autre semestre, 2-0-2). Approche pratique et théorique au développement des ressources humaines par l'art dramatique. Introduction au jeu et à la forme théâtrale, avec insistance sur le processus de création, la stimulation des capacités de communiquer et de s'exprimer, l'imagination, la spontanéité. La découverte de l'improvographie.

**ADRAM 203 L'expérience du théâtre**

★3 (*fi 6*) (l'un ou l'autre semestre, 0-4L-0). Participation au processus complet de la production d'un spectacle: interprétation, scénographie, animation et mise en scène. Création d'une pièce choisie faisant partie d'un cours enseigné à la Faculté. Prérequis: ADRAM 101 et 103.

**ADRAM 247 Communication orale**

★3 (*fi 6*) (l'un ou l'autre semestre, 0-6L-0). Exercices pour améliorer la voix et la diction; exploration des techniques de base de la communication orale et interprétation de diverses formes littéraires; développement de l'expression spontanée du langage. Anciennement ADRAM 143.

**ADRAM 301 Survol historique du théâtre**

★6 (*fi 12*) (aux deux semestres, 3-0-0). Le développement des styles et des formes du spectacle théâtral et la relation changeante entre l'espace de jeu et le public, à partir du théâtre Grec et Romain, jusqu'à nos jours. Oeuvres majeures, artistes et artisans du théâtre qui ont aidé au développement du langage théâtral, tel que nous le connaissons aujourd'hui.

**ADRAM 321 Créativité et théâtre pour jeunes**

★3 (*fi 6*) (l'un ou l'autre semestre, 2-3L-0). Approche pratique et théorique au développement des ressources humaines par l'art dramatique (de la conception à la réalisation d'un projet théâtral) tenant compte des enfants et des jeunes. Prérequis: ADRAM 101, ou l'accord du Vice-doyen aux affaires académiques.

**ADRAM 327 L'expérience du théâtre communautaire**

★3 (*fi 6*) (deuxième semestre, 1-4L-0). Etude des théories, des pratiques et du développement du théâtre populaire, communautaire et collectif en milieu adulte ou scolaire. Le côté pratique du cours implique la participation des étudiants dans le processus complet de la production d'un spectacle amateur d'une pièce dirigée par le coordonnateur du cours. Prérequis: ADRAM 101 et 103. Ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits en ADRAM 203.

**ADRAM 359 Atelier d'improvisation**

★3 (*fi 6*) (l'un ou l'autre semestre, 0-6L-0). Pratique de la préparation et de la mise en marche des improvisations afin d'explorer la création des formes dramatiques. Prérequis: ADRAM 203 ou 327 ou l'accord du Doyen.

**ADRAM 383 La mise en scène théâtrale**

★3 (*fi 6*) (deuxième semestre, 1-4L-0). Etude d'une variété de systèmes codifiés que représentent l'ensemble des arts du spectacle; sur les objectifs et défis des créateurs du théâtre; sur les sources et méthodes d'interprétation de textes littéraires. Exercices de mise en scène et extraits de productions de textes classiques ou contemporains. Prérequis: ADRAM 101 et 103. Ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits en ADRAM 201.

**ADRAM 466 Analyse du théâtre canadien**

★3 (*fi 6*) (l'un ou l'autre semestre 3-0-0). L'évolution du théâtre canadien-français de Gratien Gélinas à l'époque contemporaine. Prérequis: FRANC 235 et ★3 en littérature de niveau 300, préférablement CA FR 350. Ce cours

n'est pas accessible aux étudiants ayant ou postulant des crédits en CA FR 466.

#### ADRAM 484 Création

★3 (fi 6) (l'un ou l'autre semestre, 3-0-0). Théorie et pratique du processus créatif dans l'écriture; introduction aux procédés discursifs de la poésie, du roman et de la pièce de théâtre. Prérequis FRANC 235 et ★3 de littérature de niveau 300. Ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits en FRANC 484.

### 211.17 Art History

Department of Art and Design  
Faculty of Arts

**Note:** Since presence at lectures and seminars, participation in classroom discussion, and the completion of assignments are important components of most courses, students will serve their best interest by regular attendance.

This particularly applies to seminars in the history of art and design, where attendance will be a factor in grading.

The following table lists renumbered courses effective 1990/91:

Old	New	Old	New
ART H 201	ART H 101	ART H 409	ART H 401
ART H 202	ART H 102	ART H 459	ART H 402
ART H 303	ART H 251	ART H 559	ART H 501

The following table lists renumbered courses effective 1992/93:

Old	New	Old	New
ART H 231	ART H 202	ART H 471	ART H 405
ART H 232	ART H 252	ART H 472	ART H 455
ART H 261	ART H 204	ART H 481	ART H 406
ART H 271	ART H 205	ART H 483	ART H 457
ART H 272	ART H 255	ART H 501	ART H 418
ART H 273	ART H 207	ART H 571	ART H 505
ART H 274	ART H 209	ART H 572	ART H 555
ART H 281	ART H 206	ART H 581	ART H 506
ART H 282	ART H 256	ART H 582	ART H 556
ART H 283	ART H 257	ART H 583	ART H 557

#### 211.17.1 Undergraduate Courses

##### ART H 101 Introduction to the History of Art I

★3 (fi 6) (either term, 3-0-0). Introduction to Western Art and Design to the end of the 14th century by analysis of selected works and movements.

##### ART H 102 Introduction to the History of Art II

★3 (fi 6) (either term, 3-0-0). Introduction to Western Art and Design from the 15th century to the present by analysis of selected works and movements.

##### ART H 201 Survey of Early Christian to Ottonian Art

★3 (fi 6) (either term, 3-0-0). The history of the visual arts in Europe and the Mediterranean basin from the third to the 11th century.

##### ART H 202 Survey of Renaissance Art I

★3 (fi 6) (either term, 3-0-0). The history of the visual arts of the 15th and 16th centuries in Northern Europe.

##### ART H 203 Survey of Northern Baroque Art

★3 (fi 6) (either term, 3-0-0). The history of the visual arts of the 17th century in Northern Europe.

##### ART H 204 Survey of 18th-Century Art

★3 (fi 6) (either term, 3-0-0). The history of the visual arts of Europe during the 18th century.

##### ART H 205 Survey of 19th-Century Art I

★3 (fi 6) (either term, 3-0-0). The history of the visual arts of the first half of the 19th century in Europe.

##### ART H 206 Survey of 20th-Century Art I

★3 (fi 6) (either term, 3-0-0). The history of the visual arts up to World War II in Europe and North America.

##### ART H 207 Survey of Early Canadian Art

★3 (fi 6) (either term, 3-0-0). The history of the visual arts from the 17th century to the end of the 19th century in Canada.

##### ART H 209 Survey of the History of Design

★3 (fi 6) (either term, 3-0-0). Introduction to the development of design since the Industrial Revolution.

##### ART H 210 Survey of the History of Photography

★3 (fi 6) (either term, 3-0-0). A study of photography from its invention in the 19th century to its impact in the 20th century.

##### ART H 251 Survey of Romanesque and Gothic Art

★3 (fi 6) (either term, 3-0-0). The history of the visual arts in Europe from the 11th to the 14th century.

##### ART H 252 Survey of Renaissance Art II

★3 (fi 6) (either term, 3-0-0). The history of the visual arts of the 15th and 16th centuries in Italy.

##### ART H 253 Survey of Southern Baroque Art

★3 (fi 6) (either term, 3-0-0). The history of the visual arts of the 17th century in Southern Europe.

##### ART H 255 Survey of 19th-Century Art II

★3 (fi 6) (either term, 3-0-0). The history of the visual arts of the second half of the 19th century in Europe.

##### ART H 256 Survey of 20th-Century Art II

★3 (fi 6) (either term, 3-0-0). The history of the visual arts of the 20th century from World War II to the present, in Europe and North America.

##### ART H 257 Survey of 20th-Century Canadian Art

★3 (fi 6) (either term, 3-0-0). The history of the visual arts of the 20th century in Canada.

##### ART H 258 Survey of Modern and Post-Modern Architecture

★3 (fi 6) (either term, 3-0-0). A history of architecture from the late 19th century through the 20th century.

##### ART H 400 Topics in Theory and Criticism

★3 (fi 6) (either term, 0-3s-0). Prerequisite: consent of Department.

##### ART H 401 Topics in Medieval Art

★3 (fi 6) (either term, 0-3s-0). Prerequisite: consent of Instructor. Students are normally expected to have successfully completed ART H 201 or 251 with a minimum grade of 6.0.

##### ART H 402 Topics in Renaissance Art

★3 (fi 6) (either term, 0-3s-0). Prerequisite: consent of Instructor. Students are normally expected to have successfully completed ART H 202 or 252 with a minimum grade of 6.0.

##### ART H 403 Topics in Baroque Art

★3 (fi 6) (either term, 0-3s-0). Prerequisite: consent of Instructor. Students are normally expected to have successfully completed ART H 203 or 253 with a minimum grade of 6.0.

##### ART H 404 Topics in 18th-Century Art

★3 (fi 6) (either term, 0-3s-0). Prerequisite: Consent of Instructor. Students are normally expected to have successfully completed ART H 204 with a minimum grade of 6.0.

##### ART H 405 Topics in Art from the First Half of the 19th Century

★3 (fi 6) (either term, 0-3s-0). Prerequisite: consent of Instructor. Students are normally expected to have successfully completed ART H 205 with a minimum grade of 6.0.

##### ART H 406 Topics in Art from the Beginning of the 20th Century

★3 (fi 6) (either term, 0-3s-0). Prerequisite: consent of Instructor. Students are normally expected to have successfully completed ART H 206 with a minimum grade of 6.0.

##### ART H 407 Topics in Early Canadian Art

★3 (fi 6) (either term, 0-3s-0). Prerequisite: consent of Instructor. Students are normally expected to have successfully completed ART H 207 with a minimum grade of 6.0.

##### ART H 410 Topics in the History of Photography and Related Aspects of Representation

★3 (fi 6) (either term, 0-3s-0). Prerequisite: consent of Instructor. Students are normally expected to have successfully completed ART H 210 with a minimum grade of 6.0.

##### ART H 411 Special Topics in Art History

★3 (fi 6) (either term, 0-3s-0). Prerequisite: consent of Department.

##### ART H 418 Special Subject, Fourth-Year Honors

★6 (fi 12) (full session, 0-3s-0). Preparation of the Honors essay, required in the fourth year of the Honors Program.

##### ART H 455 Topics in Art from the Second Half of the 19th Century

★3 (fi 6) (either term, 0-3s-0). Prerequisite: consent of Instructor. Students are normally expected to have successfully completed ART H 255 with a minimum grade of 6.0.

##### ART H 456 Topics in Art from the Second Half of the 20th Century

★3 (fi 6) (either term, 0-3s-0). Prerequisite: consent of Instructor. Students are normally expected to have successfully completed ART H 256 with a minimum grade of 6.0.

##### ART H 457 Topics in 20th-Century Canadian Art

★3 (fi 6) (either term, 0-3s-0). Prerequisite: consent of Instructor. Students are normally expected to have successfully completed ART H 257 with a minimum grade of 6.0.

## 211.17.2 Graduate Courses

**ART H 501 Advanced Studies in Medieval Art**

★3 (*fi 6*) (either term, 0-3s-0). Intended for MA (History of Art and Design) students. Prerequisite: consent of Department.

**ART H 502 Advanced Studies in Renaissance Art**

★3 (*fi 6*) (either term, 0-3s-0). Intended for MA (History of Art and Design) students. Prerequisite: consent of Department.

**ART H 503 Advanced Studies in Baroque Art**

★3 (*fi 6*) (either term, 0-3s-0). Intended for MA (History of Art and Design) students. Prerequisite: consent of Department.

**ART H 505 Advanced Studies in Art from the First Half of the 19th Century**

★3 (*fi 6*) (either term, 0-3s-0). Intended for MA (History of Art and Design) students. Prerequisite: consent of Department.

**ART H 506 Advanced Studies in Art from the First Half of the 20th Century**

★3 (*fi 6*) (either term, 0-3s-0). Intended for MA (History of Art and Design) students. Prerequisite: consent of Department.

**ART H 507 Advanced Studies in Early Canadian Art**

★3 (*fi 6*) (either term, 0-3s-0). Intended for MA (History of Art and Design) students. Prerequisite: consent of Department.

**ART H 510 Topics in the History of Photography and Related Aspects of Representation**

★3 (*fi 6*) (either term, 0-3s-0). Intended for MA (History of Art and Design) students. Prerequisite: consent of Department.

**ART H 511 Special Topics in Art History**

★3 (*fi 6*) (either term, 0-3s-0). Intended for MA (History of Art and Design) students. Prerequisite: consent of Department.

**ART H 555 Advanced Studies in Art from the Second Half of the 19th Century**

★3 (*fi 6*) (either term, 0-3s-0). Intended for MA (History of Art and Design) students. Prerequisite: consent of Department.

**ART H 556 Advanced Studies in Art from the Second Half of the 20th Century**

★3 (*fi 6*) (either term, 0-3s-0). Intended for MA (History of Art and Design) students. Prerequisite: consent of Department.

**ART H 557 Advanced Studies in Canadian Art in the 20th Century**

★3 (*fi 6*) (either term, 0-3s-0). Intended for MA (History of Art and Design) students. Prerequisite: consent of Department.

**ART H 600 Historiography and Methodology**

★3 (*fi 6*) (either term, 0-3s-0). Intended for MA (History of Art and Design) students. Prerequisite: consent of Department.

**ART H 611 Special Topics in Art History**

★3 (*fi 6*) (either term, 0-3s-0). Intended for MA (History of Art and Design) students. Prerequisite: consent of Department.

## 211.18 Astronomy

Department of Physics  
Faculty of Science

**ASTRO 120 Astronomy of the Solar System**

★3 (*fi 6*) (first term, 3-0-0). This course discusses the development of astronomy and astronomical techniques, including results obtained from the latest orbiting observatories. The origin, evolution and nature of the Earth, the other planets and non-planetary bodies will be discussed. Viewing experience will be available using the campus observatory. Prerequisites: Mathematics 30 and Physics 30.

**ASTRO 122 Astronomy of Stars and Galaxies**

★3 (*fi 6*) (second term, 3-0-0). This course discusses the development of our understanding of the universe, including current models of stellar evolution and cosmology. Emphasis is placed on understanding the physical processes underlying astronomical phenomena. Viewing experience will be available using the campus observatory. Prerequisites: Mathematics 30 and Physics 30.

**ASTRO 310 Astrophysics**

★6 (*fi 12*) (full session, 3-0-0). Summary of the concepts in physics and astronomy which are relevant to astrophysics; stellar spectra, atmospheres, interiors, and evolution; galactic structure; cosmology. Prerequisites: MATH 115, PHYS 143 or 102, and a 200-level Physics or Mathematics (PHYS 208 or 271 strongly recommended). Some additional knowledge of mathematics, astronomy, and physics would be advantageous. Note: The following specialized course in Astrophysics is offered by the Department of Physics: PHYS 465.

## 211.19 Biochemistry

Department of Biochemistry  
Faculty of Medicine and Oral Health Sciences

## 211.19.1 Undergraduate Courses

**Notes**

- (1) BIOCH 203, 205, 220, 401, 410, 420, 430, 441, 450, 455, 460 can be used by students in the Faculty of Science as science courses.
- (2) Courses in clinical biochemistry are listed under Pathology.
- (3) Program note to common first year in Biological Sciences: Students in the Department of Biological Sciences who wish to enrol in a Biochemistry program after Year 1 or wish to take BIOCH 203 and 205 are advised that BIOCH 203 requires a prerequisite of ★6 of Organic Chemistry and ★3 of General Chemistry.

**BIOCH 203 Introduction Biochemistry I**

★3 (*fi 6*) (first term, 3-0-0). Structure and chemistry of the cell; protein structure and function; enzyme kinetics; chemistry of carbohydrates; intermediary metabolism. Prerequisite: CHEM 101; CHEM 161 or 261; and CHEM 163 or 263. Notes: (1) Students with grades of less than 6.0 in any of these courses require consent of Department. (2) This course may not be taken for credit if credit has already been obtained in either BIOCH 201 or BIOCH 220.

**BIOCH 205 Introduction Biochemistry II**

★3 (*fi 6*) (second term, 3-0-0). Chemistry and metabolism of lipids, amino acids, and nucleotides; membrane structure and assembly; molecular biology of nucleic acids. Prerequisite: BIOCH 203, or consent of Department. Note: this course may not be taken for credit if credit has already been obtained in BIOCH 201.

**BIOCH 220 General Biochemistry**

★3 (*fi 6*) (either term, 3-0-0). Biomolecular organization of the cell with emphasis on the structures of amino acids, proteins, carbohydrates; lipids, biological membranes, nucleotides and nucleic acids: their function and metabolism. Prerequisite: CHEM 101; and CHEM 161 or 261. This course is designed for students who do not plan to take further courses in Biochemistry. Note: BIOCH 220 may not be taken for credit if credit has already been obtained in any of BIOCH 201, 203, or 205.

**BIOCH 401 Biochemistry Laboratory**

★6 (*fi 12*) (full session, 0-0-8). A laboratory course in modern biochemical techniques. Designed for Biochemistry Honors and Specialization students in their third or fourth year. Other interested students may enrol subject to space limitations. Prerequisites: BIOCH 203 and 205, and consent of Department.

**BIOCH 410 Integration and Regulation of Metabolism**

★3 (*fi 6*) (second term, 3-0-0). Principles of metabolic regulation by hormones, intracellular signals, and protein modification. Biochemistry of cellular communication. Coordination of carbohydrate, lipid, nucleotide, and protein metabolism. Prerequisites: BIOCH 203 and 205 with minimum grades of 6.0, or consent of Department. Offered in alternate years. This course is intended for undergraduate students. Graduate students may not register for credit (see BIOCH 510).

**BIOCH 412 Medical Biochemistry and Molecular Biology**

★6 (*fi 12*) (full session, 96 hours). Integrated metabolism of carbohydrates, lipids, proteins, and nucleic acids, and regulation of cell function at the molecular level. The objective of the course is to provide an understanding of the relationship of molecular structure to biological function in both normal and pathological states. Special emphasis will be given to the molecular biology and etiology of selected diseases. Prerequisites: CHEM 101 and 102; CHEM 161 and 163. BIOCH 203 and 205 or equivalent courses in general biochemistry are strongly recommended. For medical and dental students only.

**BIOCH 420 Protein Chemistry, Structure, and Function**

★3 (*fi 6*) (second term, 3-0-0). Protein chemistry and purification. The intra- and intermolecular forces that determine protein structure. Principles of protein folding and dynamics. Enzyme mechanisms and ligand binding interactions. Prerequisite: BIOCH 203 and 205 with minimum grades of 6.0, or consent of Department. Offered in alternate years. This course is intended for undergraduate students. Graduate students may not register for credit (see BIOCH 520).

**BIOCH 430 Biochemistry of Eukaryotic Gene Expression**

★3 (*fi 6*) (first term, 3-0-0). This course will consider the organization and expression at the molecular level of information encoded in the nucleic acids of eukaryotic cells. The focus will be on genome structure and the regulation of gene expression at the levels of transcription, post-transcriptional processing, translation, post-translational modification and protein sorting. Recombinant DNA technologies and genetic engineering will be discussed

as methods for studying the cellular processing of genetic information. Prerequisites: BIOCH 203 and 205 with minimum grades of 6.0, or consent of Department. Offered in alternate years. This course is intended for undergraduate students. Graduate students may not register for credit (see BIOCH 530).

#### **BIOCH 441 Structure and Function of Biological Membranes**

★3 (*fi 6*) (first term, 3-0-0). A general survey of the structure and function of biological membranes. Topics will include the structure, properties and composition of biomembranes, the characterization and structural principles of membrane lipids and proteins, lateral and transverse asymmetry, dynamics, lipid-protein interactions, membrane enzymology, permeability, and biogenesis. Prerequisites: BIOCH 203 and 205 with minimum grades of 6.0, or consent of Department. Offered in alternate years. This course is intended for undergraduate students. Graduate students may not register for credit (see BIOCH 541).

#### **BIOCH 450 The Molecular Biology of Mammalian Viruses**

★3 (*fi 6*) (first term, 3-0-0). This course will focus on virus structure, replication, and interaction with host cells at the molecular level. Lytic viruses with single- or double-stranded DNA or RNA genomes will be discussed, as will the mechanisms of viral oncogenesis. Prerequisites: BIOCH 203 and 205 with minimum grades of 6.0, or consent of Department. Offered in alternate years. This course is intended for undergraduate students. Graduate students may not register for credit (see BIOCH 550).

#### **BIOCH 455 Biochemistry of Lipids and Lipoproteins**

★3 (*fi 6*) (first term, 3-0-0). An advanced course which focuses on specific aspects of the regulation of lipid and lipoprotein metabolism. Topics will include: the transcriptional and post-transcriptional mechanisms governing the synthesis and degradation of important enzymes, lipids, and lipid transport molecules; the role of lipid mediators in signaling pathways and protein modification; the assembly and dynamics of lipoproteins and biological membranes; genetic disruptions of lipid regulatory proteins such as cell surface receptors that lead to human disease. Prerequisites: BIOCH 203 and 205 with minimum grades of 6.0, or consent of Department. Offered in alternate years. This course is intended for undergraduate students. Graduate students may not register for credit (see BIOCH 555).

#### **BIOCH 460 Physical Biochemistry**

★3 (*fi 6*) (second term, 3-0-0). A survey of the physical techniques used in the characterization and structural determination of biological macromolecules. Topics will include hydrodynamics, optical and magnetic resonance spectroscopies, diffraction techniques such as X-ray crystallography, and small angle neutron and X-ray scattering. Emphasis will be placed on the utility of these techniques in evaluating structure-function relationships by a discussion of representative macromolecular systems. Prerequisites: BIOCH 203 and 205 with minimum grades of 6.0, or consent of Department. Prerequisite or corequisite: CHEM 271 and 273; or consent of Department. Offered in alternate years. This course is intended for undergraduate students. Graduate students may not register for credit (see BIOCH 560).

### 211.19.2 Graduate Courses

#### **BIOCH 501 Advanced Laboratory**

★3 (*fi 6*) (either term, 0-0-4). An advanced laboratory course for undergraduate students enrolled in Honors or Specialization Biochemistry who wish to engage in individual research. Enrolment is limited to students whose performance has been exceptional (e.g. GPA  $\geq$  7.5). Can be taken as a science elective but not as a substitute for required courses in Biochemistry. Prerequisite: BIOCH 401 and consent of course coordinator.

#### **BIOCH 510 Integration and Regulation of Metabolism**

★3 (*fi 6*) (second term, 3-0-0). Principles of metabolic regulation by hormones, intracellular signals, and protein modification. Biochemistry of cellular communication. Coordination of carbohydrate, lipid, nucleotide, and protein metabolism. Prerequisites: BIOCH 203 and 205 with minimum grades of 6.0, or consent of Department. Offered in alternate years. Lectures are the same as for BIOCH 410, but with additional assignments and evaluation appropriate to graduate studies. This course may not be taken for credit if credit has already been obtained in BIOCH 410.

#### **BIOCH 520 Protein Chemistry, Structure, and Function**

★3 (*fi 6*) (second term, 3-0-0). Protein chemistry and purification. The intra- and intermolecular forces that determine protein structure. Principles of protein folding and dynamics. Enzyme mechanisms and ligand binding interactions. Prerequisites: BIOCH 203 and 205 with minimum grades of 6.0, or consent of Department. Offered in alternate years. Lectures are the same as for BIOCH 420, but with additional assignments and evaluation appropriate to graduate studies. This course may not be taken for credit if credit has already been obtained in BIOCH 420.

#### **BIOCH 530 Biochemistry of Eukaryotic Gene Expression**

★3 (*fi 6*) (first term, 3-0-0). This course will consider the organization and expression at the molecular level of information encoded in the nucleic acids of eukaryotic cells. The focus will be on genome structure and the regulation

of gene expression at the levels of transcription, post-transcriptional processing translation, post-translational modification, and protein sorting. Recombinant DNA technologies and genetic engineering will be discussed as methods for studying the cellular processing of genetic information. Prerequisites: BIOCH 203 and 205 with minimum grades of 6.0, or consent of Department. Offered in alternate years. Lectures are the same as for BIOCH 430, but with additional assignments and evaluation appropriate to graduate studies. This course may not be taken for credit if credit has already been obtained in BIOCH 430.

#### **BIOCH 541 Structure and Function of Biological Membranes**

★3 (*fi 6*) (first term, 3-0-0). A general survey of the structure and function of biological membranes. Topics will include the structure, properties, and composition of biomembranes, the characterization and structural principles of membrane lipids and proteins, lateral and transverse asymmetry, dynamics, lipid-protein interactions, membrane enzymology, permeability, and biogenesis. Prerequisites: BIOCH 203 and 205 with minimum grades of 6.0, or consent of Department. Offered in alternate years. Lectures are the same as for BIOCH 441, but with additional assignments and evaluation appropriate to graduate studies. This course may not be taken for credit if credit has already been obtained in BIOCH 441.

#### **BIOCH 550 The Molecular Biology of Mammalian Viruses**

★3 (*fi 6*) (first term, 3-0-0). This course will focus on virus structure, replication, and interaction with host cells at the molecular level. Lytic viruses with single- or double stranded DNA or RNA genomes will be discussed, as will the mechanisms of viral oncogenesis. Prerequisites: BIOCH 203 and 205 with minimum grades of 6.0, or consent of Department. Offered in alternate years. Lectures are the same as for BIOCH 450, but with additional assignments and evaluation appropriate to graduate studies. This course may not be taken for credit if credit has already been obtained in BIOCH 450.

#### **BIOCH 555 Biochemistry of Lipids and Lipoproteins**

★3 (*fi 6*) (first term, 3-0-0). An advanced course which focuses on specific aspects of the regulation of lipid and lipoprotein metabolism. Topics will include: the transcriptional and post-transcriptional mechanisms governing the synthesis and degradation of important enzymes, lipids, and lipid transport molecules; the role of lipid mediators in signaling pathways and protein modification; the assembly and dynamics of lipoproteins and biological membranes; genetic disruptions of lipid regulatory proteins such as cell surface receptors that lead to human disease. Prerequisite: BIOCH 203 and 205 with minimum grades of 6.0, or consent of Department. Offered in alternate years. Lectures are the same as for BIOCH 455, but with additional assignments and evaluation appropriate to graduate studies. This course may not be taken for credit if credit has already been obtained in BIOCH 455.

#### **BIOCH 560 Physical Biochemistry**

★3 (*fi 6*) (second term, 3-0-0). A survey of the physical techniques used in the characterization and structural determination of biological macromolecules. Topics will include hydrodynamics, optical and magnetic resonance spectroscopies, diffraction techniques such as X-ray crystallography, and small angle neutron and X-ray scattering. Emphasis will be placed on the utility of these techniques in evaluating structure-function relationships by a discussion of representative macromolecular systems. Prerequisites: BIOCH 203 and 205 with minimum grades of 6.0, or consent of Department. Prerequisites or corequisites: CHEM 271 and 273, or consent of Department. Offered in alternate years. Lectures are the same as for BIOCH 460, but with additional assignments and evaluation appropriate to graduate studies. This course may not be taken for credit if credit has already been obtained in BIOCH 460.

#### **BIOCH 609 Macromolecular Structure Analysis**

★3 (*fi 6*) (second term, 3-0-0). The principles of X-ray crystallography as applied to the study of protein and nucleic acid structure. Practical aspects of diffraction and structure solution will be demonstrated by a collaborative study of a suitable small molecule of biological interest. Designed for senior honors and graduate students. Prerequisite: consent of Instructor. Maximum enrolment of 10 students. Offered in alternate years.

#### **BIOCH 620 Selected Topics in Protein Structure, Function, and Regulation**

★3 (*fi 6*) (second term, 0-3s-0). A directed reading and seminar course, based on papers taken from the recent literature of protein research. Students will critically discuss the papers and give oral presentations to the class. Designed for graduate students. Prerequisite: BIOCH 420 or equivalent, or consent of Department.

#### **BIOCH 623 Special Topics in Research on Polynucleotides**

★2 (*fi 4*) (full session, 0-1s-0). This course is designed as a journal club and discussion group in which topics under the general heading of Current Research on nucleic acids are discussed. Specific talks range in scope from biochemistry, genetics and microbiology to nuclear biology and clinical aspects.

#### **BIOCH 626 Special Topics in Protein Research**

★2 (*fi 4*) (full session, 0-1s-0). A seminar course for advanced students. Detailed consideration is given to recent advances in research on protein structure and function and mechanism of enzyme action. Prerequisite: BIOCH 420 or consent of Department.



**BIOCH 630 Selected Topics in Modern Molecular Biology**

★3 (*fi 6*) (second term, 0-3s-0). A directed reading and seminar course, based on papers taken from the recent literature of molecular biology. Students will critically discuss the papers and give oral presentations to the class. Note: designed for graduate students; offered yearly. Prerequisite: BIOCH 530 and consent of the Department.

**BIOCH 640 Special Topics in Research on Biomembranes**

★2 (*fi 4*) (full session, 0-1s-0). A seminar course for advanced students covering selected topics from the current literature in the field of membrane structure and function. Prerequisite: BIOCH 441 or consent of Department.

**BIOCH 641 Selected Topics on the Structure and Function of Biological Membranes**

★3 (*fi 6*) (first term, 0-3s-0). A directed reading and seminar course on the structure and function of biological membranes. Topics will include membrane biogenesis, bioenergetics, transport and structural aspects of membrane lipids and proteins. Prerequisite: BIOCH 441 or consent of the Department. Offered in alternate years.

**BIOCH 655 Advances in Lipid and Lipoprotein Research**

★3 (*fi 6*) (second term, 1-2s-0). Recent developments and use of the current literature will be emphasized. Topics will include regulation of lipid metabolism, intracellular lipid trafficking, regulation of lipoprotein secretion, lipid transfer among lipoproteins, reverse cholesterol transport, and atherosclerosis. Prerequisite: BIOCH 455, or 555, or consent of Department. Offered in alternate years.

**BIOCH 671 Recent Advances**

★4 (*fi 8*) (full session, 0-2s-0). A seminar course on topics of current interest in Biochemistry. Note: Open to Graduate students in Biochemistry only.

**BIOCH 675 Magnetic Resonance in Biology and Medicine II**

★3 (*fi 6*) (second term, 3-0-0). The application of nuclear magnetic resonance in fields from biochemistry to medicine. Topics to include studies of protein structure and function and enzyme mechanisms by NMR, and applications of *in vivo* NMR spectroscopy and NMR imaging. Designed for advanced honors and graduate students interested in the application of NMR to biological systems. Prerequisite: ASM 575 or consent of Instructor. Offered in alternate years.

211.20 Reserved

**211.21 Biochimie**

Faculté Saint-Jean

**BIOCM 203 Introduction à la biochimie I**

★3 (*fi 6*) (premier semestre, 3-0-0). Structure et chimie de la cellule; structure et fonction des protéines; cinétique enzymatique; chimie des glucides, métabolisme intermédiaire. Prérequis: CHIM 101; CHIM 161 ou 261; et CHIM 163 ou 263. Notes: (1) les étudiants ayant obtenu une note inférieure à 6.0 dans un de ces cours devront obtenir la permission de l'instructeur avant de s'inscrire. (2) Ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits pour BIOCH 201 ou BIOCH 220.

**BIOCM 205 Introduction à la biochimie II**

★3 (*fi 6*) (deuxième semestre, 3-0-0). Chimie et métabolisme des lipides, acides aminés et nucléotides; structure et assemblage des membranes; biologie moléculaire des acides nucléiques. Prérequis: BIOCH 203. Note: ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits pour BIOCH 201.

**211.22 Biologie**

Faculté Saint-Jean

**BIOLE 107 Introduction à la biologie cellulaire**

★3 (*fi 6*) (premier semestre, 3-0-3). La cellule étant à la base de toute fonction vitale, ce cours offre une introduction à la structure et au fonctionnement de la cellule. Les principaux sujets étudiés comprendront l'origine de la vie, le développement des cellules procaryotes et eucaryotes, la bioénergétique, les fonctions biochimiques à l'intérieur de la cellule et la communication entre les cellules. Le contrôle génétique des activités cellulaires est examiné au moyen des protocoles de l'analyse génétique moléculaire et de leurs applications au génie génétique et à la biotechnologie. Note: les étudiants qui ont des crédits pour les deux cours GENEQ 197 et MICRB 193 ne peuvent obtenir des crédits pour BIOLE 107. Prérequis: Biologie 30 et Chimie 30.

**BIOLE 108 Les organismes et leur environnement**

★3 (*fi 6*) (deuxième semestre, 3-0-3). Une introduction aux divers organismes de cette planète et comment ils ont été affectés par leur environnement et comment l'environnement est présentement le produit de l'activité d'organismes. Sera étudié également comment l'évolution a produit, sur une

longue période de temps, les principaux groupes d'organismes et comment les origines de l'évolution ont affecté leur classification. Les principes sous-jacents à notre connaissance des principales lignées seront étudiés en se servant d'exemples de bactéries, de champignons, de protistes, de plantes et d'animaux. Une description du rôle des organismes dans les principaux écosystèmes conduira à une estimation de la stabilité de ces systèmes et de l'impact humain sur eux. Note: les étudiants qui ont des crédits pour les cours BOTQ 199 et ZOOLE 120 ne peuvent obtenir des crédits pour BIOLE 108.

**BIOLE 201 Biologie cellulaire**

★3 (*fi 6*) (premier semestre, 3-0-0). Ultrastructure et métabolisme des cellules. Energie dans les systèmes biologiques; protosynthèse; respiration cellulaire; contractilité; croissance et duplication des cellules. Prérequis: GENEQ 197. Prérequis ou corequis: CHIM 160 ou 260. Anciennement BIOLE 301.

**BIOLE 207 La génétique moléculaire et l'hérédité**

★3 (*fi 6*) (premier semestre, 3-0-3). Les principes chromosomiques et moléculaires de la transmission et du fonctionnement des gènes; la construction de cartes génétiques et physiques des gènes et des génomes; les protocoles utilisés pour isoler des gènes spécifiques. Seront aussi à l'étude les exemples de mécanismes régulateurs pour l'expression de matériel génétique chez les procaryotes et les eucaryotes. Note: Ce cours n'est pas accessible aux étudiants ayant des crédits en GENEQ 197. Prérequis: BIOLE 107.

**BIOLE 208 Les principes de l'écologie**

★3 (*fi 6*) (deuxième semestre, 3-0-3). L'écologie est l'étude scientifique des interactions entre les organismes et leur environnement selon une hiérarchie de niveaux d'organisation: les individus, les populations, les communautés et les écosystèmes. Destiné à donner à l'étudiant une vue générale des concepts de base en écologie, ce cours peut aussi servir de préparation à des cours plus avancés. L'emphase dans les laboratoires sera sur le recueil, l'analyse et l'interprétation des données provenant d'expériences écologiques afin d'illustrer et compléter les notes du cours. Les exemples seront tirés d'une vaste étendue d'organismes et de systèmes. Prérequis: BIOLE 108.

**BIOLE 315 Histoire et théorie de la biologie**

★3 (*fi 6*) (l'un ou l'autre semestre, 3-0-0). Aperçu des découvertes biologiques des temps les plus reculés jusqu'à maintenant et des principales idées nées des sciences de la vie ou les influençant, et ce par rapport aux événements sociaux, historiques et culturels. Recommandé aux étudiants qui se spécialisent dans les sciences biologiques mais accessible à tous les étudiants qui s'intéressent à l'histoire de la science et de son importance dans le développement de la culture. Prérequis: Un cours de niveau 200 en science biologique.

**BIOLE 490 Etude dirigée**

★3 (*fi 6*) (l'un ou l'autre semestre, 0-0-6). L'inscription dépendra d'une entente préalable entre l'étudiant et un professeur qui serait prêt à superviser le projet. Des crédits peuvent être obtenus plus d'une fois pour ce cours. Prérequis: ★6 en sciences biologiques de niveau 300 et l'accord du Doyen.

**211.23 Biology (Biological Sciences)**

Department of Biological Sciences  
Faculty of Science

**Note:** See the following sections for listings of other Biological Sciences courses: Botany (BOT) §211.26; Entomology (ENT) §211.87; Genetics (GENET) §211.109; Microbiology (MICRB) §211.157; Zoology (ZOO) §211.238.

**211.23.1 Undergraduate Courses****BIOL 107 Introduction to Cell Biology**

★3 (*fi 6*) (either term, 3-0-3). All life functions are based on cells, and this course will provide an introduction to cell structure and function. Major topics will include the origin of life, the development of prokaryotic and eukaryotic cell lineages, energy conversions, the compartmentation of biochemical functions within a cell and communication from cell to cell. The genetic control of cell activities is examined through methods of molecular genetic analysis and their application in genetic engineering and biotechnology. Prerequisites: Biology 30 and Chemistry 30. Note: BIOL 107 and 108 can be taken in either order.

**BIOL 108 Organisms in Their Environment**

★3 (*fi 6*) (either term, 3-0-3). An introduction to how the diverse organisms on this planet have been affected by their environment and how the current environment is the product of the activities of organisms. The course also examines how evolution has operated over long time periods to produce the major groups of organisms and how evolutionary origins are reflected in their classification. The principles that underlie our understanding of the major lineages will be discussed using examples from bacteria, fungi, protists, animals, and plants. A description of the involvement of organisms in major ecosystem processes leads to an evaluation of the stability of those systems

and of human impact on the processes. Prerequisite: Biology 30. Note: BIOL 107 and 108 can be taken in either order.

**BIOL 201 Cellular Biology**

★3 (fi 6) (first term, 3-0-0). The ultrastructure and metabolism of cells. Energy in biological systems; photosynthesis; cellular respiration; contractility; cell growth and replication. Prerequisite: BIOL 107. Prerequisite or corequisite: CHEM 161 or 163.

**BIOL 207 Molecular Genetics and Heredity**

★3 (fi 6) (either term, 3-0-3). The chromosomal and molecular basis for the transmission and function of genes. The construction of genetic and physical maps of genes and genomes. Strategies for the isolation of specific genes. Examples of regulatory mechanisms for the expression of the genetic material in both prokaryotes and eukaryotes. Note: Students may not obtain credit for both BIOL 207 and GENET 197. Prerequisite: BIOL 107.

**BIOL 208 Principles of Ecology**

★3 (fi 6) (either term, 3-0-3). Ecology is the scientific study of interactions between organisms and their environment in a hierarchy of levels of organization: individuals, populations, communities, and ecosystems. Designed to provide a comprehensive survey of general concepts that can stand alone or serve as preparation for advanced courses in ecology. Labs emphasize the collection, analysis, and interpretation of data from ecological experiments to illustrate and complement the lecture material. Examples will be drawn from a broad range of organisms and systems. Students may not obtain credit for both BIOL 208 and BOT 130 or ZOOL 231. Prerequisite: ZOOL 120, BOT 199, or BIOL 108.

**BIOL 315 History and Theory of Biology**

★3 (fi 6) (either term, 3-0-0). An outline of biological discovery from early times to the present, and of the principal ideas stemming from or influencing the life sciences; both in relation to social, historical and cultural developments. Especially recommended to honors and specialization students in the biological subjects, but open to other third and fourth year students interested in the history of science as a force in the development of culture. Prerequisite: A 200-level Biological Science course.

**BIOL 321 Mechanisms of Evolution**

★3 (fi 6) (first term, 3-0-0). Discusses the major features of the evolutionary process including: the fossil record, basic population, genetics, variation, natural selection, adaptation, and speciation. Prerequisites: BIOL 108, BIOL 207. Students may not obtain credit for both ZOOL 321 and BIOL 321.

**BIOL 331 Population Ecology**

★3 (fi 6) (second term, 3-0-3). Principles of population ecology as they apply to plants and animals; population consequences of variation among individuals; habitat structure and population structure; habitat selection and foraging theory; life tables, demography, and the evolution of life history patterns; population dynamics; interactions among organisms (predation; competition; mutualism); and population regulation. Prerequisites: BIOL 208; any two of MATH 115, and MATH 120; STAT 151. Students may not obtain credit for BIOL 331 if credit has already been given for either ZOOL 331 or BIOL 231.

**BIOL 335 Principles of Systematics**

★3 (fi 6) (second term, 3-0-0). An introduction to the principles, methods, and applications of biological systematics, including reconstruction of phylogenies, creation of synthetic and cladistic classifications, historical interpretation of geographic distributions, and applications in evolutionary biology. Prerequisites: BIOL 108 and a 200-level Biological Sciences course. Students may not obtain credit for BIOL 335 if credit has already been given for either ZOOL 335 or BIOL 220.

**BIOL 361 Marine Science**

★3 (fi 6) (second term, 3-0-0). An introduction to marine science and marine biology including (1) history of marine exploration, (2) essential features of the physical marine environment, (3) a survey of major marine communities and adaptations of the organisms that live in each, (4) overviews of selected groups of marine organisms (e.g., marine mammals), and (5) human impact on the oceans. Recommended as preparation for courses offered through the Bamfield Marine Station (see courses listed under MA SC). Prerequisite: ZOOL 250 or BIOL 208.

**BIOL 366 Boreal Ecology**

★3 (fi 6) (second term, 3-0-0). Terrestrial and aquatic ecosystems of the north, emphasizing special features of the environment and biotic responses. Prerequisite: ZOOL 231 or BIOL 208.

**BIOL 380 Genetic Analysis of Populations**

★3 (fi 6) (second term, 3-1s-0). Application of molecular biology to the study of systematics, structure of natural populations, mating systems, and forensics. Among the topics discussed are molecular techniques used to detect genetic variation in natural populations, methods to construct phylogenies using molecular data, mathematical models of population structure, paternity analysis, and DNA fingerprinting. Prerequisite: BIOL 207. Students may not obtain credit for BIOL 380 if credit has already been given for GENET 280.

**BIOL 381 Pollution Biology**

★3 (fi 6) (second term, 3-0-0). A broad treatment of the ecological impact

of natural and anthropogenic pollutants on aquatic and terrestrial ecosystems. A review of the major groups of environmental pollutants and the phenomenon of long-range transport of pollutants will be used as an introduction to several important global pollution problems. Lectures will deal specifically with acid precipitation, metals in the environment, stratospheric ozone depletion, and the greenhouse effect, exploring effects on plants at the biochemical, physiological, ecological, and ecosystem levels. This background will then be used to discuss issues such as forest decline, multiple plant stresses, biomagnification, global diversity, economics and politics of pollution control, progress towards pollution control, and progress towards pollution abatement. Prerequisite: A 200-level Biological Sciences course. BOT 199 and BIOL 207 or GENET 197 recommended. Credit may not be obtained for both BIOL 381 and BOT 381.

**BIOL 400 Industrial Internship Practicum**

★3 (fi 6) (first term, 0-3s-0). Required by all students who have just completed a Biological 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 experiences of the Internship as demonstrated in an oral presentation. Prerequisite: WKEXP 943.

**BIOL 420 Molecular Systematics**

★3 (fi 6) (second term, 3-0-3). Laboratory techniques and the application and interpretation of protein and DNA variation to problems in the evolutionary biology of plants and animals: Phylogeny reconstruction and vicariance biogeography (with particular emphasis on problems unique to molecular data), paternity analysis, direction and extent of hybridization, various aspects of population structure (e.g. inbreeding, population subdivision). Prerequisites: BIOCH 203 and 205 and consent of Department. BIOL 321 or BIOL 380 strongly recommended. Offered in alternate years.

**BIOL 430 Experimental Zoology**

★3 (fi 6) (second term, 3-0-3). Emphasis is on the design of experiments and analysis of data collected from field and laboratory studies in Biology. Prerequisites: STAT 237 or 337 and a 300-level Biological Sciences course.

**BIOL 433 Mutualistic Symbiosis**

★3 (fi 6) (second term, 3-0-3). Examination of the variety of ways in which organisms interact to their mutual benefit. Examples will be taken from interactions among plants, animals, and microbes, from systems in marine, freshwater and terrestrial habitats, and from obligate and facultative associations. Prerequisites: BIOL 331 or ZOOL 331 or 332 or 371. Offered in alternate years.

**BIOL 435 Evolutionary Biogeography**

★3 (fi 6) (second term, 3-0-0). The patterns of the geographic distributions of organisms and their interpretation with respect to the evolution of floras and faunas. Prerequisite: BIOL 321. Credit may not be obtained for both BIOL 435 and BOT 435.

**BIOL 445 Cell Physiology**

★3 (fi 6) (second term, 3-0-0). Survey of the literature dealing with current advances in selected topics in cell biology. Designed for fourth year students in the biological sciences and graduate students. Prerequisites: ZOOL 242 or BIOL 201, and BIOCH 201, and a 300-level Biological Sciences course.

**BIOL 490 Individual Study**

★3 (fi 6) (either term, 0-0-6). Registration will be contingent on the student's having made prior arrangements with a faculty member willing to supervise the program. Credit for this course may be obtained more than once. Prerequisite: A 300-level Biological Sciences course and consent of the Department.

**BIOL 498 Research Project**

★3 (fi 6) (either term, 0-0-6). Directed research carried out in the laboratory of an assigned member of the Biological Sciences Department. Credit for this course may be obtained more than once. Prerequisite: A 300-level Biological Sciences course.

**BIOL 499 Research Project**

★6 (fi 12) (full session, 0-0-6). Directed research carried out in the laboratory of an assigned member of the Biological Sciences Department. The project would normally continue through both the first and second terms of the Winter Session, and would culminate in a written report. Successful completion of this course requires an oral presentation on the research project. Prerequisite: A 300-level Biological Sciences course.

## 211.23.2 Graduate Courses

### Notes

- (1) All 300- and 400-level courses in the Department of Biological Sciences may be taken for credit by graduate students with approval of the student's supervisor or supervisor 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 supervisor 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.

#### **BIOL 520 Current Problems in Molecular Evolutionary Biology**

★3 (*fi 6*) (second term, 3-0-0). Discussions of current issues relating to the molecular evolutionary biology and systematics of plants and animals. Discussions will emphasize both methodology and interpretation, and cover a wide range of topics related to the use of both micro- and macromolecular markers. Prerequisite: BIOL 420 or consent of Department. Offered in alternate years.

#### **BIOL 585 Advanced Techniques in Biological Microscopy**

★3 (*fi 6*) (second term, 0-0-6). Prerequisite: a university course in cell biology; BOT 419, BIOL 445, developmental biology or a course in microbiology strongly recommended. Techniques in transmission electron confocal and other types of microscopy used in modern biology, including image processing and analysis. Note: Enrolment strictly controlled due to limited facilities; consent of Instructor required.

#### **BIOL 606 Current Problems in Systematics and Evolution**

★3 (*fi 6*) (either term, 0-2s-0). Presentation and discussion of recent research in systematics, evolutionary biology and biodiversity. Credit for this course may be obtained more than once. Prerequisite: consent of Instructors for students not registered in the systematics and evolution program.

#### **BIOL 620 Graduate Core Course**

★3 (*fi 6*) (first term, 2-3s-0). A course designed for first-year graduate students in the Department of Biological Sciences which emphasizes the application of scientific methodology. A major goal of the course will be to illustrate the interdisciplinary nature of biological research and how such interdisciplinary connections can be relevant to the student's research. Prerequisite: consent of Department.

#### **BIOL 631 Seminar in Ecology**

★1 (*fi 2*) (either term, 0-2s-0). Credit for this course may be obtained more than once. Offered in both terms.

#### **BIOL 642 Seminar in Comparative Animal Physiology and Cell Biology**

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

#### **BIOL 663 Advanced Ecology**

★3 (*fi 6*) (either term, 3-0-0). Credit for this course may be obtained more than once.

#### **BIOL 665 Aquatic Biology**

★3 (*fi 6*) (second term, 3-0-0). Credit for this course may be obtained more than once.

#### **BIOL 684 Current Topics in Cellular Organization**

★3 (*fi 6*) (first term, 3-0-0). A discussion of current research on the correlation of structure and function of eukaryotic cells. Prerequisite: consent of Department.

## 211.24 Bioresource Engineering

Department of Agricultural, Food and Nutritional Sciences  
Faculty of Agriculture, Forestry and Home Economics

### 211.24.1 Undergraduate Courses

#### **SE BIOEN 200 Introduction to Bioresource Engineering**

★3 (*fi 6*) (either term, 3-1s-0). An introduction to engineering methods and the interface between biological and engineering systems in the bioresource industries. Examples of synthesis, analysis and implementation of engineering systems in these industries. Prerequisite: MATH 113 or 114.

#### **SE BIOEN 300 Introduction to Systems Management in Natural Resources**

★3 (*fi 6*) (first term, 3-0-0). Systems engineering concepts applied to natural resources production systems. Topics include systems design, equipment management (cost determination and replacement strategies), and project management systems.

#### **SE BIOEN 305 Off-Road Machines**

★3 (*fi 6*) (second term, 3-1s-0). Introduction to power units and machines used in agriculture and forestry. Emphasis is on general characteristics of machines, processes, and systems rather than on detailed analysis. Prerequisite: BIOEN 200.

#### **SE BIOEN 321 Simulation Methods in Natural Resource Systems**

★3 (*fi 6*) (second term, 3-0-3). Introduction to computer simulation modelling of biological and physical systems. Topics include continuous systems (e.g.

plant and animal growth, predator-prey systems), discrete systems (e.g. manufacturing and service industry operations), and expert systems. Prerequisite: A calculus course.

#### **SE BIOEN 430 Structural Design of Agricultural Buildings**

★3 (*fi 6*) (second term, 3-0-3). Principles of structural design as related to the use of timber, steel and concrete in agricultural buildings. Prerequisite: CIV E 270.

#### **SE BIOEN 453 Power Units**

★3 (*fi 6*) (first term, 3-0-3). Energy conversion, power transmission, soil vehicle mechanics, hydraulic systems, tractor performance and evaluation, tractor dynamics. Prerequisite: MEC E 330 or CIV E 330.

#### **SE BIOEN 454 Agricultural Machinery**

★3 (*fi 6*) (second term, 3-0-3). The course uses the wedge theory and the Mohr-Coulomb failure criteria as a basis for a simple tillage theory. Various tillage tools are examined as well as implement and tractor chassis mechanics. An introduction to harvesting processes is made. Particle dynamics and mechanics of raking and cutting are developed. Harvesting systems are noted. Prerequisites: MEC E 250, CIV E 381.

### 211.24.2 Graduate Courses

#### **SE BIOEN 503 Instrumentation for Bioresources and Conservation**

★3 (*fi 6*) (second term, 3-0-3). A modular course to provide graduate students with the fundamentals of instrumentation theory and application in areas relevant to their research. Modules include calibration and errors, signal conditioning on data acquisition systems as well as measurement of specific parameters such as flow, temperature, pressure, pH, etc.

#### **SE BIOEN 602 Selected Topics in Agricultural Mechanization**

★3 (*fi 6*) (either term, 3-0-0). Individual study. Application of statistical and mathematical techniques to selected problems in agricultural engineering. Formerly AG EN 602.

#### **SE BIOEN 603 Agricultural Building Topics**

★3 (*fi 6*) (either term, 3-0-0). Individual study. Formerly AG EN 603.

#### **SE BIOEN 604 Advanced Farm Power**

★3 (*fi 6*) (either term, 3-0-0). Individual study. Selected topics in agricultural power units. Formerly AG EN 604.

#### **SE BIOEN 605 Project in Agricultural Machinery**

★3 (*fi 6*) (either term, 3-0-0). Individual study. Formerly AG EN 605.

#### **SE BIOEN 606 Advanced Soil and Water Engineering**

★3 (*fi 6*) (either term, 3-0-0). Individual study. Formerly AG EN 606.

## 211.25 Biomedical Engineering

Department of Biomedical Engineering  
Faculty of Medicine and Oral Health Sciences

#### **BME 513 Imaging Methods in Medicine**

★3 (*fi 6*) (second term, 3-0-0). Introduction to the basic physical and technological aspects of medical imaging. Emphasis of the course is on computed transmission and emission tomography, magnetic resonance, and ultrasound imaging. These methods are developed and contrasted in terms of how the imaging information is generated, detected, and processed and how different hardware configurations and other factors limit image quality. The relative diagnostic potential of the imaging methods are also discussed in relation to the future prospects of each of the methods.

#### **BME 530 Topics in Biomedical Engineering**

★3 (*fi 6*) (either term, 3-0-0). Individual sections covering such topics as signal processing and rehabilitation engineering. Prerequisite: consent of Instructor.

#### **BME 553 Rehabilitation Engineering: Orthotics and Assist Locomotion**

★3 (*fi 6*) (second term, 3-0-3/2). This interdisciplinary course will introduce recent advances in modern exoskeletal bracing and neuroprosthetic systems designed to assist individuals with physical disabilities such as spinal cord injury to stand and walk. The relevant aspects of biomechanics, gait analysis, control systems, materials and clinical applications will be emphasized. Students will also have the opportunity to participate in clinical case demonstrations and gain experience in human movement measurement and analysis techniques. Prerequisite: consent of Instructor.

#### **BME 563 Biofluid Mechanics**

★3 (*fi 6*) (second term, 3-0-0). A course on the mechanics of fluids flowing in biological systems with special emphasis on the interaction between the fluid and the distensible structures that contain it. Suitable as an elective for undergraduates and graduate students. Examples of topics that may be included are as follows. Flow of blood: the circulation, arterial blood flow, venous blood flow, venous collapse. Flow of urine: voiding, ureteral peristalsis. Respiration. Artificial organs: heart-lung machine, artificial kidney. Lubrication: kneecap, eyeball. Prerequisite: one previous course in fluid mechanics or the consent of Instructor.

**BME 579 Topics in Medical Physics**

★3 (*fi 6*) (either term, 3-0-0). Individual sections dealing with such topics as computed tomography, nuclear magnetic resonance, therapeutic radiation. Prerequisite: consent of Instructor.

**BME 599 Project in Biomedical Engineering**

★3 (*fi 6*) (either term, 0-0-6). Practical application of science to problems in health care; involves report on problem and alternative solutions, plus complete demonstration and documentation of chosen solution. Prerequisite: Any BME course or consent of Department.

**BME 600 Seminars in Biomedical Engineering**

★2 (*fi 4*) (full session, 0-1s/2-0). A series of seminars designed to expose graduate students to the various areas of research and to provide a forum for progress reports in individual areas. Seminars from research workers from inside and outside the University will be included. Seminars are held in an informal atmosphere with ample opportunity for discussion.

**BME 630 Advanced Topics in Biomedical Engineering**

★3 (*fi 6*) (either term, 3-0-0). Prerequisite: consent of Department.

**BME 675 Magnetic Resonance in Biology and Medicine I**

★3 (*fi 6*) (first term, 3-0-0). The physical principles behind the application of nuclear magnetic resonance spectroscopy in fields from biochemistry to medicine. Topics include Fourier transform NMR, multipulse techniques, two-dimensional NMR, relaxation theory, *in vivo* spectroscopy, NMR imaging. Designed for advanced honors and graduate students interested in the application of NMR to biological systems. Intended to be followed by BIOCH 575. Offered in alternate years. Prerequisite: consent of Instructor.

**BME 679 Advanced Topics in Medical Physics**

★3 (*fi 6*) (either term, 3-0-0). Prerequisite: consent of Department.

**211.26 Botany (Biological Sciences)**

Department of Biological Sciences  
Faculty of Science

**Notes**

- (1) See the following sections for listings of other Biological Sciences courses: Biology (BIOL) §211.23; Entomology (ENT) §211.88; Genetics (GENET) §211.111; Microbiology (MICR) §211.158; Zoology (ZOO) §211.239.
- (2) See also INT D 421 and 455 for courses which are offered by more than one department or Faculty and which may be taken as options or as a course in this discipline.

**211.26.1 Undergraduate Courses****§ BOT 201 Simple Eukaryotes: Algae, Fungi and Lichens**

★3 (*fi 6*) (first term, 3-0-3). A review of the diverse phyla encompassed by the traditional terms "fungi" and "algae," ultrastructure, biochemistry and DNA analyses, and the interpretation of evolutionary relationships; the role of selected examples in terrestrial, aquatic and marine ecosystems. Laboratories permit the systematic study of most phyla and the partial characterization of communities of these organisms in several different habitats. Prerequisite: BIOL 108.

**§ BOT 202 Introductory Plant Developmental Biology**

★3 (*fi 6*) (second term, 3-0-3). This course will integrate the structural and molecular aspects of fertilization and seed development, germination, and cell and tissue differentiation using both conifer and flowering plant examples. Some selected examples from nonseed plants will be used where appropriate. Prerequisites: BOT 199 or BIOL 108; GENET 197 or BIOL 207.

**§ BOT 204 Introduction to Plant Resources**

★3 (*fi 6*) (first term, 3-0-3). Identification of vascular and non-vascular plants (including some fungi) and quantitative assessment of vegetation. Includes population and community sampling techniques, community classification, assessment of diversity, and quantification of range and timber resources. Prerequisites: BOT 199 or BIOL 108 plus ★3 in Life Sciences. Note: ENCS 204 and BOT 204 cannot both be taken for credit.

**§ BOT 210 The Plant Kingdom—Vascular Plants**

★3 (*fi 6*) (second term, 3-0-3). A comparative survey of vascular plants focusing on their morphology, classification and phylogeny. Emphasis is on living plant groups with some paleobotanical evidence presented. Prerequisite: BOT 199 or BIOL 108.

**§ BOT 240 Whole Plant Physiology**

★3 (*fi 6*) (first term, 3-0-3). An introductory general course on water and energy relations, evapotranspiration, mineral nutrition, membrane transport, ascent of sap, translocation, net assimilation, growth, development, hormone action, and stress. Prerequisites: BOT 199 or BIOL 107; CHEM 101 or 161 or 163.

**§ BOT 250 Cellular and Molecular Aspects of Plant Biology**

★3 (*fi 6*) (first term, 3-0-0). An introduction to plant molecular biology. An examination of biochemical and molecular processes occurring in plants;

protein synthesis; nucleic acid and protein synthesis; nitrogen fixation; phytochrome metabolism; and secondary plant metabolism. Prerequisites: BOT 199 or BIOL 107; CHEM 161 and 163.

**§ BOT 302 Biology of Algae**

★3 (*fi 6*) (first term, 3-0-3). Origins and evolution of algae; their comparative morphology, life histories and taxonomy; aspects of their ecology and physiology; adaptations to different habitats and environments; algae and symbiosis; economic aspects. Prerequisite: BOT 201. Offered in odd-numbered years.

**§ BOT 304 Field Botany**

★3 (*fi 6*) (first term, 3-0-3). Lectures and laboratory and field exercises provide an introduction to the description and identification of plants and their local habitats. Factors affecting variation in natural vegetation and methods used to describe it are discussed. Field exercises and projects will take place during the two weeks preceding the fall term and some may take place off campus. Presentations will take place during the first five weeks of term. This course requires the payment of additional fees (see §22.2.3). Prerequisites: BIOL 108 and any 200-level Biology course.

**§ BOT 305 Biology of Bryophytes**

★3 (*fi 6*) (second term, 3-0-3). The identification, classification and morphology of mosses, hepatics, and hornworts. Special emphasis is given to phylogeny and ecology of mosses. Lectures include such topics as botanical nomenclature and cladistics as applied to bryophytes, phytogeography, and origins of land plants. The laboratories stress the comparative structure of bryophyte families and genera. Prerequisite: BOT 201. Offered in odd-numbered years.

**§ BOT 306 Biology of the Fungi**

★3 (*fi 6*) (second term, 3-0-3). A systematic review of the Kingdom Fungi with emphasis on the ecological and economic importance of these organisms. Special emphasis is given to the practical aspects of isolating and identifying the fungi and interpreting their role in different environments. Coevolution of the fungi with plants, animals, and other microbes will be discussed. Prerequisites: BOT 199 or MICRB 193 or BIOL 108 and a 200-level Biological Science course. BOT 201 recommended.

**§ BOT 309 Plant Anatomy**

★3 (*fi 6*) (first term, 3-0-3). A developmental approach to the structure of seed plants. Development and structure of cell walls, apical and lateral meristems, all major tissues and organs, floral, wood anatomy, flowering plants reproductive biology, and embryology will be included. Prerequisite: Any 200-level Botany course.

**§ BOT 320 Flowering Plants of the World**

★3 (*fi 6*) (first term, 3-0-3). Emphasizes evolution and classification of flowering plants, the angiosperms. The course discusses the diversity of flowering plants on a worldwide basis and focuses on relationships of the major flowering plant families. Also included are discussions of systems of classification, nomenclature, field-collecting techniques and preparation of specimens, and family characteristics. Laboratories will deal with the practical aspects of flowering plant classification and identification. Prerequisite: BOT 210. Credit may be obtained in only one of BOT 220 and BOT 320.

**§ BOT 332 Plant Community Ecology**

★3 (*fi 6*) (first term, 3-0-3). Major topics in the discussion of plant communities include vegetation and vegetation regions, species interactions, ecological succession, the spatial structure of plant communities, classification and ordination of communities, vegetation mapping. The laboratory component includes field trips. Prerequisites: BIOL 108 or BOT 199 and BIOL 208. This course requires the payment of additional fees (see § 22.2.3). Credit may not be given for both BOT 332 and BOT 230.

**§ BOT 333 The Ecology of Aquatic and Peatland Plants**

★3 (*fi 6*) (second term, 3-0-3). An introduction to the ecology of freshwater, marine and peatland plants, communities, and ecosystems. Major topics covered are physical and chemical cycles; habitats, niche concepts, and communities; the flora and its adaptations to the benthos, plankton, and wetland habitats; dispersal and transport; succession including an introduction to paleolimnology; and paleostratigraphy of peatlands, including their evolution; growth and decline of populations, productivity; eutrophication, acidification; classification of peatlands; distribution of wetlands relative to climate; geological and hydrological factors. Prerequisites: BOT 199 or BIOL 108 and a 200-level Biological or Earth Sciences course.

**§ BOT 340 Physiology of Growth and Development**

★3 (*fi 6*) (second term, 3-0-0). Lectures and seminars on the involvement of plant growth substances and pigments in the regulation of plant growth and development. The influence of environmental factors on this regulation will be emphasized. Prerequisite: BOT 240. Offered in odd-numbered years.

**§ BOT 380 Drug Plants of the World**

★3 (*fi 6*) (second term, 3-0-0). A survey of the biology and historical uses of important drug-producing plants. An evaluation of the chemistry of biologically active compounds from poisonous, allergenic, analgesic, and hallucinogenic plants, and the current uses of such plant products in modern

scientific research. Use of plant biotechnology to develop drug-producing plants. Prerequisite: A 200-level Biological Sciences course. BOT 199 or 210 or BIOL 108 recommended.

**BI BOT 382 Plant Biotechnology**

★3 (fi 6) (first term, 3-0-0). Lectures will cover the techniques used in modern plant biotechnology and will deal with the way this technology is being used to modify and improve economically important plant species. Topics covered will include cloning of plant genes; plant, gene vectors; tissue culture clonal propagation and plant breeding. Prerequisite: A 200-level Biological Sciences course. BIOL 207 recommended. Offered in even numbered years.

**BI BOT 383 Biology of Economic Plants**

★3 (fi 6) (first term, 3-0-0). Lectures will deal with the biology and utilization of economically important vascular and nonvascular plants emphasizing relevant morphology, physiology, distribution, and history of use. Prerequisites: BOT 199 or BIOL 108 and a 200-level Biological Sciences course. Offered in even-numbered years.

**BI BOT 384 Global Change and Ecosystems**

★3 (fi 6) (first term, 3-0-0). The ecological impact of climate change and large-scale human activities on terrestrial and aquatic ecosystems. Topics of emphasis include the impacts of climatic warming, desertification, water diversion projects, and invasion of exotic species. Emphasis will be on the community and ecosystem-level impacts in natural ecosystems, although the societal implications of ecological alterations will be discussed. Some consideration of the way society assesses impacts and places value on environmental benefits will be used to evaluate environmental options, trade-offs, and solutions. Prerequisite: BIOL 208 or equivalent. Offered in even-numbered years.

**BI BOT 409 Advanced Structural Botany**

★3 (fi 6) (second term, 3-0-0). A lecture/seminar course dealing with advanced topics in plant structure and development. Prerequisite: BOT 309. Offered in even-numbered years.

**BI BOT 411 Paleobotany**

★3 (fi 6) (first term, 3-0-3). The fossil record of plants as it relates to the evolutionary history of existing groups. Prerequisite: A 300-level Biological or Earth Sciences course. Offered in even-numbered years.

**BI BOT 419 Plant Microtechnique**

★3 (fi 6) (second term, 3-0-3). Theory and practice of preparing plant cells and tissues for observation with light and scanning electron microscopy. Fixation, dehydration, embedding, sectioning, standard staining procedures, some histo-chemistry, use of light microscope, introduction to modern embedment media. Prerequisite: BOT 309. Offered in odd-numbered years.

**BI BOT 431 Physiological Ecology**

★3 (fi 6) (first term, 3-0-3). The application of ecophysiological theory and practice of the study of plant responses to increasing carbon dioxide levels and increased irradiance of ultraviolet-B light. Experimental work will include demonstrations and individual projects making use of the phytotron facility. Seminars will involve the discussion of significant research papers in the discipline. Prerequisites: A 200-level course in Plant Physiology and a senior course in Ecology. Offered in odd-numbered years.

**BI BOT 433 Lake and Peatland Development**

★3 (fi 6) (first term, 3-0-3). An introduction to field and laboratory techniques in studying lake and peatland histories along with a critical evaluation of the parameters used to make interpretations about their history. Parameters discussed include physical, chemical (clastic, organic and fossil pigments), and biotic (bryophytes, pollen, seeds, diatoms, chrysophytes). Both natural development and modified systems will be discussed. Prerequisites: BOT 201 and a 300-level Biological or Earth Sciences course. Offered in even-numbered years.

**BI BOT 442 The Mineral Nutrition of Plants**

★3 (fi 6) (second term, 3-0-0). A broad treatment of the acquisition and utilization of mineral nutrients by higher plants. Specific topics will include the effect of plant roots on the solubility and availability of soil minerals, the role of roots, root hairs, root nodules, and mycorrhiza in mineral acquisition, mechanisms of ion transport across the plasma membrane, functions of macronutrients, micronutrients, and the beneficial elements, chemical composition of plant tissues, and response of plants to mineral deficiencies and toxicities. Offered in odd-numbered years.

## 211.26.2 Graduate Courses

### Notes

- (1) All 300- and 400-level courses in the Department of Biological Sciences may be taken for credit by graduate students with approval of the student's supervisor or supervisor 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 supervisor 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.

**BOT 504 Algae: Biology and Identification**

★3 (fi 6) (first term, 3-0-3). Treatment of contemporary topics with the laboratory component emphasizing the freshwater biota, and techniques used to study and identify algae. Offered in odd-numbered years.

**BOT 505 Biosystematics of the Mosses**

★3 (fi 6) (second term, 3-0-0). Lectures, discussions and surveys of the literature of approaches and techniques for studying the phylogeny of mosses. The course will include a historical review of bryology and invited lectures on such topics as phylogenetics, nomenclature, phonetics, biometric analyses of population, experimental taxonomy and herbarium practices. Offered in even-numbered years.

**BOT 506 Advanced Mycology**

★3 (fi 6) (second term, 3-0-0). Reports and discussion of major and current research in the biosystematics and ecology of the fungi. Evaluation of methods of investigation in these areas. Offered in odd-numbered years.

**BOT 511 Advanced Paleobotany**

★3 (fi 6) (second term, 3-0-3). Special problems in paleobotany involving laboratory techniques and readings of current literature and oral written presentation. Offered in odd-numbered years.

**BOT 520 Molecular Systematics**

★3 (fi 6) (second term, 3-0-0). A course for those interested in botanical systematics and evolutionary genetics. The course will include a discussion of use of both micro- and macromolecular techniques in systematics. The primary focus will be on the use of isozyme, chloroplast DNA and nuclear DNA variation for taxonomic and phylogenetic applications. Lectures will emphasize the theory behind the use of molecular biology as a tool in systematics and these will be coupled with laboratory demonstrations of techniques and microcomputer analysis of data sets. Students will be required to complete an independent project using one or more of the available techniques. Prerequisite: BOT 220, 305, 306, or BOT 435 recommended. Offered in odd-numbered years.

**BOT 530 Advanced Plant Ecology**

★3 (fi 6) (second term, 3-0-0). Seminar discussion of major and contemporary topics in plant ecology, using general readings and students' abstracts of published papers. Offered in even-numbered years.

**BOT 540 Nutrient Partitioning in Plants**

★3 (fi 6) (first term, 3-0-0). Long distance transport in plants through phloem and xylem and the regulation of nutrient partitioning will be surveyed. Special emphasis will be placed on the transport of carbon in source and sink tissues. The role of environmental and nutritional factors in the control of partitioning will be discussed. Offered in even-numbered years.

**BOT 543 Plant Stress**

★3 (fi 6) (second term, 3-0-0). A lecture seminar course addressing current topics dealing with the response of plants to environmental stresses. The focus will be on stress response at the whole plant, cellular and molecular level. Metal stress arising from agricultural practices, industrial activity, waste disposal, and urbanization will serve as a model for addressing other plant stresses including wounding, temperature, and water stress. Specific topics will include the concept of toxicity thresholds, regulation of stress related genes, stress interactions, the physiology and biochemistry of tolerance and toxicity, evolution of tolerant ecotypes, and breeding for stress tolerance in crop cultivars. Offered in even-numbered years.

## 211.27 Business

Department of Organizational Analysis  
Faculty of Business

**Note:** Enrolment in all BUS 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.

### 211.27.1 Undergraduate Courses

**BUS 201 Introduction to Canadian Business**

★3 (fi 6) (either term, 3-0-0). This course introduces the student to the structure of Canadian Business in the global context. Emphasis will be given to the examination of a number of business sectors and to various problems that are encountered by organizations operating in these sectors. Potential solutions will be discussed. Guest speakers from industry and government will discuss their own organizations and the current issues that they are facing.

**BUS 379 Business Policy**

★3 (fi 6) (either term, 3-0-0). Case studies in business policy. Prerequisites: FIN 301, MGTSC 352, MARK 301, ORG T 301 and 311.

**BUS 488 Selected Topics in Business**

★3 (fi 6) (either term, 3-0-0). Prerequisite: consent of Faculty of Business.

## 211.27.2 Graduate Courses

**BUS 601 Business Practicum**

★3 (fi 6) (either term, 3-0-0). At the beginning of the course students are divided into groups and the groups are assigned a project in either a business or government organization. At the end of the course each group is required to write a report and to make a presentation derived from the project to the other groups in the course. Prerequisite: All required Year 1 MBA core courses.

**BUS 855 International Study Tour**

★1.5 (fi 16) (second term, 18 hours). A week-long intensive course. Understanding the challenges facing local companies in their environment, for example, Asia or Eastern Europe. An on-site visit to the location is included. Restricted to Executive MBA students only.

**BUS 860 Special Topics**

★3 (fi 32) (first term, 3-0-0). Topics will vary from year to year. Restricted to Executive MBA students only.

**BUS 875 Special Topics**

★3 (fi 32) (second term, 3-0-0). Topics will vary from year to year. Restricted to Executive MBA students only.

**BUS 880 Business Project**

★3 (fi 32) (first term, 3-0-0). Students are required to conduct an operations audit on a client company and prepare a business plan. The company selected could be the student's own organization or an unit within the organization. Restricted to Executive MBA students only.

**BUS 885 Business Project**

★3 (fi 32) (second term, 3-0-0). Students will complete a "custom-designed" project for a client company under faculty supervision. Restricted to Executive MBA students only.

**BUS 900 Directed Research Project**

★3 (fi 6) (variable).

## 211.28 Business Economics

Department of Marketing, Business Economics and Law  
Faculty of Business

The following table lists courses renumbered effective 1997/98:

Old	New	Old	New
MANEC 301	BUEC 301	MANEC 466	BUEC 466
MANEC 379	BUEC 379	MANEC 470	BUEC 470
MANEC 414	BUEC 414	MANEC 471	BUEC 471
MANEC 444	BUEC 444	MANEC 484	BUEC 484
MANEC 445	BUEC 445	MANEC 488	BUEC 488
MANEC 454	BUEC 454	MANEC 495	BUEC 495

**BUEC 301 Microeconomics for Canadian Business Management**

★3 (fi 6) (either term, 3-0-0). Theories of choice as applied to consumer behavior and business decisions, production and price determination in alternative market forms; interrelatedness of firm decisions and of market outcomes, the impact of uncertainty. Prerequisites: ECON 101/102, MATH 113 or equivalent. Students may receive credit for only one of ECON 281, 383, or BUEC 301.

**BUEC 311 Business Economics, Organizations and Management**

★3 (fi 6) (either term, 3-0-0). Business organizations as systems of mutually reinforcing functional areas where decision making is driven by underlying economic forces. The application of economic theory to facilitate complex decision making within organizations: economic models of decision making are linked directly to functional areas of management. Topics include the organization of firms and industries; meeting customer needs; and decision making involving production, resource use, dealing with risk and uncertainty, scale and scope of operations, competitive advantage, and product pricing. Prerequisites: ECON 101, 102, and MATH 113 or equivalent.

**BUEC 379 Government and Business**

★3 (fi 6) (either term, 3-0-0). The role of business in the public policy process: How business organizations influence public policy and its administration and how public policies affect business. Processes of change are of particular interest. Attention is on the motivation, behavior patterns, and the dynamics of the interaction of different stakeholder groups, policy makers, and administrators. A framework for analysis of the effectiveness and efficiency of different fiscal, regulatory, and promotional policies; consideration is given to the impact of technological, economic, and social change on policy choice in the long term. Prerequisite: BUEC 311.

**BUEC 414 Competitive Strategy**

★3 (fi 6) (either term, 3-0-0). An analysis of the ways firms develop and implement competitive plans with an emphasis on underlying economic

factors. Consideration is given to market definition; competitive conditions analysis; pricing; government regulation; and long-term dynamic forces driving competition. Prerequisite: BUEC 311.

**BUEC 444 International Business**

★3 (fi 6) (either term, 3-0-0). A course to acquaint students with the problems and opportunities arising when a firm operates in more than one country: the choice between operating abroad, export and licensing, the nature and causes of the emergence of new capital markets, international institutions facilitating export finance, commodity price stabilization programmes, the implications of commercial, tax and integration policy for business decisions, aspects of international management such as hedging of foreign exchange risk, transfer pricing and choice of optimal capital structure.

**BUEC 445 Competitive Strategies in the International Business Environment**

★3 (fi 6) (either term, 3-0-0). This course provides an understanding of the design and implementation process of competitive strategies by firms with either multi-country or global operations. Emphasis is placed on competitive strategy frameworks, changing patterns of international competition, levels of analysis of international competition, and formulation and implementation of international competitive strategies. The material is illustrated by means of special case studies of Canadian firms. Prerequisite: BUEC 311.

**BUEC 454 Real Estate Management**

★3 (fi 6) (either term, 3-0-0). Real estate markets; real estate law; real estate economics and location; taxation of real estate; marketing, property management; development; mortgage lending, real estate investment, brokerage, and regulation. A variety of learning opportunities will be provided to students including participation in a real estate development simulation, presentations by speakers from industry, applied student research on one of the topic areas, field assignment, and/or field trip. Prerequisite: BUEC 311.

**BUEC 466 Taxation in Theory and Practice**

★3 (fi 6) (either term, 3-0-0). An examination of the Canadian tax structure from economic, legal and administrative points view. BCom degree credit will not be granted for both BUEC 466 and ECON 353.

**BUEC 470 Cultural Industries in a Global Economy**

★3 (fi 6) (either term, 3-0-0). This course examines international competition in selected cultural and entertainment industries, the effects of new technologies on competition, US competitive advantage and dominance of trade. Canadian public policy, and competitive strategy responses to this dominance. Prerequisite: BUEC 311 or consent of Instructor.

**BUEC 484 Economic Problems**

★3 (fi 6) (either term, 3-0-0). Current economic problems in business.

**BUEC 488 Selected Topics in Business Economics**

★3 (fi 6) (either term, 3-0-0). Prerequisite: BUEC 311, ECON 281, or consent of Department.

**BUEC 495 Individual Research Projects**

★3 (fi 6) (either term, 3-0-0). Special study for advanced undergraduates. Prerequisites: Consent of instructor and Associate Dean. (When a student registered in this course for a second or third time, subsequent higher course numbers are to be used: BUEC 496, 497.)

## 211.29 Business Law

Department of Marketing, Business Economics and Law  
Faculty of Business

**Note:** Enrolment in all B LAW courses, except B LAW 301, 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
LEG R 301	B LAW 301	LEG R 428	B LAW 428
LEG R 402	B LAW 402	LEG R 442	B LAW 442
LEG R 403	B LAW 403	LEG R 488	B LAW 488
LEG R 422	B LAW 422	LEG R 495	B LAW 495

## 211.29.1 Undergraduate Courses

**B LAW 301 Legal Foundations of the Canadian Economy**

★3 (fi 6) (either term, 3-0-0). A synoptic view of the Canadian legal system, with emphasis on underlying considerations of social policy. While considering the nature, sources, philosophy, and policy objectives of the law, selected topics from the fields of tort and contract will be analyzed.

**B LAW 402 Business Contracts**

★3 (fi 6) (either term, 3-0-0). An examination at the special types of contracts that are encountered in business and commercial life. Topics include contract

of sale, agency, negotiable instruments, insurance, bailment, employment contracts and contracts involving land as well as societal regulation of the freedom of contract. Prerequisite: B LAW 301.

#### **B LAW 403 Commercial Transactions**

★3 (*fi 6*) (either term, 3-0-0). An integrated analysis of the legal principles applying to commercial transactions, including an examination of the statutes and case law governing the sale of goods, conditional sale and chattel mortgages. Prerequisite: B LAW 301

#### **B LAW 422 Law of Business Organizations**

★3 (*fi 6*) (either term, 3-0-0). An introduction to the role of the corporation in the business and commercial life of Canada and Alberta, with emphasis on the small private company. Topics include characteristics of corporate existence, process of incorporation, forming a private company, relationship with third parties, distinction between management and ownership, duties of directors and officers, and shareholder rights. Prerequisite: B LAW 301.

#### **B LAW 428 Natural Resource and Environmental Law**

★3 (*fi 6*) (either term, 3-0-0). The course considers the legal framework in which managerial decisions affecting the environment are taken. It looks at the substance of environmental law and the procedures for enforcing it. The interaction of this legal approach with business strategies for dealing with environmental issues is analyzed. Prerequisite: B LAW 301.

#### **B LAW 442 International Business Law**

★3 (*fi 6*) (either term, 3-0-0). A study of the law regulating the conduct of international business transactions. This includes trade law (GATT, commodity agreements, economic integration, national rules); finance law (IMF, OECD, ICSID, multinationals, promotion and financing of world trade); and commercial law (payment mechanisms, international commercial contracts, UN Convention on the International Sale of Goods, settlement procedures, pertinent national and international laws). Corequisites: recommended BUEC 444 and FIN 442.

#### **B LAW 488 Selected Topics in Business Law**

★3 (*fi 6*) (either term, 3-0-0). Prerequisite: B LAW 301, or consent of Department.

#### **B LAW 495 Individual Research Projects**

★3 (*fi 6*) (either term, 3-0-0). Special study for advanced undergraduates. Prerequisites: Consent of instructor and Associate Dean. (When a student registers in this course for a second or third time, subsequent higher course numbers are to be used: B LAW 496, 497.)

## 211.29.2 Graduate Courses

#### **B LAW 622 Law, Public Policy and the Canadian Managerial Environment**

★3 (*fi 6*) (either term, 3-0-0). Professional training for business or public administration has two principal dimensions: (1) the internal operation finance and control of organizations; and (2) the external environment—social, political, moral, legal, and natural—to which organizations must adapt themselves. This course provides basic graduate training in the environmental dimensions of management, not through a general survey of environmental factors, but rather through intensive analysis of selected features of the dynamic legal interface between business and society.

#### **B LAW 642 International Business Law**

★3 (*fi 6*) (either term, 3-0-0). A study of the law regulating the conduct of international business transactions. This includes trade law (GATT, commodity agreements, economic integration, national rules); finance law (IMF, OECD, ICSID, multinationals, promotion and financing of world trade); and commercial law (payment mechanisms, international commercial contracts, UN Convention on the International Sale of Goods, settlement procedures, pertinent national and international laws).

211.30 Reserved

## 211.31 Canadian Studies

Department of Political Science, Canadian Studies Program  
Faculty of Arts

#### **Notes**

- (1) See also INT D 405 for a course which is offered by more than one department or Faculty and which may be taken as an option or as a course in this discipline.
- (2) Students seeking credit in CANST 350 or 351, or in any Canadian Studies course at the 400-level or above, should consult the Canadian Studies Advisor before registering.

#### **■ CANST 200 An Introduction to Canadian Studies**

★3 (*fi 6*) (either term, 3-0-0). Introduces students to the interdisciplinary study of Canada by relating significant expressions of Canadian social, political and cultural concerns and understandings, so as to highlight Canada's distinctive place in North America and the world.

#### **■ CANST 302 Canada's North: The Human Dimension**

★3 (*fi 6*) (either term, 3-0-0). An interdisciplinary social science survey of northern Canada with reference to patterns of relationships both in northern Canada and between the North and the rest of Canada.

#### **■ CANST 305 The Politics of the Arts in Canada I**

★3 (*fi 6*) (first term, 3-0-0). A comparative study of private and public arts organizations and activities at the federal level; cultural nationalism; issues and outcomes in cultural policy. Note: Not to be taken by students with credit in CANST 300.

#### **■ CANST 306 The Politics of the Arts in Canada II**

★3 (*fi 6*) (second term, 3-0-0). A comparative study of private and public arts organizations and activities at the provincial and municipal levels; regional, provincial and local diversity; issues and outcomes in cultural policy. Note: Not to be taken by students with credit in CANST 300.

#### **CANST 351 Canadian Intellectual Traditions, 1660–1890**

★3 (*fi 6*) (either term, 0-3s-0). An interdisciplinary lecture/seminar course that traces recurrent themes in Canadian thought from 1660–1890, with emphasis on how ideas have historically found expression in the politics, economics, social structures, educational systems, and art forms in Canada. Prerequisite: CANST 200 or consent of Department. Not available to students with credit in CANST 350 or 301.

#### **CANST 352 Canadian Intellectual Traditions, 1890–1960**

★3 (*fi 6*) (either term, 0-3s-0). An interdisciplinary lecture/seminar course that traces recurrent themes in Canadian thought from 1890–1960, with emphasis on how ideas have historically found expression in the politics, economics, social structure, educational systems and art forms in Canada. Prerequisite: CANST 351 or consent of Department. Not available to students with credit in CANST 350 or 301.

#### **CANST 360 The National Question in Canada**

★3 (*fi 6*) (either term, 0-3s-0). A study of Canadian, Quebecois, and Aboriginal nationalisms in Canada's political, intellectual, and artistic traditions. Prerequisite: ★6 in CANST courses, or in Canadian content courses (in English or French), in economics, history, political science, or sociology; or consent of Department. Reading competence in French is required.

#### **CANST 403 Science and Public Policy in Canada**

★3 (*fi 6*) (either term, 0-3s-0). The relationship of science to other public affairs in Canada and the effect of economic, political and cultural forces on the formulation of science policy.

#### **CANST 404 Canadian Culture and Communication in English Canada**

★3 (*fi 6*) (either term, 0-3s-0). An interdisciplinary examination of Canadian culture and popular culture; national policy issues in a transitional age of communications. Prerequisite: consent of Department.

#### **CANST 406 Seminar in Canadian Studies**

★3 (*fi 6*) (either term, 0-3s-0).

#### **CANST 408 Advanced Studies on Canada's Northern Peoples**

★3 (*fi 6*) (either term, 0-3s-0). Interdisciplinary seminar on contemporary issues facing residents of Canada's north.

#### **CANST 410 The Women's Movement in Contemporary Canada**

★3 (*fi 6*) (either term, 0-3s-0). An interdisciplinary exploration of the theories and practices of feminist organizing for change in Canada since 1960. Topics include: links with first-wave feminism in Canada; the 1970 Report of the Royal Commission on the Status of Women; coalitions and collectives; the law as an avenue of reform; the women's movement in Alberta and Edmonton.

#### **CANST 450 Contemporary Canadian Issues**

★3 (*fi 6*) (either term, 0-3s-0). An interdisciplinary examination of selected political, economic, social, and cultural problems facing Canada at the present time. Prerequisites: CANST 351 and an additional ★3 CANST course at the 300- or 400-level, or consent of Department. Formerly CANST 400.

#### **CANST 510 Directed Readings in Canadian Studies**

★3 (*fi 6*) (either term, 0-3s-0). Designed to meet the needs of individual students, normally in the final year of the BA (Canadian Studies), the BA (Etudes canadiennes) or Honors in Canadian Studies.

#### **CANST 520 Honors Essay: Fourth Year Honors Canadian Studies**

★6 (*fi 12*) (full session, 0-3s-0). Preparation of the Honors essay required in the fourth year of the program. Formerly CANST 409.

## 211.32 Canadien-Français

Faculté Saint-Jean

#### **CA FR 320 Civilisation canadienne-française I**

★3 (*fi 6*) (premier semestre, 3-0-0). La civilisation et la culture du Canada français des origines à la Confédération. Note: Ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits pour FR CA 222 à la Faculté des Arts.

**CA FR 322 Civilisation canadienne-française II**

★3 (fi 6) (deuxième semestre, 3-0-0). La civilisation et la culture du Canada français de la Confédération à nos jours. Note: Ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits pour FR CA 223 à la Faculté des Arts.

**CA FR 350 Panorama de la littérature canadienne-française**

★3 (fi 6) (l'un ou l'autre semestre, 3-0-0). Littérature canadienne-française, des origines à nos jours, vue à travers un choix d'oeuvres dominantes marquant les diverses périodes de son évolution. Prérequis: FRANC 235. Note: ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits pour FR CA 300 à la Faculté des Arts.

**CA FR 465 La poésie canadienne-française du XXe siècle**

★3 (fi 6) (l'un ou l'autre semestre, 3-0-0). L'évolution de la poésie canadienne-française de Saint-Denys Garneau à l'époque contemporaine. Prérequis: FRANC 235 et ★3 en littérature de niveau 300, préférablement CA FR 350. Note: Ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits pour FR CA 422 à la Faculté des Arts.

**CA FR 466 Le théâtre canadien-français du XXe siècle**

★3 (fi 6) (l'un ou l'autre semestre, 3-0-0). L'évolution du théâtre canadien-français de Gratien Gélinas à l'époque contemporaine. Prérequis: FRANC 235 et ★3 en littérature de niveau 300, préférablement CA FR 350. Note: ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits pour ADRAM 466 et pour FR CA 421 à la Faculté des Arts.

**CA FR 470 Le roman canadien-français du XXe siècle**

★3 (fi 6) (l'un ou l'autre semestre, 3-0-0). Le roman canadien-français depuis la génération de 1890 jusqu'à la naissance du nouveau roman, vu à travers les plus grands romanciers de cette période. Prérequis: FRANC 235 et ★3 en littérature de niveau 300, préférablement CA FR 350. Note: ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits pour FR CA 451 à la Faculté des Arts. Anciennement CA FR 451.

**CA FR 480 Choix de sujet**

★3 (fi 6) (l'un ou l'autre semestre, 3-0-0). Prérequis: FRANC 225, 235 et ★3 en littérature de niveau 300.

**CA FR 482 Choix de sujet**

★3 (fi 6) (l'un ou l'autre semestre, 3-0-0). Prérequis: FRANC 225, 235 et ★3 en littérature de niveau 300.

**CA FR 499 Etudes dirigées**

★3 (fi 6) (l'un ou l'autre semestre, 3-0-0). Cours destiné à permettre aux étudiants d'approfondir un sujet de leur choix en littérature canadienne-française. Prérequis: FRANC 235 et ★3 en littérature de niveau 300, préférablement CA FR 350.

**211.33 Capstone Courses**

Faculty of Agriculture, Forestry and Home Economics

**CAPS 400 Integrated Agricultural Resource Management**

★3 (fi 6) (either term, 0-3s-0). An exploration of production and environmental concerns and social issues related to agriculture, through large and small group discussion and written reports. Prerequisite: Open to fourth-year students in the BSc in Agriculture Program (to be taken in final year of program). [Agricultural, Food, and Nutritional Sciences]

**CAPS 410 Environmental Impact Assessment**

★3 (fi 6) (either term, 0-3s-0). The background and needs for environmental impact assessment (EIA); evolution of requirements in Alberta, Canada, and elsewhere; federal and provincial jurisdiction; current and evolving regulatory framework; integration of EIA into the planning and decision-making process; resource, environmental quality, and social issues; EIA conduct and delivery; project implementation in response to EIA findings; case studies. Prerequisite: Open to fourth-year students only or consent of Instructor. [Rural Economy]

**D CAPS 423 Management in Agriculture, Food and Forestry**

★3 (fi 6) (either term, 0-3s-0). Case studies of management topics in agriculture, food and forestry. Input from managers and technical specialists involved in planning, financing and managing selected agriculture, food and forestry businesses. Use of computer-assisted management approaches for selected case studies. Prerequisite: Open to fourth-year students in the Agricultural/Food Business Management and the Forest Business Management Programs, or by consent of Instructor. [Rural Economy]

**S CAPS 431 Integrated Forest Management**

★3 (fi 6) (either term, 3-0-3). Problem solving, decision making and planning in relation to the management of forest resources. Application of models and related tools. Public involvement and issues management will be addressed. This course is the capstone course for the forest management major and should be taken concurrently with FOR 432. This course requires the payment of additional miscellaneous fees. See §22.2.3 for details. Prerequisite: FOR 302, 303, 304, 323, and 430.

**CAPS 440 Nutrition and Food Science**

★3 (fi 6) (either term, 0-3s-3). An integrated exploration of issues pertaining

to food systems, technological processes, and food quality or nutrition and metabolism. Open to fourth-year students only.

**211.34 Cell Biology**

Department of Cell Biology and Anatomy and  
Department of Biological Sciences  
Faculties of Medicine and Oral Health Sciences  
and Science

**211.34.1 Undergraduate Courses****CELL 300 Advanced Cell Biology I**

★3 (fi 6) (first term, 3-0-0). A senior course studying various topics in modern cell biology. The course will examine aspects of eukaryotic cell structure and function. It will include, but not be restricted to, areas such as intracellular signaling, cell-cycling, protein targeting and organelle biogenesis, and cell-cell interactions. This course will make extensive use of the current literature to illustrate important concepts. Prerequisite: BIOL 201. Pre- or corequisite: BIOCH 203/205.

**CELL 301 Advanced Cell Biology II**

★3 (fi 6) (second term, 3-0-0). A continuation of CELL 300, designed to cover topics from CELL 300 in greater depth and recent developments in cell biology. This course is intended for, but not restricted to, students in the Cell Biology Honors and Specialization programs.

**CELL 445 Current Topics in Cell Biology**

★3 (fi 6) (first term, 3-0-0). A survey of current literature dealing with recent advances in selected topics in Cell Biology. Intended for fourth year students in the Cell Biology Program and graduate students. Prerequisites: CELL 300, CELL 301 or permission of Instructor.

**CELL 490 Honors Thesis**

★6 (fi 12) (full session, 0-0-6). Required of students in the final year of the Cell Biology Honors program. Prerequisite: CELL 301.

**CELL 495 Individual Study**

★3 (fi 6) (either term, 0-0-6). Registration will be contingent on the student's having made prior arrangements with a Faculty member in a department participating in the Cell Biology Program. Credit may be obtained for this course more than once. Prerequisites: A 300-level CELL, Biological Sciences, or Biochemistry course, and the consent of the Director of the Undergraduate Cell Biology Program.

**CELL 498 Research Project**

★3 (fi 6) (either term, 0-0-6). Directed research carried out in the laboratory of an assigned member of a department participating in the Cell Biology Program. Credit may be obtained for this course more than once. Successful completion requires a written report. Prerequisite: A 300-level CELL, Biological Sciences, or Biochemistry course.

**CELL 499 Research Project**

★6 (fi 12) (full session, 0-0-6). Directed research carried out in the laboratory of an assigned member of a department participating in the Cell Biology Program. The project would normally continue through both the first and second terms of the Winter Session. Successful completion of this course requires a written report and oral presentation on the research project. Prerequisite: A 300-level CELL, Biological Sciences, or Biochemistry course.

**211.34.2 Graduate Courses****CELL 614 Molecular Mechanisms of Cellular Regulation**

★3 (fi 6) (first term, 0-4s-0). A current appraisal of the scientific literature in selected areas of molecular and cellular biology. Information will be provided in the form of selected readings of current papers, and through student seminar presentations. The overall goal of the course is to introduce students to current research topics in molecular and cellular biology, and to enhance their abilities in the appraisal and presentation of scientific material.

**211.35 Chemical Engineering**

Department of Chemical and Materials Engineering  
Faculty of Engineering

The following table lists renumbered courses effective 1993/94:

Old	New	Old	New
CH E 324	CH E 243	CH E 518	CH E 418
CH E 356	CH E 265	CH E 534	CH E 434
CH E 385	CH E 285	CH E 546	CH E 446
CH E 412	CH E 312	CH E 553	CH E 453
CH E 414	CH E 314	CH E 554	CH E 454
CH E 416	CH E 316	CH E 556	CH E 465
CH E 424	CH E 343	CH E 558	CH E 458
CH E 451	CH E 351	CH E 576	CH E 474



Old	New	Old	New
CH E 456	CH E 365	CH E 581	CH E 481
CH E 476	CH E 375	CH E 583	CH E 483
CH E 490	CH E 390		

## 211.35.1 Undergraduate Courses

### CH E 243 Engineering Thermodynamics

□3.5 (*fi 6*) (either term, 3-1s-0). An introduction to the first and second laws of thermodynamics. Prerequisites: MATH 101, and EN PH 131. (★3)

### CH E 265 Process Analysis

□4.5 (*fi 6*) (either term, 3-0-3). Basic process principles; material and energy balances, transient processes, introduction to computer-aided balance calculations; one tour to a local chemical plant. Prerequisites: ENCOMP 100, MATH 102 and CHEM 105. Corequisites: CH E 243 and MATH 209 or equivalent. (★3)

### CH E 285 An Introduction to the Process Industries

□1.0 (*fi 2*) (first term, 1-0-0). Introduction to Chemical and Materials Engineering and processing with special reference to Alberta. (★1)

### CH E 312 Fluid Mechanics

□3.5 (*fi 6*) (first term, 3-1s-0). Newtonian and non-Newtonian fluid behavior; hydrostatics; buoyancy, application of Bernoulli and momentum equations; frictional losses through pipes, ducts, and fittings; pipe networks; pumps; compressible flow in pipes; drag on submerged bodies and flow through porous media. Prerequisites: CH E 243, MATH 201, MATH 209. (★3)

### CH E 314 Heat Transfer

□4.0 (*fi 6*) (either term, 3-1s-4/4). Principles of conduction, convection and radiation heat transfer. Design and performance analysis of thermal systems based on these principles. Corequisite: CH E 312. (★3)

### CH E 316 Equilibrium Stage Processes

□4.0 (*fi 6*) (either term, 3-0-2). Design of separation processes with emphasis on the equilibrium stage concept, distillation, absorption and extraction. Prerequisites: CH E 265 and 343. (★3)

### CH E 343 Chemical Engineering Thermodynamics

□3.5 (*fi 6*) (first term, 3-1s-0). The thermodynamics of non-ideal gases and liquids; vapour-liquid equilibrium, thermodynamics of chemical processes and multicomponent systems. Prerequisites: CH E 243 and 265. (★3)

### CH E 351 Chemical Engineering Laboratory I

□3.5 (*fi 6*) (first term, 2-0-3). Technical report writing; thermodynamics, material, and energy balances, and calibration experiments. Prerequisite: ENGL 199 or equivalent. Prerequisites or corequisites: CH E 243, 265 and 312. (★3)

### CH E 365 Chemical Engineering Design I

□4.5 (*fi 6*) (either term, 3-0-3). Engineering design concepts; cost estimation; engineering economics; project planning and scheduling; selected project design examples. Prerequisites: CH E 265 and 343. Prerequisites or corequisites: CH E 314 and 316. (★3)

### CH E 375 Mathematical Applications

□3.5 (*fi 6*) (either term, 3-1s-0). Statistical analysis of engineering problems and experimental design. Prerequisite: STAT 235 or equivalent. (★3)

### CH E 390 Introduction to Biochemical Engineering

□3.5 (*fi 6*) (either term, 3-0-1). Physical and chemical properties of cells, tissues, and biological fluids; engineering analysis of processes such as cell growth and fermentation; purification of products. Prerequisite: CH E 265 or MICRB 293. (★3)

### CH E 418 Diffusion Operations

□4.0 (*fi 6*) (either term, 3-0-2). Molecular and turbulent diffusion; mass transfer coefficients; mass transfer equipment design including absorption and cooling towers, adsorption and ion exchange. Prerequisites: CH E 314 and 343. (★3)

### CH E 434 Chemical Reactor Analysis

□3.5 (*fi 6*) (either term, 3-1s-0). Kinetics of chemical reactions; design of chemical reactors. Prerequisite: CH E 343. (★3)

### CH E 436 Colloids and Surfaces

□3.5 (*fi 6*) (Intersession, 3-1s-0). Interactions between fluid phases and solids; micelles; electrokinetic phenomena; adsorption isotherms; applications to industrial processes. Prerequisite: CH E 343. (★3)

### CH E 446 Process Dynamics and Control

□3.8 (*fi 6*) (either term, 3-0-3/2). Introduction to process modelling and transient response analysis; design and analysis of feedback systems; stability analysis; process control applications; data acquisition and process control using digital computers. Prerequisites: MATH 201 or equivalent, MATH 209. Corequisites: CH E 312 and 314 or equivalents. (★3)

### CH E 453 Chemical Engineering Laboratory II

□3.0 (*fi 6*) (first term, 1-0-4). Experiments in fluid mechanics. Prerequisites: CH E 312 and 351. (★3)

### CH E 454 Chemical Engineering Laboratory III

□3.0 (*fi 6*) (either term, 1-0-4). Experiments in kinetics and mass transfer. Prerequisites: CH E 316, 351, 418, and 434. (★3)

### CH E 458 Chemical Engineering Laboratory IV

□3.0 (*fi 6*) (either term, 1-0-4). Projects in Chemical Engineering. Prerequisite: consent of Department. (★3)

### CH E 465 Chemical Engineering Design II

□4.0 (*fi 6*) (second term, 1-0-6). Integration of chemical engineering practice, theory and economics into the design and evaluation of proposed capital projects. Prerequisites: CH E 316, 365 and 434. (★3)

### CH E 474 Computational Methods in Chemical Engineering

□3.5 (*fi 6*) (either term, 3-1s-0). Mathematical formulation of chemical engineering problems; solution of systems of linear and nonlinear algebraic equations; numerical interpolation, differentiation and integration; numerical solution of ordinary and partial differential equations. Prerequisites: CH E 265, ENCOMP 100, or equivalent, MATH 102, 201, and 209. (★3)

### CH E 481 Colloquium I

□0.5 (*fi 2*) (first term, 0-1s-0). Oral presentations. Graded on a pass/fail basis. Prerequisite: 85 units completed or consent of Instructor. (★1)

### CH E 483 Colloquium II

□0.5 (*fi 2*) (second term, 0-1s-0). Oral presentation of technical material. Graded on a pass/fail basis. Prerequisite: CH E 481. (★1)

### CH E 502 Environmental Impact of the Process Industries

□3.5 (*fi 6*) (either term, 3-1s-0). Industrial emissions, pollution control, and waste minimization. Special processes, design techniques, and operating procedures related to environmental and ecological considerations. Corequisite or prerequisite: CH E 316. (★3)

### CH E 522 Hydrocarbon Fluid Properties and Processing

□3.5 (*fi 6*) (either term, 3-1s-0). An introduction to the physical, chemical and engineering principles required for the design and operation of plants used for the treatment of natural gas, heavy oils and bitumens. Prerequisite or corequisite: CH E 343. (★3)

### CH E 536 Chemical Kinetics and Catalysis

□3.5 (*fi 6*) (either term, 3-1s-0). Characterization of heterogeneous catalysts; mechanisms and kinetics of heterogeneously catalyzed reactions. Prerequisite: CH E 434 or consent of Instructor. (★3)

### CH E 538 Polymer Reactor Engineering

□3.5 (*fi 6*) (second term, 3-1s-0). Introduction to chain and step polymerization kinetics; physical, chemical and mechanical characterization methods for polymers; bulk, suspension, solution and emulsion polymerization processes; copolymers; polymerization reactor design and control. Prerequisite: CH E 434 or consent of Instructor. (★3)

### CH E 539 Introduction to Polymer Science and Engineering

□3.5 (*fi 6*) (either term, 3-1s-0). Physical and chemical properties of polymers; polymer characterization; polymer solution thermodynamics; melts, glasses elastomers, and crystalline materials; mechanical properties; processing. Prerequisite: CH E 312 or equivalent and STAT 235 or equivalent, or consent of Instructor. (★3)

### CH E 540 Introduction to Real-Time Computer Applications

□3.8 (*fi 6*) (first term, 3-0-3/2). Introduction to real-time computer hardware and operating systems; data acquisition techniques; supervisory and direct digital control; industrial and laboratory applications. Laboratory will involve student use of Department's real-time digital computer and interfaced applications. Prerequisite: ENCOMP 100 or equivalent. (★3)

### CH E 555 Process Optimization

□3.5 (*fi 6*) (either term, 3-1s-0). Single and multivariable search techniques; linear programming; dynamic programming; EVOP; nonlinear programming. Prerequisites: CH E 314 and MATH 201 or consent of Instructor. (★3)

### CH E 562 Process Modelling and Simulation

□3.8 (*fi 6*) (second term, 3-0-3/2). Modelling of process systems; digital simulation; numerical solutions. Prerequisites: CH E 314 and 446 or equivalent. Prerequisite or corequisite: CH E 434. (★3)

### CH E 564 Process Control

□3.8 (*fi 6*) (second term, 3-0-3/2). Computer process control techniques; discrete-time response of dynamic systems; sampling of continuous signals; Z-transform representation; design of digital feedback controllers; linear and nonlinear system analysis. Prerequisite: CH E 446 or equivalent. (★3)

### CH E 580 Pulp and Paper Manufacture, Chemical Engineering, and Environmental Impact

□3.5 (*fi 6*) (either term, 3-1s-0). This course will describe the resources, processes and chemistry, design and flow sheets, environmental impact, and remediation of pulp and paper manufacture with special reference to Alberta. Prerequisite: CH E 365 or consent of Instructor. (★3)

### CH E 594 Advanced Topics in Chemical Engineering

□3.5 (*fi 6*) (either term, 3-1s-0). An advanced treatment of selected chemical engineering topics of current interest to staff and students. (★3)

## 211.35.2 Graduate Courses

**CH E 612 Advanced Fluid Mechanics**

□3.0 (*fi 6*) (either term, 3-0-0). Potential, boundary layer, viscometrics, and secondary flows; application to multiphase phenomena. (★3)

**CH E 613 Selected Topics in Mass Transfer**

□3.0 (*fi 6*) (second term, 3-0-0). A study of fundamental mass transfer with emphasis on gas-liquid and liquid-liquid systems. (★3)

**CH E 615 Advanced Separation Processes**

□3.0 (*fi 6*) (either term, 3-0-0). Characterization, selection and design of equilibrium and rate-governed separation processes. Topics include capacity and efficiency of mass transfer equipment and process energy requirements. (★3)

**CH E 616 Selected Topics in Fluid Mechanics**

□3.0 (*fi 6*) (either term, 3-0-0). Problems in fluid mechanics associated with polymeric fluids, multiphase systems and flow through porous media. Prerequisite: CH E 612 or consent of Instructor. (★3)

**CH E 617 Colloids and Interfaces**

□3.0 (*fi 6*) (either term, 3-0-0). The emphasis of the course is on the basics of colloid and interfacial phenomena. It is aimed at upper level and graduate students in chemical and mineral engineering, chemistry and geochemistry with an interest in application to the energy sector, mineral processing, materials handling, and chemical industry. (★3)

**CH E 624 Advanced Thermodynamics**

□3.0 (*fi 6*) (first term, 3-0-0). Principles of thermodynamics; properties of homogeneous fluid phases; phase and chemical equilibria; application to industrial problems. (★3)

**CH E 631 Rheology of Polymers and Other Complex Fluids**

□3.0 (*fi 6*) (either term, 3-0-0). General principles of liquid-state rheology. Modelling stress behavior in terms of continuum mechanics. Measurement techniques for nonlinear and viscoelastic properties, in shear and elongational flows. Interpretation of macroscopic properties of polymers in terms of molecular characteristics. Dynamical modelling of polymer chains in solutions and melts. (★3)

**CH E 632 Polymer Melt Processing**

□3.0 (*fi 6*) (either term, 3-0-0). Fluid mechanical fundamentals of melt processing operations. Extrusion, fibre spinning, calendaring, moulding. Incorporation of continuum rheological models into equations of motion to predict behavior of engineering relevance. Description of anomalies arising from melt elasticity and methods of mitigating these. (★3)

**CH E 634 Advanced Chemical Reactor Design**

□3.0 (*fi 6*) (either term, 3-0-0). Design of homogeneous and heterogeneous reactors for isothermal and non-isothermal operation; analysis of rate data; transport processes in heterogeneous catalytic systems. (★3)

**CH E 636 Advanced Chemical Kinetics and Catalysis**

□3.0 (*fi 6*) (either term, 3-0-0). Gas phase reactions; kinetics in liquid solutions; characterization of catalysts; heterogeneous catalysts. (★3)

**CH E 639 Polymer Engineering and Science**

□3.0 (*fi 6*) (either term, 3-0-0). Polymerization; molar mass distributions and measurement; chain conformations; solution thermodynamics; amorphous and crystalline states; physical properties of melts, elastomers, and plastics; melt processing; mechanical properties. (★3)

**CH E 646 Process Dynamics and Computer Process Control**

□3.5 (*fi 6*) (first term, 3-0-3/3). An introductory graduate level course in process dynamics and control. Topics include: dynamic process modelling, simulation, estimation, filtering, multiloop and multivariable control, plus stability and performance analysis. (★3)

**CH E 648 Engineering Applications of Artificial Intelligence**

□3.0 (*fi 6*) (either term, 3-0-0). Review of computer engineering, knowledge processing techniques, problem solving, reasoning, representation, expert system, AI tools and languages, coupling system, knowledge integration, distributed intelligent system, blackboard architecture, common sense system, object-oriented programming, human factors, neural network, engineering applications. (★3)

**CH E 654 Optimization of Process Systems**

□3.0 (*fi 6*) (either term, 3-0-0). Applications of optimization techniques to process design and operation. Multivariable search techniques; linear programming; distribution and critical path networks; nonlinear programming; dynamic programming; integer and mixed programming. Optimization in CAPD programs. (★3)

**CH E 662 Dynamics of Process Systems**

□3.8 (*fi 6*) (second term, 3-0-3/2). Analysis and simulation of the dynamics of chemical engineering systems; process identification techniques; on-line characterization of process dynamics. Prerequisite: CH E 646 or consent of Instructor. (★3)

**CH E 664 Advanced Process Control**

□3.5 (*fi 6*) (first term, 3-0-3/3). Selected topics related to multivariable control: continuous systems, discrete systems, frequency domain analysis, stability and/or robustness and performance. Emphasis will be on current developments in the literature, plus process applications. Prerequisite: CH E 646. (★3)

**CH E 674 Numerical Solutions of Engineering Problems**

□3.0 (*fi 6*) (second term, 3-0-0). Numerical solutions of engineering problems using linear and nonlinear sets of equations, ordinary and partial differential equations. (★3)

**CH E 676 Applied Mathematics**

□3.0 (*fi 6*) (either term, 3-0-0). Application of mathematics to engineering problems with emphasis on operator methods. (★3)

**CH E 683 Graduate Seminar I**

□0.5 (*fi 2*) (either term, 0-1s-0). Discussion of progress and problems in research in Chemical Engineering. (★1)

**CH E 684 Graduate Seminar II**

□0.5 (*fi 2*) (either term, 0-1s-0). Discussion of progress and problems in research in Chemical Engineering. Prerequisite: CH E 683. (★1)

**CH E 685 Graduate Seminar III**

□0.5 (*fi 2*) (either term, 0-1s-0). Discussion of progress and problems in research in Chemical Engineering. Prerequisite: CH E 684. (★1)

**CH E 686 Graduate Seminar IV**

□0.5 (*fi 2*) (either term, 0-1s-0). Discussion of progress and problems in research in Chemical Engineering. Prerequisite: CH E 685. (★1)

**CH E 694 Advanced Topics in Chemical Engineering**

□3.0 (*fi 6*) (either term, 3-0-0). An advanced treatment of selected chemical engineering topics of current interest to staff and students. (★3)

**CH E 696 Special Topics in Process Dynamics and Computer Control**

□3.0 (*fi 6*) (either term, 3-0-0). Advanced treatment of selected topics in process dynamics and/or computer process control of current interest to staff and students. (★3)

**CH E 900 Directed Research Project**

★3 (*fi 6*) (variable).

**211.36 Chemistry**

Department of Chemistry  
Faculty of Science

## 211.36.1 Undergraduate Courses

**CHEM 101 Introductory University Chemistry I**

★3 (*fi 6*) (either term, 3-1s-3). Atomic structure, covalent bonding, thermochemistry, chemical equilibrium, acids and bases, descriptive chemistry of the main-group elements. Prerequisite: Chemistry 30, or equivalent.

**CHEM 102 Introductory University Chemistry II**

★3 (*fi 6*) (either term, 3-1s-3). States of matter and intermolecular forces, solubility and solutions, electrochemistry, thermodynamics, chemical kinetics, bonding and properties of transition-metal complexes. Prerequisite: CHEM 101.

**CHEM 103 Introductory University Chemistry I**

□4.3 (*fi 6*) (either term, 3-1s-3/2). Atomic structure, covalent bonding, thermochemistry, chemical equilibrium, acids and bases, descriptive chemistry of the main-group elements. Prerequisite: Chemistry 30, or equivalent. Note: Restricted to Engineering students only. (★3).

**CHEM 105 Introductory University Chemistry II**

□3.8 (*fi 6*) (either term 3-0-3/2). States of matter and intermolecular forces, solubility and solutions, electrochemistry, thermodynamics, chemical kinetics, bonding and properties of transition-metal complexes. Prerequisite: CHEM 103. Note: Restricted to Engineering students only. (★3).

**CHEM 161 Organic Chemistry I**

★3 (*fi 6*) (first term, 3-0-3). The study of basic molecular structure and reactivity of organic compounds based on their functional groups. Introduction to nomenclature, three dimensional structure, physical properties, and reactivity of compounds of carbon. Functional groups covered will emphasize alkanes, alkenes, alkynes, alkyl halides, alcohols, and some aromatics. Examples will include hydrocarbons (petroleum products), halogenated organic compounds (e.g. pesticides), and polymers of industrial importance which may be found in everyday life. Note: Students with credit in CHEM 101 and 102 normally will proceed to CHEM 261. Such students may enrol in CHEM 161 only if written consent of the Department is obtained. Prerequisite: Chemistry 30 or equivalent.

**CHEM 163 Organic Chemistry II**

★3 (*fi 6*) (second term, 3-0-3). Continuation of the study of structure and

reactivity of functional groups with special emphasis on molecules important to biology (e.g., fats, sugars, medicinal agents, antibiotics, amino acids, proteins, nucleic acids). Functional groups covered will include alcohols, aromatics, carbonyl compounds (aldehydes, ketones, carboxylic acid derivatives) and amines. Molecules found in everyday life (soaps, detergents, fibers, perfumes, and biopolymers) will be discussed. Prerequisite: CHEM 161.

#### **CHEM 211 Quantitative Analysis I**

★3 (*fi 6*) (first term, 3-0-4). Principles, methods, and experimental applications emphasizing solution phase equilibria, titrimetry, volumetric laboratory skills, and evaluation of experimental data. Includes examples of organic and inorganic analysis. Prerequisite: CHEM 100 or 102 or 104.

#### **CHEM 213 Quantitative Analysis II**

★3 (*fi 6*) (second term, 3-0-4). A continuation of CHEM 211 emphasizing the principles, methods, and experimental applications of separation techniques, atomic and molecular spectrometry, electrochemistry, and evaluation of experimental data. Includes examples of organic and inorganic analysis and use of the analytical literature. Prerequisite: CHEM 211

#### **CHEM 241 Inorganic Chemistry I**

★3 (*fi 6*) (second term, 3-0-3). Bonding, structure and chemical properties of inorganic compounds with emphasis on the main group elements. Note: This course may not be taken for credit if credit has already been received in CHEM 330 or 331. For Chemistry Honors and Specialization students only, except by consent of Department. Prerequisites or corequisites: CHEM 273 and CHEM 160/163 or 260/263.

#### **CHEM 261 Organic Chemistry I**

★3 (*fi 6*) (first term, 3-0-3). The correlation of structure and chemical bonding in carbon compounds with the physical properties and chemical reactivity of organic molecules. Discussion will be based on functional groups with emphasis on hydrocarbons and derivatives that contain halogens, oxygen, sulfur, and the hydroxy group. Introduction to stereochemistry, three dimensional structure, reaction mechanisms, especially addition to double bonds, nucleophilic substitution and elimination reactions. Prerequisite CHEM 100, 102, 104 or 105. Note: Students who have obtained credit for CHEM 161 cannot take CHEM 261 for credit. (□4.5)

#### **CHEM 263 Organic Chemistry II**

★3 (*fi 6*) (second term, 3-0-3). Continuation of the structural and chemical properties of the basic functional groups of organic compounds including alkynes, aromatic compounds, aldehydes, ketones, carboxylic acids and their derivatives and amines. Illustration of these functional groups in natural products such as carbohydrates, amino acids and proteins, nucleic acids and lipids. Discussion of the application of spectroscopic methods for the structure determination in simple organic molecules. Prerequisite: CHEM 261. Note: Students who have obtained credit for CHEM 163 cannot take CHEM 263 for credit. (□4.5)

#### **CHEM 271 Energetics of Chemical Reactions**

★3 (*fi 6*) (first term, 3-0-3). A study of the implications of the laws of thermodynamics for transformations of matter including phase changes, chemical reactions, and biological processes. Topics include: thermochemistry; entropy change and spontaneity of processes; activity and chemical potential; chemical and phase equilibria; properties of solutions; simple one- and two-component phase diagrams. The conceptual development of thermodynamic principles and the application of these principles to systems of interest to chemists, biochemists, and engineers will be emphasized. Prerequisites: CHEM 100 or 102 or 104 or 105 and MATH 101 or 115. (□4.5)

#### **CHEM 273 Physical Properties and Dynamics of Chemical Systems**

★3 (*fi 6*) (second term, 3-0-3). A continuation of CHEM 271 in which the physical properties of chemical systems and the dynamics and energetics of chemical processes are discussed. Topics include: colligative properties; electrochemical cells and ion activities, implications for ionic equilibria; kinetic theory and transport properties of gases and liquids; surfaces and colloid chemistry; reaction dynamics, detailed mechanisms of chemical reactions, catalysis. The emphasis will be on the development of principles of physical chemistry and their application to properties and processes of interest to chemistry, biochemists, and engineers. Prerequisite: CHEM 271.

#### **CHEM 275 Physical Properties and Dynamics of Chemical Systems**

□3.8 (*fi 6*) (second term, 3-0-3/2). A continuation of CHEM 271 in which the physical properties of chemical systems and the dynamics and energetics of chemical processes are discussed. Topics include: colligative properties; electrochemical cells and ion activities, implications for ionic equilibria; kinetic theory and transport properties of gases and liquids; surfaces and colloid chemistry; reaction dynamics, detailed mechanisms of chemical reactions, catalysis. The emphasis will be on the development of principles of physical chemistry and their application to properties and processes of interest to chemists, biochemists, and engineers. Prerequisite: CHEM 271 or CH E 343. Note: This course is only available for students in the Faculty of Engineering. (★3)

#### **CHEM 303 Environmental Chemistry I**

★3 (*fi 6*) (first term, 3-0-0). The chemistry of environmental processes.

Atmospheric chemistry; thermal and photochemical reactions of atmospheric gases including oxygen, ozone, hydroxy radical, and oxides of nitrogen and sulfur. Aquatic chemistry; characterization, reactions, and equilibria of dissolved species, water purification treatments. Metals and organohalides in the environment. Risk assessment. Prerequisites: CHEM 100, 102, or 104; CHEM 160, 163, 260, or 263; CHEM 212 or 213.

#### **CHEM 305 Environmental Chemistry II**

★3 (*fi 6*) (second term, 3-0-4). A continuation of CHEM 303 with laboratory applications. Experiments will illustrate and complement the principles and processes taught in CHEM 303 such as adsorption from aqueous solutions, convective/diffusive transport, vapour/solution equilibria, metal ion speciation with soil derived ligands, photochemistry, properties of aerosols, coagulation of colloids, sedimentation, ion exchange, computer modelling of complex systems, trace analysis of pesticides, chemical treatment of hazardous wastes. Quantitative calculations will be emphasized. The lecture component will provide theoretical background for experiments and instrumentation used for chemical measurements. There will be one or more field trips. Prerequisite: CHEM 160, 163, 260 or 263; CHEM 212 or 213 and either CHEM 303 or 273. Note: Restricted to students in the Environmental Physical Sciences and Chemistry (Honors, Specialization, and General Science with concentration in Chemistry) programs.

#### **CHEM 311 Instrumental Analysis for Engineers**

□4.5 (*fi 6*) (second term, 3-0-3). Fundamentals of volumetric, chromatographic, spectrographic, and electrochemical analysis. Volumetric techniques are covered briefly. Instrumental techniques discussed include gas and liquid chromatography, UV and IR spectroscopy, ion-selective electrodes and voltammetry. Emphasis is on the principles of each method, and the nature of matrix and other effects that influence the quality of the data obtained. Reference will be made to applications such as air and water quality, and process analyzers in manufacturing. Prerequisites: CHEM 261 and 271 or CHEM 275 or CH E 343. Note: Restricted to Engineering students only. (★3)

#### **CHEM 313 Instrumentation in Chemical Analysis**

★3 (*fi 6*) (first term, 3-0-4). Instrumentation and analytical applications of spectroscopic, chromatographic and electroanalytical methods are discussed and applied in the laboratory. Prerequisites: CHEM 212 or 213; 273 or 275; ★6 in junior Physics.

#### **CHEM 331 Basic Inorganic Chemistry I**

★3 (*fi 6*) (first term, 3-0-3). Basic bonding, structural principles, and chemical properties of inorganic compounds with emphasis on the main group elements. Note: No credit is available for this course in the Honors and Specialization Chemistry programs. Prerequisite: CHEM 100, 102, or 104; CHEM 160, 163, 260, or 263.

#### **CHEM 332 Basic Inorganic Chemistry II**

★3 (*fi 6*) (second term, 3-0-3). A continuation of CHEM 331 with emphasis on the bonding, structure, properties, and reactions of transition metal complexes and their organometallic derivatives. Note: Students in the General program wishing to transfer into Specialization or Honors Chemistry programs will be given ★3 for CHEM 331 and CHEM 332 and must take CHEM 341 to satisfy the requirements of these programs Prerequisite: CHEM 331.

#### **CHEM 341 Inorganic Chemistry II**

★3 (*fi 6*) (first term, 3-0-3). A continuation of CHEM 241 with emphasis on the transition metals. Note: For Chemistry Honors and Specialization students only, except by consent of Department. Prerequisites: CHEM 241; or CHEM 330; or CHEM 332 and consent of Department.

#### **CHEM 361 Organic Chemistry**

★3 (*fi 6*) (first term, 3-0-4). Mechanisms and reactions of aromatic and aliphatic compounds. Prerequisites: CHEM 100, 102, or 104; CHEM 160, 163, 260, or 263.

#### **CHEM 363 Organic Chemistry**

★3 (*fi 6*) (second term, 3-0-4). A continuation of CHEM 361. Prerequisite: CHEM 361.

#### **CHEM 375 Atoms, Molecules, and Electromagnetic Radiation**

★3 (*fi 6*) (second term, 3-0-0). A course dealing with atoms, molecules and electromagnetic radiation, and spectroscopic and photochemical applications of their interaction. The emphasis is on the qualitative appreciation of the phenomena and their uses. No credit is available for this course in Honors or Specialization Chemistry Programs. Prerequisites: CHEM 273 and ★6 of junior physics.

#### **CHEM 381 Introduction to Quantum Chemistry**

★3 (*fi 6*) (first term, 3-0-4) The methods of quantum mechanics are introduced and applied to simple systems related to chemistry. After the essential results of quantum mechanics are outlined, the discussion of atomic and molecular structure will guide the student from the hydrogen atom through many-electron atoms and the hydrogen molecular ion to the first neutral molecule—the diatomic hydrogen molecule. The laboratory portion of the course consists of practical applications enriching and illustrating the lecture material, and incorporates the use of computers as a routine aid to processing experimental results. Prerequisites: CHEM 273; MATH 215; and PHYS 238.

**CHEM 383 Elements of Molecular Structure and Spectroscopy**

★3 (fi 6) (second term, 3-0-4). The course is a continuation of CHEM 381 and introduces the student to the practical applications of quantum chemistry. The subjects will include: molecular orbital theories of the electronic structure of larger molecules, rotational spectroscopy, rotation-vibration spectroscopy, electronic spectroscopy of atoms and molecules, and magnetic resonance spectroscopy. Next, by using elements of statistical thermodynamics, the student will learn about the relation between the macroscopic thermodynamic properties of molecular systems, enthalpy, entropy and Gibbs free energy, and the microscopic molecular properties, energy levels. Prerequisite: CHEM 381.

**CHEM 400 Industrial Internship Practicum**

★3 (fi 6) (first term, 0-3s-0). Required by all students who have just completed a Chemistry 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 demonstrated in an oral presentation. This course cannot be used in place of a senior-level CHEM option. Prerequisite: WKEXP 402.

**CHEM 401 Introduction to Chemical Research**

★3 (fi 6) (either term, 0-1s-8). Introduction to methods of chemical research. For students in the fourth year of Honors or Specialization Chemistry. Prerequisites: A 300-level Chemistry course and a GPA of at least 7.0 in all chemistry courses.

**CHEM 403 Chemical Research**

★3 (fi 6) (either term, 0-1s-8). Investigational work under the direction of a member of the Department. Prerequisite or corequisite: CHEM 401.

**CHEM 405 Special Topics in Chemistry**

★3 (fi 6) (either term, 3-0-3). Prerequisite: A 300-level Chemistry course.

**CHEM 407 Computing Applications in Chemistry**

★3 (fi 6) (second term, 3-0-3/2). Prerequisite: MATH 215. Corequisite: CHEM 383.

**CHEM 413 Electronics for Scientists**

★3 (fi 6) (second term, 3-0-3). An intensive, practical course with emphasis on basic instrument components, operational amplifiers, digital circuits, and other electronic components of modern research instruments. Prerequisites: A 300-level Chemistry course and consent of Department.

**CHEM 415 Analytical Electrochemistry**

★3 (fi 6) (second term, 3-0-3). Theory and application of polarography, potentiometry, cyclic voltammetry, and other modern electroanalytical techniques. Prerequisite: CHEM 313.

**CHEM 417 Analytical Spectroscopy**

★3 (fi 6) (second term, 3-0-3). Optical spectrochemical measurement systems are discussed including dispersive and interferometric spectrometers, detectors, lasers, readout systems and data processing. Techniques covered include all optical methods for analytical emission, absorption, luminescence and scattering measurements on atomic and molecular systems from the far-IR to the vacuum ultraviolet. Prerequisite: CHEM 313.

**CHEM 419 Advanced Analytical Chemistry**

★3 (fi 6) (first term, 3-0-0). Topics covered in this course include an introduction to biomolecules, electrophoresis and biological-scale chromatography, protein and peptide sequence analysis, immunological essays, and DNA sequence analysis. Statistical interpretation of typical results will be incorporated in the material. Prerequisites: CHEM 212 or 213; 260 (or 160) or 263 (or 163); 273; and a 300-level Chemistry course.

**CHEM 421 Analytical Separations**

★3 (fi 6) (first term, 3-0-3). Theory and practice of gas and liquid chromatography, including column properties, adsorption, ion exchange, bonded phases, size exclusion, bandbroadening and detectors. Prerequisites: CHEM 313 and consent of Department.

**CHEM 433 Structure in the Solid State**

★3 (fi 6) (first term, 3-0-0). An introduction to X-ray crystallography. Prerequisite: CHEM 341.

**CHEM 437 Transition Metal Chemistry**

★3 (fi 6) (second term, 3-0-0). The synthesis, structures, bonding and reaction mechanisms of classical and organometallic complexes. Prerequisite: CHEM 341.

**CHEM 439 Inorganic Reaction Mechanisms**

★3 (fi 6) (first term, 3-0-0). Substitution and electron transfer reactions of transition metal ion compounds. Prerequisite: CHEM 341.

**CHEM 461 Qualitative Organic Analysis**

★3 (fi 6) (second term, 3-0-4). Introduction to techniques used in organic chemical research for separation (purification) and identification (structure elucidation). Special emphasis on combined use of modern spectroscopic methods. Prerequisite: CHEM 363.

**CHEM 463 Chemistry of Carbohydrates**

★3 (fi 6) (either term, 3-0-0). The physical and chemical properties of the carbohydrates and related substances are discussed in terms of conformational analysis and modern reaction theory. An appreciation of the organic chemistry derived from studies of polyoxygenated compounds. Prerequisite or corequisite: CHEM 363.

**CHEM 465 Theoretical Organic Chemistry**

★3 (fi 6) (first term, 3-0-0). A discussion of bonding and mechanisms of reactions of organic molecules, including resonance and reactive intermediates. Prerequisites: CHEM 273 and 363 or consent of Instructor.

**CHEM 467 Advanced Organic Synthesis**

★3 (fi 6) (second term, 3-0-0). A study of the reactions of organic compounds with emphasis on advanced synthetic methods. Prerequisites: CHEM 363 and consent of Department.

**CHEM 469 Natural Products**

★3 (fi 6) (first term, 3-0-0). Structural relationships among secondary metabolites; bio-synthetic pathways, rearrangements and chemical transformations of acetogenins, alkaloids, flavonoids and isoprenoids. Prerequisite: CHEM 363.

**CHEM 477 Symmetry and Spectroscopy of Polyatomic Molecules**

★3 (fi 6) (either term, 3-0-0). The application of the principles of molecular symmetry to molecular properties. Topics include group theory with emphasis on vibrational motion and normal vibrations; quantum mechanics of vibration and rotation; magnetic resonance spectroscopy; perturbation methods; selection rules in rotational, infrared, and Raman spectroscopy; molecular symmetry and molecular orbitals; electronic spectroscopy of polyatomic molecules. Prerequisite: CHEM 383.

**CHEM 479 Molecular Kinetics**

★3 (fi 6) (second term, 3-0-0). Rate laws for simple and complex reactions, reaction mechanisms, potential energy surfaces, molecular dynamics, theories of reaction rates, catalysis, with application to gas and liquid phase reactions, photochemical reactions in chemistry and biology, and enzyme catalysis. Prerequisites: CHEM 273, MATH 215, PHYS 238, and a 300-level Chemistry course.

**CHEM 481 Chemical Thermodynamics**

★3 (fi 6) (second term, 3-0-0). A continuation of chemical thermodynamics which enlarges upon the basic material in CHEM 271 and 273. Prerequisites: CHEM 273, MATH 215, PHYS 238, and a 300-level Chemistry course.

**CHEM 483 Magnetic Resonance and Its Chemical Applications**

★3 (fi 6) (second term, 3-0-0). A course on the theory of magnetic resonance spectroscopy and some of its applications to chemical systems. The curriculum includes: (1) a cursory discussion of first order NMR spectra; (2) quantum mechanics of spin systems and a quantum description of magnetic resonance experiments—the Bloch equations; (3) relaxation effects; (4) Fourier transform spectroscopy; (5) chemical exchange effects; (6) nuclear Overhauser effects; and (7) two-dimensional NMR. Prerequisite: CHEM 383.

**CHEM 491 Radiation Chemistry**

★3 (fi 6) (first term, 3-0-0). Interaction of radiation with matter, kinetics of radiolysis reactions. Prerequisites: CHEM 273, a 300-level Chemistry course, and consent of Department.

**CHEM 493 Introduction to Computational Quantum Chemistry**

★3 (fi 6) (first term, 3-0-0). Applications are stressed in this course which introduces the student to contemporary computational quantum chemistry to the Hartree-Fock limit, using state-of-the-art computer codes running on UNIX workstations. Elementary introduction to the UNIX operating system is given. The subjects include: optimization of the geometry of molecules; Prediction of molecular properties; calculation of infra-red and Raman spectra; solvent effects; thermochemistry of chemical reactions. Assignments in the course will allow the student to use advanced workstations and computer codes. Prerequisites: CHEM 383. Offered in alternate years.

**211.36.2 Graduate Courses****CHEM 502 Departmental Research Seminar**

★0 (fi 4) (full session, 0-2s-0).

**CHEM 504 Advanced Research Seminar**

★0 (fi 4) (full session, 0-2s-0).

**CHEM 523 Special Topics in Advanced Analytical Chemistry**

★3 (fi 6) (either term, 3-0-0).

**CHEM 531 Organometallic Chemistry**

★3 (fi 6) (second term, 3-0-0).

**CHEM 541 Spectroscopic Techniques in Inorganic Chemistry**

★3 (fi 6) (either term, 3-0-0).

**CHEM 543 The Chemistry of the Main Group Elements**

★3 (fi 6) (second term, 3-0-0).

**CHEM 557 Free Radical Reactions in Organic Chemistry**★3 (*fi 6*) (second term, 3-0-0).**CHEM 563 Heterocyclic Chemistry**★3 (*fi 6*) (second term, 3-0-0).**CHEM 581 Special Topics in Physical Chemistry**★3 (*fi 6*) (second term, 3-0-0). Prerequisite: consent of Department.**CHEM 583 Advanced Computational Chemistry of Molecules**

★3 (*fi 6*) (second term, 3-0-0). The course will focus on the practical applications of accurate methods for the study of molecular structure and properties, using modern computer codes running on UNIX workstations. The methods discussed and used will allow for the treatment of electron correlation, which is essential in studies of chemical processes which involve breaking and making chemical bonds and in the accurate description of excited states of molecules and ions. Assignments in the course will allow the student to use advanced workstations and commuter codes. Prerequisite: CHEM 493. Offered in alternate years.

**CHEM 585 Infrared and Raman Spectroscopy**★3 (*fi 6*) (second term, 3-0-0). Prerequisite: CHEM 493 or equivalent.**CHEM 599 Chemical Applications of Mass Spectrometry**★3 (*fi 6*) (second term, 3-0-0).**211.37 Chimie**

Faculté Saint-Jean

**CHIM 101 Introduction à la chimie I**

★3 (*fi 6*) (premier semestre, 3-1s-3). Stoechiométrie, gaz parfaits, thermo-chimie, équilibre chimique, acides et bases, structure atomique et liaison chimique. Prérequis: Chimie 30 ou l'équivalent.

**CHIM 102 Introduction à la chimie II**

★3 (*fi 6*) (deuxième semestre, 3-1s-3). Solubilité, cellule électrochimique et équation de Nerst, cinétique chimique, modes de liaison et structure, chimie des éléments de transition. Prérequis: CHIM 101.

**CHIM 161 Chimie organique I**

★3 (*fi 6*) (premier semestre, 3-0-3). Etude de la structure moléculaire et de la réactivité des composés organiques basée sur leurs groupes fonctionnels. Nomenclature, structure tridimensionnelle, propriétés physiques et réactivité de composés de carbone. L'accent sera mis sur les hydrocarbures (produits pétroliers) les composés organiques halogénés (pesticides), et les polymères d'importance industrielle que l'on retrouve dans la vie de tous les jours. Note: les étudiants ayant des crédits en CHIM 101 et 102 devront normalement suivre CHIM 261. Prérequis: Chimie 30 ou l'équivalent.

**CHIM 163 Chimie organique II**

★3 (*fi 6*) (deuxième semestre, 3-0-3). Continuation de l'étude de la structure et réactivité des groupes fonctionnels avec accent sur les molécules importantes en biologie (corps gras, sucres, médicaments, amino-acides, protéines, acides nucléiques) aussi bien que les molécules de tous les jours (savons, détergents, fibres, parfums et biopolymères). Prérequis: CHIM 161.

**CHIM 261 Chimie organique I**

★3 (*fi 6*) (premier semestre, 3-0-3). Etude de la structure moléculaire et de la réactivité des composés organiques basée sur leurs groupes fonctionnels. Nomenclature, structure tridimensionnelle, propriétés physiques et réactivité de composés de carbone. L'accent sera mis sur les hydrocarbures (produits pétroliers), composés organiques halogénés (pesticides), et les polymères d'une importance industrielle que l'on retrouve dans la vie de tous les jours. Détermination des structures des composés organiques. Note: ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits en CHIM 161. Prérequis: CHIM 100 ou 102 ou 104.

**CHIM 263 Chimie organique II**

★3 (*fi 6*) (deuxième semestre, 3-0-3). Continuation de l'étude de la structure et réactivité des groupes fonctionnels avec accent sur les molécules importantes en biologie (corps gras, sucres, médicaments, amino-acides, protéines, acides nucléiques) aussi bien que les molécules de tous les jours (savons, détergents, fibres, parfums et biopolymères). Note: ce cours n'est pas accessible aux étudiants ayant ou postulant des crédits en CHIM 163. Prérequis: CHIM 261.

**211.38 Chinese**Department of East Asian Studies  
Faculty of Arts**211.38.1 Undergraduate Courses**

**Note:** Those students wishing to major in Chinese are strongly encouraged to start with the intensive courses. The following courses with

the exception of CHINA 211, 212, 311, and 312 are designed primarily for students whose first language is not Chinese, and are not open to students with credit in matriculation-level Chinese.

**CHINA 100 Intensive Chinese I**

★6 (*fi 12*) (either term, 0-10L-0). An intensive introduction to Mandarin Chinese. This course is equivalent to CHINA 101/102. Normally students proceed from CHINA 100 to 200. CHINA 100 and 101/102 may not both be taken for credit.

**CHINA 101 Non-Intensive Chinese I**

★3 (*fi 6*) (either term, 0-5L-0). A non-intensive introduction to Mandarin Chinese. CHINA 100 and 101 may not both be taken for credit.

**CHINA 102 Non-Intensive Chinese II**

★3 (*fi 6*) (either term, 0-5L-0). A continuation of CHINA 101. Prerequisite: CHINA 101. CHINA 100 and 102 may not both be taken for credit.

**S CHINA 180 Basic University Chinese I**

★3 (*fi 6*) (either term, 0-5L-0). A course designed for students with some prior knowledge of spoken Mandarin Chinese but needing training in reading and writing. Note: Not open to students with credit in CHINA 100, 101, or 102. Prerequisite: consent of Department.

**S CHINA 200 Intensive Chinese II**

★6 (*fi 12*) (second term, 0-10L-0). A continuation of CHINA 100. CHINA 200 and 201/202 may not both be taken for credit. Prerequisite: CHINA 100 or 102. Formerly CHINA 300.

**D CHINA 201 Non-Intensive Chinese III**

★3 (*fi 6*) (either term, 0-5L-0). A continuation of CHINA 101/102. The course is designed to develop further basic skills in spoken and written Chinese. CHINA 200 and 201 may not both be taken for credit. Prerequisite: CHINA 100 or 102. CHINA 201/202 is roughly the equivalent of CHINA 200. Note: Not open to students with credit in CHINA 303. Formerly CHINA 303. Formerly CHINA 301.

**D CHINA 202 Non-Intensive Chinese IV**

★3 (*fi 6*) (either term, 0-5L-0). A continuation of CHINA 101/102. The course is designed to develop further basic skills in spoken and written Chinese. CHINA 200 and 202 may not both be taken for credit. Prerequisite: CHINA 100 or 102. CHINA 201/202 is roughly the equivalent of CHINA 200. Note: Not open to students with credit in CHINA 303. Formerly CHINA 303.

**S CHINA 211 Modern Standard Chinese for Those Proficient in Other Dialects I**

★3 (*fi 6*) (first term, 3-0-1). This course is designed for speakers proficient in one of the regional dialects of Chinese to gain fluency in the standard language. Prerequisite: Proficiency in any of the regional dialects of China. Note: Open only to students with a background in Chinese language. Formerly CHINA 311.

**S CHINA 212 Modern Standard Chinese for Those Proficient in Other Dialects II**

★3 (*fi 6*) (second term, 3-0-1). Continuation of CHINA 211. Prerequisite: CHINA 211. Note: Open only to students with a background in Chinese language. Formerly CHINA 312.

**S CHINA 225 Calligraphy I**

★3 (*fi 6*) (either term, 3-0-0). Introduction to the history of Chinese calligraphy and related cultural aspects. Emphasis on techniques of brush writing. Note: CHINA 225 and JAPAN 225 may not both be taken for credit. Lectures in English. No prerequisite. Note: This course will not fulfil the Language other than English requirement of the BA degree. Formerly CHINA 325.

**S CHINA 226 Calligraphy II**

★3 (*fi 6*) (either term, 3-0-0). A continuation of CHINA 225. Prerequisite: CHINA 225. Note: CHINA 226 and JAPAN 226 may not both be taken for credit. Note: This course will not fulfil the Language other than English requirement of the BA degree. Formerly CHINA 326.

**S CHINA 230 Heritage of China: Texts and Context**

★3 (*fi 6*) (either term, 3-0-0). An introductory level course designed to acquaint students with themes and ideas revealed in literature that are central to the Chinese perspective. Note: This course will not fulfil the Language other than English requirement of the BA degree.

**CHINA 250 The Chinese Language in its Cultural Setting I**

★6 (*fi 12*) (0-15L-0). (Intercession abroad only). Oral immersion course to be studied abroad. Designed for improvement of oral/aural skills at senior elementary level. Prerequisites: CHINA 100 and 200 or consent of Department. Formerly CHINA 350.

**S CHINA 280 Basic University Chinese II**

★3 (*fi 6*) (either term, 0-5L-0). A continuation of CHINA 180. Note: Not open to students with credit in CHINA 200, 201, or 202. Upon the completion of CHINA 280 students may proceed to CHINA 301. Prerequisite: CHINA 180.

**D CHINA 301 Intermediate Chinese I**

★3 (*fi 6*) (first term, 0-4L-0). Continuing study of spoken and written modern standard Chinese. Conversation and composition are integrated with reading

and discussion of texts of modern Chinese prose, fiction, and other kinds of writing. Prerequisite: CHINA 200, 202, or 280.

**D CHINA 302 Intermediate Chinese II**

★3 (fi 6) (second term, 0-4L-0). A continuation of CHINA 301. Prerequisite: CHINA 301.

**S CHINA 318 Business Chinese: Language and Culture**

★3 (fi 6) (either term, 3-0-0). Intermediate level of modern standard Chinese with emphasis on the vocabulary and communication style of the Chinese business world. Prerequisite: CHINA 200, 202, or 280.

**S CHINA 323 Early Literature in English Translation I**

★3 (fi 6) (either term, 3-0-0). Chinese literature from earliest times through the Tang dynasty. Lectures in English. No prerequisite. Note: This course will not fulfill the Language other than English requirement of the BA degree.

**S CHINA 324 Early Literature in English Translation II**

★3 (fi 6) (either term, 3-0-0). Chinese literature from the Song through the Qing Dynasties. Lectures in English. No prerequisite. Note: This course will not fulfill the Language other than English requirement of the BA degree.

**S CHINA 327 Modern Literature in English Translation I**

★3 (fi 6) (either term, 3-0-0). Chinese literature from 1912 to 1949. Lectures in English. No prerequisite. Note: This course will not fulfill the Language other than English requirement of the BA degree.

**S CHINA 328 Modern Literature in English Translation II**

★3 (fi 6) (either term, 3-0-0). Chinese literature from 1949 through the present. Lectures in English. No prerequisite. Note: This course will not fulfill the Language other than English requirement of the BA degree.

**S CHINA 341 Introduction to Classical Chinese I**

★3 (fi 6) (first term, 3-0-0). An introduction to the syntax and semantic structures of classical Chinese. Prerequisite: CHINA 200 or 202.

**S CHINA 342 Introduction to Classical Chinese II**

★3 (fi 6) (second term, 3-0-0). A continuation of CHINA 341. Prerequisite: CHINA 341.

**CHINA 350 The Chinese Language in its Cultural Setting II**

★6 (fi 12) (0-15L-0). (Intersession abroad only). Oral immersion course to be studied abroad. Designed for improvement of oral/aural skills at senior intermediate level. Prerequisites: CHINA 302 and 306, or consent of Department. Formerly CHINA 450.

**S CHINA 407 Advanced Chinese: Film and Drama**

★3 (fi 6) (either term, 3-0-0). Further development of language skills through study of film and drama. Prerequisite: CHINA 302.

**S CHINA 408 Advanced Chinese: Modern Fiction**

★3 (fi 6) (either term, 3-0-0). Further development of language skills through reading of texts of modern Chinese fiction selected from the May Fourth period down to the present. Prerequisite: CHINA 302.

**S CHINA 413 Advanced Chinese: Readings in the Humanities and the Social Sciences**

★3 (fi 6) (either term, 3-0-0). Writings in the Chinese humanities and social sciences by modern scholars. Prerequisite: CHINA 302.

**S CHINA 414 Readings in Traditional Vernacular Literature**

★3 (fi 6) (either term, 3-0-0). Designed to familiarize the students with both language and the literary conventions used in fiction and drama. Prerequisite: CHINA 302.

**S CHINA 423 Survey of Classical Chinese Poetry**

★3 (fi 6) (either term, 3-0-0). Readings in classical Chinese poetry with emphasis on tradition, form and technique. Readings and lectures in English. Prerequisite: Any 300-level literature course.

**S CHINA 425 Survey of Post-Mao Fiction**

★3 (fi 6) (either term, 3-0-0). A discussion of the major literary trends as well as the fictional works of important writers who have emerged in the post-Mao era (since 1976). Readings and lectures in English. Prerequisite: Any 300-level literature course or consent of Department.

**S CHINA 429 Translation: Chinese to English I**

★3 (fi 6) (either term, 3-0-0). Theory and practice of translation. Prerequisite: CHINA 402 and/or 406 or consent of Department.

**S CHINA 441 Classical Chinese I**

★3 (fi 6) (first term, 3-0-0). Continuing study of the syntactic, lexical and stylistic forms used in classical Chinese texts. Prerequisite: CHINA 342.

**S CHINA 442 Classical Chinese II**

★3 (fi 6) (second term, 3-0-0). A continuation of CHINA 441. Prerequisite: CHINA 441.

**S CHINA 451 Topics in Early Fiction**

★3 (fi 6) (either term, 3-0-0). A critical analysis of form and themes in pre-1911 fiction. Lectures and readings in Chinese. Prerequisite: consent of Department.

**S CHINA 452 Topics in Modern Literature**

★3 (fi 6) (either term, 3-0-0). A critical study of topics chosen from

contemporary prose, poetry, and drama. Lectures and readings in Chinese. Prerequisite: consent of Department.

**S CHINA 455 Topics in Taiwan Literature**

★3 (fi 6) (either term, 3-0-0). Readings in Taiwan literature with emphasis on tradition, theme, and technique. Lectures and readings in Chinese. Not open to students in CHINA 426. Prerequisite: CHINA 302.

**S CHINA 481 Supervised Reading in Chinese I**

★3 (fi 6) (either term, 3-0-0). Accelerated reading course primarily for senior or graduate students in special areas of need or interest. Prerequisite: Written consent of Department.

**S CHINA 482 Supervised Reading in Chinese II**

★3 (fi 6) (either term, 3-0-0). Further accelerated reading for senior and graduate students. Prerequisite: Written consent of Department.

## 211.38.2 Graduate Courses

**CHINA 501 Methods of Research—Pre-Modern**

★3 (fi 6) (first term, 3-0-0). Sinology; historical and critical approaches to pre-modern Chinese literature. A reading knowledge of Chinese is required.

**CHINA 502 Methods of Research—Modern**

★3 (fi 6) (second term, 3-0-0). Sinology; historical and critical approaches to modern Chinese literature. A reading knowledge of Chinese is required.

**CHINA 551 Topics in Traditional Chinese Fiction**

★3 (fi 6) (either term, 3-0-0). A critical analysis of form and themes in pre-1911 fiction. A reading knowledge of Chinese is required.

**CHINA 552 Topics in Modern Chinese Literature**

★3 (fi 6) (either term, 3-0-0). Major literary trends and contemporary literature from post-Mao China and Taiwan. Lectures and readings in Chinese.

**CHINA 554 Topics in Classical Chinese Poetry**

★3 (fi 6) (either term, 3-0-0). Readings in classical Chinese Poetry with emphasis on tradition, form and technique. Readings and lectures in Chinese.

**CHINA 555 Topics in Classical Chinese Prose**

★3 (fi 6) (either term, 3-0-0). Readings in classical Chinese prose with emphasis on tradition, form and technique. Readings and lectures in Chinese.

**CHINA 599 Topics in Chinese Literature**

★3 (fi 6) (either term, 3-0-0). Survey of major topics in Chinese literature, pre-modern and modern. CHINA 599 must be taken at least once and may be repeated for credit when course content differs. A reading knowledge of Chinese is required.

## 211.39 Christian Theology

St Joseph's and St Stephen's Colleges

**Note:** The following courses can be used as Arts options.

### 211.39.1 St Joseph's College (from within the Roman Catholic Tradition)

**S CHRTC 100 The Bible and the Origins of the Christian Church**

★3 (fi 6) (either term, 3-0-0). A study of the basic themes of the Christian bible; creation and covenant; sin and evil; the biblical history of ancient Israel; the prophets and justice; the preaching, death, and resurrection of Jesus Christ; redemption; the emergence of the Church.

**S CHRTC 172 Introduction to Catholic Moral Thought**

★3 (fi 6) (either term, 3-0-0). An introduction to the major themes in Catholic moral reflection with application to some contemporary issues. The meaning of morality and Christian conversion; the role of experience, the Bible, the Church, moral norms, the development of conscience, and personal responsibility. Formerly CHRTC 272.

**S CHRTC 264 Dimensions of the Christian Faith**

★3 (fi 6) (either term, 3-0-0). What is Christianity? An introduction to the major dimensions of Christianity, such as revelation, faith, Scripture, God, Jesus as Lord and Saviour, with reflection on them in light of contemporary human experience. Formerly CHRTC 364.

**S CHRTC 266 Jesus in the New Testament**

★3 (fi 6) (either term, 3-0-0). Exploring the person of Jesus through studying the four Gospels, Paul, and later New Testament writers, with reflection on such recent approaches as liberation theology, feminist exegesis, and the Jesus-seminar.

**S CHRTC 270 The Catholic Church Today**

★3 (fi 6) (either term, 3-0-0). A study of how the Catholic Church understands itself today, its relationships with other Christians and with non-Christians, and its role in the contemporary world. Formerly CHRTC 370.

**S CHRTC 292 Spirituality for Today's Christian**

★3 (fi 6) (either term, 3-0-0). Developing an understanding of the role of

prayer, leisure, and work within a Christian lifestyle in the light of Scripture, Christian tradition, current theological reflection, and personal differences.

**S CHRTC 296 History of the Church from its Beginning to Luther**

★3 (fi 6) (either term, 3-0-0). A survey of the development of the Church and of its influence on society from its beginning until the Reformation.

**S CHRTC 297 The History of Christianity**

★3 (fi 6) (either term, 3-0-0). A lecture and discussion course about the development of one of the leading religious traditions in the world. Not open to students who have successfully completed HIST 297.

**S CHRTC 298 History of the Church from the Reformation to the Present**

★3 (fi 6) (either term, 3-0-0). A survey of the development of the Church and of its influence on society from the Protestant and Catholic Reformations until the present.

**CHRTC 340 The Reformation: Conflict in the Church in the Sixteenth Century**

★3 (fi 6) (either term, 3-0-0). An historical study of the sources and consequences of the Protestant and Catholic Reformations. Note: consent of the College required for students with credit in HIST 404. Not to be taken by students with credit in CHRTC 344.

**S CHRTC 342 The Early Church**

★3 (fi 6) (either term, 3-0-0). The historical development of the early Church and its institutions until the establishment of the papal states in the eighth century.

**S CHRTC 343 The Medieval Church**

★3 (fi 6) (either term, 3-0-0). The historical development of the Church and its institutions from the time of Charlemagne until the Council of Trent in the 16th century.

**S CHRTC 345 The Church in the Age of Reason and Revolution**

★3 (fi 6) (either term, 3-0-0). An historical study of the Church's struggle with revolution, secularism, liberalism, nationalism, and scientism from the 17th to the 19th centuries: the missionary expansion of the Church. Note: Not to be taken by students with credit in CHRTC 346.

**S CHRTC 347 The Church in the Modern Age**

★3 (fi 6) (either term, 3-0-0). An historical study of the Church's struggle in the 20th century with political and social movements such as industrialization, modernism, democratization, totalitarianism.

**S CHRTC 348 The Church in Canada**

★3 (fi 6) (either term, 3-0-0). An historical study of the Church in Canada from colonialization until the present.

**S CHRTC 349 Christianity and Social Justice in Canada**

★3 (fi 6) (either term, 3-0-0). An examination of particular social justice issues related to the economy, women, native peoples, the environment, etc., in light of Catholic social teachings and other Christian perspectives; social action strategies, and education for social justice.

**S CHRTC 351 The Christian Meaning of Sex and Marriage**

★3 (fi 6) (either term, 3-0-0). Questions of meaning and morality concerning human sexuality and marriage, including love, non-marital sex, divorce, parenthood, and gender roles, considered in light of human experience. Scripture, Christian Tradition, Catholic Church teaching, and contemporary theological discussion.

**S CHRTC 352 Bioethical Problems: Christian Perspectives**

★3 (fi 6) (either term, 3-0-0). Ethical questions concerning euthanasia, allowing to die, abortion, reproductive technologies, transplants, genetic engineering, scarce medical resources, animal and human research, considered in light of Catholic and other contemporary perspectives.

**S CHRTC 354 The Gospels of Matthew, Mark, and Luke**

★3 (fi 6) (either term, 3-0-0). A comparison of the Gospels of Matthew, Mark, and Luke to determine their theological and pastoral orientations in proclaiming the Jesus tradition to the developing Christian communities. Not open to students with credit in CHRTC 355 or 356 or 357.

**S CHRTC 358 John the Evangelist and his School**

★3 (fi 6) (either term, 3-0-0). An introduction to the themes and structure of the fourth Gospel, the development of the Church evidenced in John's letters, and the place of the Book of Revelation in the Christian life.

**S CHRTC 362 The Hebrew Bible as a Theological Source**

★3 (fi 6) (either term, 3-0-0). A study of the Hebrew Scriptures (Old Testament), their relationship to the Christian Scriptures (New Testament), and their use in Christian theology.

**S CHRTC 371 The Sacraments**

★3 (fi 6) (first term, 3-0-0). The role of the sacraments in Christian life and worship. The sacraments as mysteries of salvation and as community celebrations. Relationships among the various sacraments. Historical development and current understandings of specific sacramental rites.

**S CHRTC 372 The Eucharist in Christian Worship**

★3 (fi 6) (either term, 3-0-0). A theological study of the development of Catholic Eucharistic liturgy from Jewish foundations to the present. The meaning of the Eucharist. Contemporary theological developments in the liturgy in theory and practice.

**S CHRTC 374 Great Minds of Early Christianity**

★3 (fi 6) (either term, 3-0-0). Development in Christian thought during the early centuries of Christianity. Formulation of statements of belief. Early encounters of Christianity with the philosophical and religious thought of the ancient world.

**S CHRTC 376 The Development of Christian Thought**

★3 (fi 6) (either term, 3-0-0). The development of Christian thought as seen in the writings of selected Christian thinkers such as Chrysostom, Augustine, Thomas Aquinas, Catherine of Sienna, Teresa of Avila, Martin Luther, and John Henry Newman.

**S CHRTC 379 Eastern Christian Churches in Communion with Rome**

★3 (fi 6) (either term, 3-0-0). An introduction to the theology and liturgy of Eastern Christianity in communion with Rome with special attention to the Ukrainian Church.

**S CHRTC 380 Christian Religious Education and the Child**

★3 (fi 6) (either term, 3-0-0). Key themes relevant to the faith life of children: the presence of God, a sense of belonging, the need for community. Prayer, scripture, liturgical celebration and sacraments, the church as faith community, and social responsibility in relation to the child's life experience.

**S CHRTC 381 Christian Religious Education and the Adolescent/Young Adult**

★3 (fi 6) (either term, 3-0-0). Key themes relevant to the faith search of adolescents/young adults: the life and teaching of Jesus, the challenge of the Good News in our culture, and the meaning of belonging and commitment to Church. The roles of school, family, and parish in religious education and the development of a faith nurturing school culture. Curriculum related areas of study will include: Christ, scripture, sacrament, church, morality, and social responsibility.

**S CHRTC 392 Women's Perspectives and Catholic Theology**

★3 (fi 6) (either term, 3-0-0). The influence of various women's perspectives on the development of Catholic thought and action in the 20th century.

**S CHRTC 394 Theological and Ethical Concerns in Business**

★3 (fi 6) (either term, 3-0-0). A theological study of ethical issues in business settings, dealing with such themes as employer-employee relations, job security, advertising, distribution of wealth, acquisitive individualism, the common good; decisions on ethical issues in light of contemporary Catholic teaching.

**S CHRTC 396 Theology and the Environment**

★3 (fi 6) (either term, 3-0-0). A theological study of ethical issues concerning our human relationship to the planet earth: responsible stewardship, non-renewable resources, pollution, the use of technology.

**S CHRTC 398 Christianity and Modern Spiritual Movements**

★3 (fi 6) (either term, 3-0-0). A theological examination of such modern responses to the Christian calling as Charismatic Renewal, Marriage Encounter, movements of justice and liberation, and of such contemporary expressions of the search for spiritual meaning as Creation Spirituality, New Age.

**S CHRTC 400 Topics in Christian Theology**

★3 (fi 6) (either term, 3-0-0). Prerequisite: CHRTC 264 or consent of the College.

**S CHRTC 401 Topics in Moral Theology**

★3 (fi 6) (either term, 3-0-0). Prerequisite: One of CHRTC 172, 351, 352, or consent of the College.

**S CHRTC 403 Topics in Christian Spirituality**

★3 (fi 6) (either term, 3-0-0). Prerequisite: CHRTC 292 or consent of the College.

**S CHRTC 404 Topics in Christian Liturgy**

★3 (fi 6) (either term, 3-0-0). Prerequisite: One of CHRTC 371, 372, 379, or consent of the College.

**S CHRTC 405 Topics in Biblical Theology**

★3 (fi 6) (either term, 3-0-0). Prerequisite: One of CHRTC 100, 266, 362, or consent of the College.

**S CHRTC 407 Topics in Christian Religious Education**

★3 (fi 6) (either term, 3-0-0). Prerequisite: CHRTC 380 or 381 or consent of the College.

**S CHRTC 408 Vatican Council II**

★3 (fi 6) (either term, 3-0-0). An examination of the origin and teachings of the Second Vatican Council (1962-65); subsequent changes in the thought

and life of the Catholic community. Prerequisite: CHRTC 264, or 270, or consent of the College.

**S CHRTC 410 Modern Catholic Theologians**

★3 (fi 6) (either term, 3-0-0). An exploration of the efforts of recent Catholic theologians to relate Christian beliefs to modern culture. Prerequisite: One course in Christian theology or consent of the College.

**S CHRTC 411 Topics in Christian Unity**

★3 (fi 6) (either term, 3-0-0). An examination of selected aspects of inter-Church dialogues in the 20th century and the efforts to recover the unity-within-diversity of Christianity. Prerequisite: One course in Christian theology or consent of the College.

**S CHRTC 431 Issues in the Theology of Sexuality**

★3 (fi 6) (either term, 3-0-0). A theological study of selected issues such as the sacramentality of human sexuality, embodiment, sex education, reproduction, marriage. Prerequisite: CHRTC 351 or consent of the College.

**S CHRTC 432 Advanced Bioethics**

★3 (fi 6) (either term, 3-0-0). A theological analysis of selected bioethical issues such as defective newborns, allocation of scarce medical resources, suffering and death. Prerequisite: CHRTC 352 or consent of the College.

**S CHRTC 450 Directed Readings in Catholic Theology**

★3 (fi 6) (either term, 3-0-0). An intensive directed readings course on a topic selected by the student in consultation with one of the faculty. A major term paper is required. Prerequisites: One course in Christian theology and permission of the College.

**Note:** For philosophy courses offered by St Joseph's College, see Philosophy listing (from within the Roman Catholic Tradition) St Joseph's College.

211.39.2 St Stephen's College (from within the Liberal Protestant Tradition)

**S CHRTP 301 Hebrew Scriptures**

★3 (fi 6) (first term, 3-0-0). Background, authorship, sources, literary qualities and general teaching of the various books of the Hebrew Scriptures (Old Testament), and the process of the Old Testament formation. Note: Not open to students with credit in CHRTP 301 Old Testament Literature.

**S CHRTP 305 Christian Scriptures**

★3 (fi 6) (second term, 3-0-0). Jewish and Greek environment of the New Testament; the authorship and content of its various books, and the process of New Testament formation. Note: Not open to students with credit in CHRTP 305 New Testament Literature.

**S CHRTP 312 The Question of Faith**

★3 (fi 6) (first term, 0-3s-0). An introduction to a methodology for a disciplined examination of issues in contemporary religious experience with reference to selected readings from leading thinkers.

**S CHRTP 313 Topics in Applied Christian Ethics**

★3 (fi 6) (either term, 3-0-0). Exploration and analysis of selected issues in social ethics within the context of theological reflection and commitment. Particular attention will be paid to the development of debate within the Protestant tradition.

**S CHRTP 314 Topics in Women and Religion**

★3 (fi 6) (either term, 3-0-0). Women's relation to and place in the dominant religious tradition of the West, Christianity. Attention will be paid to women's attempts to critique and transform received tradition and/or to develop alternative forms of religious life.

**S CHRTP 315 Topics in Religion and Literature**

★3 (fi 6) (either term, 3-0-0). Religious systems mediate their values and concerns in a variety of ways (liturgy, mythos, theology, etc.). This course investigates major Christian concerns such as doubt, faith, suffering, hope, forgiveness and redemption as mediated through narrative. In addition to exploring deep questions of religious meaning, attention will also be paid to the transmission and transformation of values, and the use of literature as a religious vehicle for social change.

**S CHRTP 316 Issues in Contemporary Sexuality and Spirituality**

★3 (fi 6) (second term, 2-1s-0). A study of selected beliefs concerning sexuality and spirituality in the light of contemporary theories and debates.

**S CHRTP 317 New Issues in Theology**

★3 (fi 6) (either term, 3-0-0). A survey course exploring recent developments in Christian Theology and their implications for traditional beliefs, symbols, and the integration of faith and practice.

**S CHRTP 318 Feminist Theology**

★3 (fi 6) (first term, 1-2s-0). An examination of feminist criticisms of selected doctrines and practices.

**S CHRTP 418 The Makers of Modern Theology**

★3 (fi 6) (either term, 0-3s-0). A study of the major works of a key theologian of the 19th or 20th century.

211.40 Reserved

211.41 Civil Engineering

Department of Civil and Environmental Engineering  
Faculty of Engineering

The following table lists renumbered courses effective 1993/94:

Old	New	Old	New
CIV E 305	CIV E 290	CIV E 431	CIV E 331
CIV E 350	CIV E 250	CIV E 451	CIV E 355
CIV E 351	CIV E 251	CIV E 452	CIV E 356
CIV E 360	CIV E 270	CIV E 480	CIV E 381
CIV E 401	CIV E 391	CIV E 500	CIV E 490
CIV E 402	CIV E 405	CIV E 507	CIV E 407
CIV E 409	CIV E 303	CIV E 572	CIV E 474
CIV E 430	CIV E 330	CIV E 590	CIV E 481

The following table lists renumbered courses effective 1994/95:

Old	New	Old	New
CIV E 220	CIV E 221	CIV E 393	CIV E 395
CIV E 291	CIV E 398	CIV E 394	CIV E 295
CIV E 333	CIV E 433	CIV E 420	CIV E 421
CIV E 370	CIV E 372	CIV E 473	CIV E 374

211.41.1 Undergraduate Courses

**CIV E 221 Environmental Engineering Fundamentals**

□3.8 (fi 6) (second term, 3-0-3/2). Basic mechanisms of chemistry, biology, and physics relevant to environmental engineering processes. Principles of equilibrium reactions and kinetics, mass transfer and material balances, microbial growth and kinetics, water, energy, and nutrient cycles. Applications to environmental engineering systems as biological degradation, mass and energy movement through the environment, and design of water and wastewater treatment systems. Prerequisites: CHEM 103 and CHEM 105. (★3)

**CIV E 250 Plane Surveying**

□4.0 (fi 6) (either term, 3-0-2). Basic surveying concepts and instrumentation, measurement errors, coordinate systems, leveling, traversing, layout surveys, earthwork volumes, conventional, and digital mapping, GIS concepts, aerial photography, and GPS. Prerequisites: MATH 101 and 102. (★3)

**CIV E 251 Survey School**

□2.0 (fi 6) (second term, two weeks Intersession, spring term). Practical exercises in field methods; project type of assignments; field astronomy; electronic distance measuring instruments. Note: Survey School is held off campus. Prerequisite: CIV E 250. (★3)

**CIV E 265 Engineering Drawing and Computer Graphics**

□3.5 (fi 6) (either term, 2-0-3). Multiview representation, pictorial views of three-dimensional objects. Computer-aided graphics using AutoCAD. (★3)

**CIV E 270 Mechanics of Deformable Bodies I**

□4.5 (fi 6) (either term, 3-0-3). Plane stress and strain; stress-strain relationships; stresses and deformations resulting from axial and transverse loads; buckling of columns; torsion of circular sections; combined stress; statically indeterminate problems. Laboratory to demonstrate mechanical properties and verify assumptions of analysis. Prerequisites: ENGG 130, EN PH 131, and MATH 101. (★3)

**CIV E 290 Civil Engineering Analysis I**

□3.0 (fi 6) (second term, 3-0-0). Statistical and probabilistic approaches to civil engineering problems. Prerequisites: ENCMP 100, MATH 101. (★3)

**CIV E 295 Civil Engineering Analysis II**

□4.0 (fi 6) (second term, 3-0-2). Application of numerical methods to civil engineering problems. Prerequisites: ENCMP 100, MATH 102 and 209. (★3)

**CIV E 303 Project Management**

□3.8 (fi 6) (first term, 3-0-3/2). Planning and scheduling; theories and techniques of project management. (★3)

**CIV E 312 Transportation Engineering**

□3.0 (fi 6) (either term, 3-0-0). Transportation systems and their elements. Population and transportation in Canada. Principles of transportation planning. Traffic volume, capacity, speed, density, and safety. Fundamentals of traffic control and public transport. Economic and environmental evaluation in transportation planning and operations design. Principles of transportation systems management (★3)

**CIV E 321 Principles of Environmental Modelling and Risk**

□3.8 (fi 6) (either term, 3-0-3/2). Introduction modelling environmental processes to predict the movement of water and fate of contaminants in the hydrologic cycle. Principles of mass transfer, conservation of mass, environmental transformations, nutrient enrichment and depletion are developed. Introduction to storm events, rainfall, runoff, stream discharge and stormwater management. Applications of modelling results to the quantification of risk using examples from hydrology, water pollution and



health protection and development of environmental regulations. Prerequisite: CIV E 221. Corequisite: CIV E 330. (★3)

#### **CIV E 330 Introduction to Fluid Mechanics**

□3.5 (*fi 6*) (either term, 3-1s-0). Fluid properties; dimensional analysis; hydrostatics; fundamental equations of fluid motion; laminar, turbulent and inviscid flows; boundary layers and flow around immersed bodies; elementary building aerodynamics. Prerequisites: MATH 201 and 209. (★3)

#### **CIV E 331 Applied Hydraulics**

□ 3.8 (*fi 6*) (either term, 3-0-3/2). Introduction to applied hydraulics; control volume methods, open channel hydraulics, pipe systems, pumps, distribution and collection system hydraulics and design. Prerequisite: CIV E 330 and 221. (★3)

#### **CIV E 372 Structural Analysis I**

□4.0 (*fi 6*) (either term, 3-2s-0). Introduction to structural loads; deformations of statically determinate beams, trusses and frames; influence lines; analysis of statically indeterminate structures by consistent deformations, slope deflection and moment distribution; direct stiffness analysis. Prerequisite: CIV E 270. (★3)

#### **CIV E 374 Structural Design I**

□4.5 (*fi 6*) (either term, 3-0-3). Introduction to limit states design. Behavior and design of steel and reinforced concrete members. Prerequisite: CIV E 372. (★3)

#### **CIV E 381 Soil Mechanics**

□4.5 (*fi 6*) (either term, 3-0-3). Compaction; site investigation; theories of water seepage; effective stress principles; settlement; strength and mechanical properties; introduction to retaining structures, foundation, and slope stability. Prerequisites: EAS 210 and CIV E 295. Corequisites: CIV E 330, 395, CIV E 391 or ENV E 351. (★3)

#### **CIV E 391 Civil Engineering Materials**

□4.5 (*fi 6*) (either term, 3-0-3). Classification of soils. Properties of Portland cement concrete related to micro- and macro-structure and constituent materials. Properties of bituminous materials and design of bituminous mixes. Prerequisite: MATE 252. (★3)

#### **CIV E 395 Civil Engineering Analysis III**

□3.5 (*fi 6*) (either term, 3-0-2/2). The formulation of partial differential equations for modelling civil engineering problems. Introduction to analytical and numerical solution techniques. Prerequisites: MATH 201 and CIV E 295. (★3)

#### **CIV E 398 Introduction to Continuum Mechanics**

□3.5 (*fi 6*) (first term, 3-1s-0). Stress, strain and displacements in two and three dimensions. Constitutive equations. Governing equations of elasticity and simple solutions. Strain energy and virtual work. Theories of failure. Prerequisites: CIV E 270 and MATH 209. (★3)

#### **CIV E 404 Construction Methods**

□3.8 (*fi 6*) (either term, 3-0-3/2). Principles of building, heavy and bridge construction; wood and formwork design, stability during construction, economics of equipment selection, movement of material on construction sites, safety, and constructability issues. Prerequisite: CIV E 372. (★3)

#### **CIV E 405 Construction Materials and Methods**

□4.5 (*fi 6*) (first term, 3-0-3). Introduction to the elements and methods of building construction. Foundations, structural framing, floor and roof systems, wall assemblies, utilities and finishes. Influence of materials. (Field trips and incidental fee required.) Prerequisite: consent of Department (★3)

#### **CIV E 407 Construction Contract Documents**

□3.8 (*fi 6*) (first term, 3-0-3/2). Introduction to elements of contract documents. Definition, interpretation, and applications of drawings, specifications, type of contracts, bidding documents, general and special conditions, and associated contract documents. Prerequisite: consent of Department. (★3)

#### **CIV E 412 Highway Engineering**

□3.8 (*fi 6*) (either term, 3-0-3/2). Principles of highway planning. Highway and terrain. Vehicular motion. Horizontal and vertical geometric design. Cost/benefit analysis in highway design. Earthwork and mass diagram. Flexible and rigid pavement design. Prerequisites: CIV E 312, 250 and 391. (★3)

#### **CIV E 421 Processes for Public Health and Environmental Protection**

□3.8 (*fi 6*) (either term, 3-0-3/2). Theory of chemical, physical and biological processes in environmental engineering. Chemical kinetics and equilibrium, biological growth and kinetics, elements of reactor design, sedimentation, filtration, absorption; precipitation and gas transfer, introduction to facility design. Prerequisite: CIV E 221. (★3)

#### **CIV E 433 Hydrology**

□3.8 (*fi 6*) (either term, 3-0-3/2). Introduction to concepts in hydrology and hydrogeology. Hydrology topics include precipitation, evaporation, infiltration, streamflow and hydrograph analysis. Hydrogeology topics include infiltration, percolation, seepage, drainage, aquifer hydraulics, contaminant transport and urban runoff quality. (★3)

#### **CIV E 474 Structural Design II**

□3.8 (*fi 6*) (either term, 3-0-3/2). Behavior and design of steel and reinforced

concrete structures. This course builds on the material presented in CIV E 374 and places greater emphasis on the behavior of overall structures. Prerequisite: CIV E 374. (★3)

#### **CIV E 481 Soil Engineering**

□3.8 (*fi 6*) (first term, 3-0-3/2). Site investigation; strength of soils; geosynthetics for soil improvement; design of excavations and earth pressures on retaining structures; stability of natural slopes and their improvement; design of cuts and embankments; foundation design, stability and settlement; pile foundations; frost action and permafrost. Prerequisite: CIV E 381. (★3)

#### **CIV E 490 Civil Engineering Report Writing**

□2.0 (*fi 6*) (either term, 1-2s-0). Written and oral communication; lectures and practice on presentation of oral and written reports. A comprehensive written report must be submitted by each student. Prerequisite: consent of Department. (★3)

#### **CIV E 506 Construction Estimating, Planning, and Control**

□3.0 (*fi 6*) (second term, 3-0-0). Introduction to elements of construction, planning, scheduling, and cost estimating. Familiarization with quantity take-off, estimate preparation, cost recovery, resource allocation, project scheduling, risk analysis, and bid preparation. Prerequisite: CIV E 303. (★3)

#### **CIV E 511 Traffic Engineering and Planning**

□3.0 (*fi 6*) (second term, 3-0-0). Principles and measurements of traffic flow. Quality of service. Traffic control. Transportation demand studies, traffic impact analysis. Computer applications. Prerequisite: CIV E 211. (★3)

#### **CIV E 512 Town Planning**

□3.5 (*fi 6*) (second term, 3-1s-0). Historical growth and development of cities; growth and decay; population forecasting; urban land use and land planning; transportation planning; public services; planning legislation; outline plan preparation. Prerequisite: CIV E 421 or consent of Department. (★3)

#### **CIV E 521 Environmental Engineering Design**

□3.0 (*fi 6*) (second term, 3-0-0). Fundamentals of municipal design, planning and environmental impact assessment; solid waste management; detailed design and assessment projects; reports; presentations; field trips. Prerequisites: CIV E 221, 321, and 421. (★3)

#### **CIV E 531 Environmental Fluid Mechanics**

□4.0 (*fi 6*) (second term, 3-0-2). Turbulent flow; equations of motion and pollutant conservation equation; slender flows, jets and plumes. Mixing processes in rivers and lakes. Hydraulics of hot water and effluent discharges into water bodies. Oil spills in rivers and ocean. Prerequisite: CIV E 331. (★3)

#### **CIV E 540 Hydraulic Engineering**

□3.0 (*fi 6*) (second term, 3-0-0). Theory and design of hydraulic structures like dams, spillways, energy dissipators, drop structures, weirs, and culverts. Elementary river engineering including backwater curve computations. Hydraulic transients. Prerequisite: CIV E 331. (★3)

#### **CIV E 560 Structural Analysis II**

□4.0 (*fi 6*) (first term, 3-2s-0). Analysis of statically indeterminate beams, frames, and trusses; matrix formulation and computer solutions. Prerequisite: CIV E 372. (★3)

#### **CIV E 574 Structural Design III**

□3.0 (*fi 6*) (second term, 3-0-0). Design of prestressed concrete structures; masonry and reinforced masonry elements; timber structures; fatigue life of steel structures and cold formed steel elements. Prerequisites: CIV E 374 and 474. (★3)

#### **CIV E 591 Geotechnical Design**

□3.0 (*fi 6*) (second term, 3-0-0). Evaluation of site conditions. Design and analysis of shallow and deep foundations and retaining structures. Slope stability of embankments and cuts including foundation excavations. Prerequisite: CIV E 481. (★3)

#### **CIV E 592 Civil Engineering Applications of Operations Research**

□3.0 (*fi 6*) (either term, 3-0-0). Introduction to basic concepts of systems analysis, operations research, and decision-making as applied to civil engineering problems. Prerequisite: CIV E 290. (★3)

#### **CIV E 598 Special Topics in Civil Engineering I**

□3.0 (*fi 6*) (either term, 3-0-0). (★3)

#### **CIV E 599 Special Topics in Civil Engineering II**

□4.0 (*fi 6*) (either term, 3-0-2). (★3)

### 211.41.2 Graduate Courses

#### **CIV E 602 Construction Administration**

□3.0 (*fi 6*) (either term, 3-0-0). Administration of construction projects: financial control, advanced estimating, ratio analysis, cost control structures, cost planning and control, data collection and reporting, integrated project management, bid evaluation and risk analysis. (★3)

#### **CIV E 603 Computer Applications and Information Management in Construction**

□3.0 (*fi 6*) (either term, 3-0-0). Application of computers to the planning,

organization, and control of construction projects. Computer-aided process control. Strategies for software and hardware organization. Computer-aided information management in construction. (★3)

#### **CIV E 604 Construction Law**

□3.0 (*fi 6*) (either term, 3-0-0). Covers fundamentals of construction law; overview of the Canadian Legal System, business organization. Tort liability, construction contracts, agreements. Lien legislation, statutes governing the engineering profession and other legal topics. (★3)

#### **CIV E 605 Advanced Project Planning and Control**

□3.0 (*fi 6*) (either term, 3-0-0). Advanced techniques used for project planning and control, applications of operations research to construction management, case studies, and applications. (★3)

#### **CIV E 606 Design and Analysis of Construction Operations**

□3.0 (*fi 6*) (either term, 3-0-0). Application of discrete event process simulation to the design and analysis of construction systems. Introduction to CYCLONE and SLAM II simulation languages. Emphasis on modelling construction technologies including heavy and highway construction technologies, building construction, underground tunnelling, and trenchless excavation. (★3)

#### **CIV E 607 Work Improvement Studies**

□3.0 (*fi 6*) (either term, 3-0-0). Planning for productivity improvement, work measurement technique, data analysis and evaluation, human behavior as a factor in construction productivity, safety in productivity improvement, computer and other tools for productivity improvement. (★3)

#### **CIV E 608 Construction Engineering I**

□1.5 (*fi 6*) (either term, 0-3s-0). Introduction to the elements and methods of construction and principles of material handling on construction projects. Covers earthmoving, piling, asphalt production and laying, concrete production and transportation, lifting, formwork, building systems, modular construction, pipeline construction. Includes site tours. This will be a three-hour session with a P/F mark. (★3)

#### **CIV E 609 Construction Engineering II**

□3.0 (*fi 6*) (either term, 3-0-0). Principles of construction engineering. Structural analysis and design for construction including approximate analysis, codes, and computer methods. Design and analysis of temporary structures, formwork and shoring, false work, hoisting and rigging cranes and lifting equipment. Case studies include bridge erection schemes, cambering of girders, and stochastic analysis. (★3)

#### **CIV E 610 Pavement Design**

□3.0 (*fi 6*) (either term, 3-0-0). Pavement performance and evaluation; stresses and displacements in layered systems; theories and principles of flexible and rigid pavement design and construction; rehabilitation of pavements and cost analysis. (★3)

#### **CIV E 611 Pavement Materials**

□3.0 (*fi 6*) (either term, 3-0-0). Source, manufacture, properties, tests and specifications of bituminous materials; properties and testing of aggregate, bituminous and stabilized mixtures; construction and quality control. (★3)

#### **CIV E 612 Transportation Design**

□3.0 (*fi 6*) (either term, 3-0-0). Introduction to all modes of transportation; principles of geometric design of transportation facilities including highways, railways, airports and parking terminals; economics of location. (★3)

#### **CIV E 613 Transportation Systems Analysis**

□3.0 (*fi 6*) (either term, 3-0-0). Urban and regional transport planning; travel demand forecasting; origin-destination analysis; trip distribution models; network analysis; economic principles in transportation; freight transport; strategy of transport planning. (★3)

#### **CIV E 614 Transportation Engineering**

□3.0 (*fi 6*) (either term, 3-0-0). Principles of traffic psychology; introduction to theory of traffic flow; traffic capacity of highways, interchanges and urban roads; traffic operations; traffic control devices and signal systems; principles of street illumination; principles of air traffic and railway traffic operations. (★3)

#### **CIV E 615 Functional Planning and Geometric Design**

□3.5 (*fi 6*) (either term, 2-0-3). Types of interchanges, network planning and other facets of functional planning, geometric design, merging and diverging movements, environmental and safety factors. (★3)

#### **CIV E 616 Public Transportation**

□3.0 (*fi 6*) (either term, 3-0-0). Public transport networks; population and transport network densities; traffic prediction and choice of transport mode; capacity and operating characteristics of various types of public transport; design characteristics of various transit systems; integration with urban planning. (★3)

#### **CIV E 617 Computer Applications in Transportation Engineering and Planning**

□3.0 (*fi 6*) (either term, 3-0-0). Computer modelling in transportation engineering. Application programs in traffic operations, urban transportation

planning and transportation decision analysis. The course provides an opportunity to apply the concepts and modelling principles to practical situations and to acquire the necessary skills with a variety of programs used in transportation engineering research and practice. (★3)

#### **CIV E 620 Environmental Engineering Measurements I**

□4.5 (*fi 6*) (first term, 3-0-3). Theory and procedures for determining the quality of natural water, potable water, municipal and industrial wastes. Fundamental parameters and concepts for environmental quality evaluation. (★3)

#### **CIV E 621 Municipal Distribution and Collection Systems**

□3.0 (*fi 6*) (second term, 3-0-0). Detailed and advanced design of water supply systems, sewerage and storm drains. Rates of flow, and hydraulics of networks and sewers, rainfall-runoff analysis, storm water storage, loads on conduits are examined. Solid waste collection and processing systems. (★3)

#### **CIV E 622 Physical/Chemical Water and Wastewater Treatment**

□3.0 (*fi 6*) (first term, 3-0-0). Theory and design of chemical and physical unit processes utilized in the treatment of water and wastewater, sedimentation, flotation, coagulation, precipitation, filtration, disinfection, ion exchange, reverse osmosis, adsorption, and gas transfer. (★3)

#### **CIV E 623 Industrial Water and Wastewater Management**

□3.0 (*fi 6*) (either term, 3-0-0). Industrial water quantity and quality requirements. Characteristics of wastes, inplant controls, product recovery; effluent characteristics, chemical and toxic properties, pretreatment and treatment design theory and methodology, water reclamation and reuse regulations. (★3)

#### **CIV E 624 Biological Waste Treatment Processes**

□3.0 (*fi 6*) (second term, 3-0-0). Study of the theoretical and applied aspects of wastewater treatment by activated sludge, fixed and moving biological films, conventional and aerated lagoons, sludge digestion, septic tanks, land treatment, and nutrient removal. Guidelines, regulations and economics. System analysis and design of facilities. (★3)

#### **CIV E 625 Engineering Management of Water Quality**

□3.0 (*fi 6*) (either term, 3-0-0). Concepts, rationale, theory, institutions and engineering aspects of water quality management. Methods of water quality management; oxygen; chemical and microbial models, natural and induced re-aeration techniques; thermal pollution and ice cover considerations. (★3)

#### **CIV E 626 Environmental Health Engineering**

□3.0 (*fi 6*) (either term, 3-0-0). Environmental contaminants: their sources and effects on humans and other biota. Risk assessment. Air quality (health considerations and management). Radioactive wastes and their control. Noise sources, health considerations and control techniques. (★3)

#### **CIV E 627 Environmental Engineering Measurements II**

□3.0 (*fi 6*) (second term, 1-0-4). Laboratory experiments to present techniques for obtaining data and relationships needed for design of treatment facilities. Analytical approaches, data interpretation, presentation and design methods. Applications of experimental design principles. (★3)

#### **CIV E 628 Municipal Solid Waste Management**

□3.0 (*fi 6*) (either term, 3-0-0). Principles of municipal waste management to protect public health, municipal waste streams, waste stream analysis and prediction. Refuse collection, storage and hauling methods, and facilities. Engineering design and operation of solid waste processing, treatment and disposal methods: resource recovery, recycling programs, incineration, composting, landfilling, and novel techniques. Solid waste legislation and policies. Environment impacts, impact management and facility siting of waste facilities. (★3)

#### **CIV E 630 Open Channel Flow**

□3.0 (*fi 6*) (either term, 3-0-0). Steady and unsteady flow in open channels. (★3)

#### **CIV E 631 Engineering Fluid Mechanics**

□3.5 (*fi 6*) (either term, 3-0-1). Navier-Stokes equations and viscous flow. Turbulence and Reynolds equations. Potential flow. Boundary layers. Flow around bodies. Jets and wakes. Related Lab experiments. (★3)

#### **CIV E 632 Hydraulic Structures**

□3.5 (*fi 6*) (either term, 3-0-1). Hydraulic design of water-handling structures used for extraction, retention, conveyance, control, regulation, energy dissipation, drainage, navigation, flood controls and other civil engineering schemes. Related Lab experiments. (★3)

#### **CIV E 633 Pipe Flow**

□3.0 (*fi 6*) (either term, 3-0-0). Steady and unsteady flow in pipe systems. Pipe networks. Slurry transport. Pump characteristics and pump-system interaction. Pipeline design. (★3)

#### **CIV E 634 Numerical Methods in Hydraulics**

□3.0 (*fi 6*) (either term, 3-0-0). Finite difference, finite element and boundary integral methods. Applications of these methods. (★3)

#### **CIV E 635 Advanced Environmental Fluid Mechanics**

□3.5 (*fi 6*) (either term, 3-0-1). Mixing processes and pollutant transport in

rivers, lakes, estuaries, coastal waters, and the atmosphere. Prerequisite: CIV E 631. Related Lab experiments. (★3)

#### **CIV E 636 Ice Engineering**

□3.5 (fi 6) (either term, 3-0-1). Elementary heat transfer analysis. Ice formation processes. Ice hydraulics. Ice mechanics. Interaction of ice and engineering structures. (★3)

#### **CIV E 640 River Engineering**

□3.5 (fi 6) (either term, 3-0-1). Flow and sediment transport in alluvial channels; engineering geomorphology; river ecology; design of river engineering installations. (★3)

#### **CIV E 641 Advanced Surface Water Hydrology**

□3.0 (fi 6) (either term, 3-0-0). Precipitation, evaporation, infiltration. Streamflow and hydrograph analysis. Hydrologic systems. Hydrologic routing. Simulation models. Statistical methods. (★3)

#### **CIV E 642 Risk and Decision in Civil Engineering**

□3.0 (fi 6) (either term, 3-0-0). Analysis of data; models and solutions in respect to decision making for civil engineering problems such as quality control, safety of structures, traffic flow, transportation planning, watershed management, water supply, measurement theory, simulation, natural phenomena. (★3)

#### **CIV E 643 Porous Media Hydraulics**

□3.5 (fi 6) (either term, 3-0-1). Saturated and unsaturated flow: infiltration, percolation seepage, drainage and aquifer hydraulics. (★3)

#### **CIV E 650 Advanced Topics in Photogrammetry**

□3.0 (fi 6) (either term, 3-0-0). Specialized photogrammetric techniques for use in engineering and scientific measurements. Emphasis on close-range and terrestrial photogrammetry, self-calibration modelling and special adjustment techniques. (★3)

#### **CIV E 651 Advanced Topics in Surveying**

□3.0 (fi 6) (either term, 3-0-0). Study of modern survey techniques and their application. Emphasis on modern positioning systems, deformation monitoring, survey design and data analysis. (★3)

#### **CIV E 652 Advanced Topics in Data Analysis and Adjustment**

□3.0 (fi 6) (either term, 3-0-0). Study of data analysis techniques. Regression and adjustment procedures for photogrammetric, surveying and engineering applications. (★3)

#### **CIV E 653 Readings in Project Management**

□3.0 (fi 6) (first term, 3-0-0). Management of construction projects: organizational issues, advanced time management, total quality management, materials management, change control and management of change. (★3)

#### **CIV E 656 Environmental Engineering Assessment and Management**

□3.0 (fi 6) (either term, 3-0-0). Review of EIA basics: definitions, cause-effect mechanisms, description of engineered activities and baselines, environmental impact predications, testing and monitoring of effects, project evaluation and decision making for engineering design, and impact management of engineered facilities. Environmental management plans and audits, communication with stakeholders, and review of projects. Prerequisites: CIV E 620 and 622. (★3)

#### **CIV E 658 Design of Civil Engineering Experiments**

□3.0 (fi 6) (either term, 3-0-0). Introduction to experimental design; design of experiments in environmental, transportation, and other civil engineering speciality areas; analysis of experimental and survey data. (★3)

#### **CIV E 660 Advanced Structural Analysis**

□3.0 (fi 6) (either term, 3-0-0). Direct stiffness theory and modelling of three dimensional framed structures. Linear and nonlinear stability concepts. Approximate and Direct stiffness formulation of geometric nonlinear problems. (★3)

#### **CIV E 661 Dynamics of Structures**

□3.0 (fi 6) (either term, 3-0-0). Dynamics of single and multiple degree of freedom systems. Time step methods. Modal and response spectrum analysis for earthquake loading. Random vibration analysis. Dynamic wind loading analysis. Dynamics of foundations. (★3)

#### **CIV E 663 Design of Shell Structures**

□3.0 (fi 6) (either term, 3-0-0). (Offered alternate years.) Assumptions, derivation and limitations of shell theory as applied to the design of folded plate structures, storage structures consisting of shells of revolution; cylindrical and parabolic roof shells. Emphasis is placed on design problems. (★3)

#### **CIV E 664 Introduction to Solid Mechanics**

□3.0 (fi 6) (either term, 3-0-0). Formulation of basic equations of elasticity in solid mechanics. Cartesian tensor notation. Variational principles. (★3)

#### **CIV E 665 Introduction to the Finite Element Method**

□3.0 (fi 6) (second term, 3-0-0). Fundamentals of the formulation and application of the finite element method to problems of continuum mechanics, with special reference to civil engineering, including problems in solid

mechanics and soil mechanics. Prerequisite: CIV E 664 or consent of Instructor. (★3)

#### **CIV E 666 Structural Concepts**

□4.0 (fi 6) (second term, 3-1s-1). Causes and characteristics of loads on buildings, bridges and other structures. Reasons for and calculations of load and resistance factors. (★3)

#### **CIV E 667 Advanced Topics in the Finite Element Method**

□3.0 (fi 6) (first term, 3-0-0). (Offered in alternate years.) Convergence criteria, equilibrium and hybrid elements. Application of finite element methods to problems in stability, dynamics, plates and shells. Treatment of geometric and material nonlinearities. Prerequisite: CIV E 665 or consent of Instructor. (★3)

#### **CIV E 670 Behavior and Design of Steel Members**

□4.0 (fi 6) (first term, 3-1s-1). Material properties and plate-buckling problems. Behavior and design of steel tension and compression members, beams and beam-columns. Behavior and design of welded and bolted connections. This course is designed to give the student an understanding of the individual members which form the steel structure. (★3)

#### **CIV E 671 Behavior and Design of Steel Structures**

□3.0 (fi 6) (second term, 3-0-0). Brittle fracture and fatigue problems. Behavior and design of composite beams and plate girders. Discussion of frame behavior; overall buckling and instability concepts as related to the design of columns and bracing systems. This course is designed to build on the material contained in CIV E 670 and to give the student an insight into the behavior of the total structure. (★3)

#### **CIV E 672 Behavior and Design of Concrete Members**

□4.0 (fi 6) (first term, 3-1s-1). Strength and behavior of simple reinforced concrete members. Relation between results of research and current design specifications. Material properties. Members subjected to flexure, axial compression, combined flexure and axial load, combined flexure and shear, torsion. (★3)

#### **CIV E 673 Behavior and Design of Concrete Structures**

□3.0 (fi 6) (second term, 3-0-0). Strength and behavior of statically indeterminate reinforced concrete structures. Elastic and limit analysis and design considerations for continuous slab systems, frames and shear walls. (★3)

#### **CIV E 674 Behavior and Design of Prestressed Concrete Structures**

□3.0 (fi 6) (second term, 3-0-0). (Offered alternate years.) Principles and methods of prestressing. Service load design and analysis. Behavior and strength design. Losses in prestress and anchorage zone stresses. Continuous beams and slabs. Discussion of design specifications. (★3)

#### **CIV E 676 Behavior and Design of Masonry Structures**

□3.0 (fi 6) (either term, 3-0-0). (Offered alternate years.) Historical developments. Masonry units, mortars and grouts. Behavior, strength and stability of masonry under axial compression. Reinforced masonry in bending and combined axial load and bending. Ductility and joint control. Design application including discussion of code requirements. (★3)

#### **CIV E 677 Behavior and Design of Cold-Formed Steel Structures**

□3.0 (fi 6) (either term, 3-0-0). General design considerations, cold forming effects, effective width method, behavior and design of tension members, beam-columns, and connections. Behavior and design of light gage steel diaphragms, composite steel decks, and industrial steel building design. (★3)

#### **CIV E 680 Engineering Properties of Soils**

□4.0 (fi 6) (first term, 3-1s-1). Principle of effective stress, clay-water systems, soil compressibility and theories of consolidation. Pore pressure parameters. Strength of granular and cohesive media. Anisotropy of soils. Laboratory measurement of strength and deformation properties. Stress-strain relations. (★3)

#### **CIV E 681 Seepage and Drainage**

□4.0 (fi 6) (first term, 3-1s-1). Elements of hydrogeology; regional groundwater flow, borehole logging methods. Theory of groundwater flow through soils and rocks, permeability, Darcy's law, field governing equations and their solution by approximate methods, finite difference and finite element methods, unsaturated flow. Civil engineering applications, seepage in earth structures, design of dewatering systems for excavations and slopes, field testing, grouting. (★3)

#### **CIV E 682 Environmental Geotechnics**

□3.0 (fi 6) (either term, 3-0-0). Environmental laws and regulatory processes; geotechnical characterization for environmental problems; transfer processes; elements of groundwater contaminants, geotechnical aspects of waste management; mine waste; dumps and tailings dams; design of landfills; in-situ characterization; site remediations; geotechnical aspects of nuclear waste storage. (★3)

#### **CIV E 683 Site Investigation Practice**

□3.0 (fi 6) (first term, 3-0-0). Techniques of site investigation for geotechnical engineering, *in situ* testing, instrumentation for field performance studies, case histories covering both rock and soil applications. (★3)

**CIV E 684 Engineering Geology and Terrain Analysis**

□4.0 (*fi 6*) (second term, 3-1s-1). Information sources in engineering geology and terrain analysis, elements of the geology of sediments and glacial geology. Glacial and periglacial land forms. Photogeology and airphoto interpretation applied to geotechnical engineering. Case histories based on specific materials and regional problems. (★3)

**CIV E 687 Rock Engineering for Near Surface Structures**

□3.0 (*fi 6*) (second term, 3-0-0). Deterministic and probabilistic design methods for rock slopes and foundations on rocks. Economic, operational and geological factors affecting design. Support and stabilization techniques, excavation methods, monitoring structures in and on rock, foundations for dams and for large loads. (★3)

**CIV E 690 Advanced Foundation Engineering**

□3.5 (*fi 6*) (second term, 3-0-1). Theories of lateral pressures. Limit equilibrium methods, elasticity methods, semi-empirical methods. Soil anchors. Design of retaining walls and strutted excavations. Bearing capacity of shallow and deep foundations. Allowable settlement of structures. Analysis of settlement of shallow and deep foundations. Behavior of pile groups. Design problems in foundation engineering. (★3)

**CIV E 692 Tunnelling**

□3.5 (*fi 6*) (second term, 3-1s-0). Methods of tunnelling, including excavation methods and support techniques, ground response, *in situ* and induced stress field, displacement field around deep and near surface tunnels, ground-support interaction, design criteria for tunnels in soil and rock, shaft design, site investigation practice and monitoring of tunnels. (★3)

**CIV E 694 Permafrost Engineering**

□4.0 (*fi 6*) (second term, 3-1s-1). Implications for northern development, extent, engineering classification, thermal regime, ground ice, genesis, site investigations, heat conduction in the ground, properties of frozen soil, thaw consolidation, freezing mechanisms, foundations in frozen ground; slope stability, highways and airfields, pipelines and earth dams in arctic and sub-arctic regions. Prerequisite: CIV E 481 or consent of Department. (★3)

**CIV E 695 Soil Structures**

□4.0 (*fi 6*) (second term, 3-1s-1). Stresses in slopes. Limit equilibrium methods of analysis. Landslides in soil. Design of earth dams and embankments. Case histories of earth and rockfill dams. Dam foundations. Soft ground tunnelling. (★3)

**CIV E 696 Geotechnical Aspects in Highway Engineering**

□3.0 (*fi 6*) (second term, 3-0-0). Terrain analysis for highway design, design and construction of highway embankments, quality control procedures, special treatments for soft foundations of embankments. Behavior of compacted soils under repeated loading, swelling subgrade soils. Admixture stabilization using Portland cement, lime, bituminous materials or other chemicals. (★3)

**CIV E 697 Rock Engineering**

□4.0 (*fi 6*) (first term, 3-1s-1). Elements of structural geology, analysis of the geometry of rock defects, properties of intact rocks. Properties of rock masses and stresses in rock masses, stability of rock slopes. Rock foundations and underground excavations in rock. Case studies. (★3)

**CIV E 698 Geotechnical Engineering of Oil Sands Development**

□3.0 (*fi 6*) (either term, 3-0-0). Origin and distribution of oil sands; surficial geology, geomorphological setting and geology of oil sands deposits in Alberta; regional hydrogeology; material and geotechnical properties, and site investigation practice. Geotechnical engineering in surface mining projects; underground access projects; *in situ* recovery projects; plant site development, and development of infrastructures. (★3)

**CIV E 709 Advanced Topics in Construction Engineering and Management**

□3.0 (*fi 6*) (either term, 3-0-0). (★3)

**CIV E 719 Advanced Topics in Transportation and Highway Engineering**

□3.0 (*fi 6*) (either term, 3-0-0). (★3)

**CIV E 729 Advanced Topics in Environmental Engineering**

□3.0 (*fi 6*) (either term, 3-0-0). (★3)

**CIV E 739 Advanced Topics in Fluid Mechanics and Hydraulics**

□3.0 (*fi 6*) (either term, 3-0-0). (★3)

**CIV E 749 Advanced Topics in Water Resources Engineering**

□3.5 (*fi 6*) (either term, 3-0-1). Related Lab experiments. (★3)

**CIV E 759 Special Topics in Civil Engineering**

□3.0 (*fi 6*) (either term, 3-0-0). (★3)

**CIV E 779 Advanced Topics in Structural Engineering**

□3.0 (*fi 6*) (either term, 3-0-0). (★3)

**CIV E 799 Advanced Topics in Soil Mechanics**

□3.0 (*fi 6*) (either term, 3-0-0). (★3)

**CIV E 900 Directed Research Project**

★3 (*fi 6*) (variable).

**211.42 Classics**

Department of History and Classics  
Faculty of Arts

**Notes**

- (1) None of the courses under this heading will fulfil the language-other-than-English requirement of the BA degree.
- (2) All 200- and 300-level courses under this heading are survey courses designed primarily for the non-specialist and may be taken by students with no knowledge of Greek or Latin.
- (3) The Classics Department does not permit first-year students, regardless of their Faculty, to take its 300-level courses. It permits only third- and fourth-year students, regardless of their Faculty, to take its 400-level courses.
- (4) The courses numbered 460 through 500, are designed for fourth-year, Honors, and graduate students. No Greek or Latin is required at the 400-level, but may be required at the 500-level. The precise topics covered in any given course may vary from year to year. Some account, therefore, may be taken of the particular interests of students within the framework of the course. Normally, students who take these courses are expected to have at least one senior course in ancient history or literature; if they do not, they must obtain the consent of Department to their registration, and the Department will consider their special needs. Note: Details of the topics to be offered in any given year may be obtained from the Department. For additional related courses see Greek and Latin listings.
- (5) See also INT D 331 for a course which is offered by more than one department or Faculty and which may be taken as an option or as a course in this discipline.

**211.42.1 Undergraduate Courses**

The following table lists renumbered courses effective 1996/97:

Old	New	Old	New
CLASS 141	CLASS 294	CLASS 361	CLASS 261
CLASS 201	CLASS 221	CLASS 363	CLASS 371
CLASS 250	CLASS 270	CLASS 364	CLASS 372
CLASS 251	CLASS 271	CLASS 367	CLASS 352
CLASS 349	CLASS 321	CLASS 368	CLASS 353
CLASS 350	CLASS 321	CLASS 369	CLASS 376
CLASS 351	CLASS 322	CLASS 370	CLASS 377
CLASS 357	CLASS 302		

**§ CLASS 102 Greek and Roman Mythology**

★3 (*fi 6*) (either term, 3-0-0). A survey of classical mythology with readings in translation from various ancient authors as well as from modern scholarly works. Formerly CLASS 202.

**§ CLASS 110 The Ancient World**

★3 (*fi 6*) (either term, 3-0-0). World history from the beginning of written records down to the sixth century AD. The course covers the ancient history of the Mediterranean world, with particular emphasis on Egypt, Greece and Rome and compares developments in civilization in these areas with those in Persia, India, China and Japan. Note: Students choosing CLASS 110 for partial fulfillment of the Humanities Group A requirement must also take one of HIST 110, 111 or 112. Formerly CLASS 210.

**§ CLASS 160 Greek and Latin Etymology**

★3 (*fi 6*) (either term, 3-0-0). A study of Greek and Latin words commonly used in English: how these words are built, and how they gain and change in meanings. Formerly CLASS 260.

**§ CLASS 221 Literature of Greece and Rome**

★3 (*fi 6*) (either term, 3-0-0). An introductory survey in English translation of major works from Greek and Latin literature. This will include epic, lyric, and drama. Formerly CLASS 201. May not be taken concurrently with or subsequent to CLASS 321/322.

**§ CLASS 252 Ancient Art and Archaeology**

★3 (*fi 6*) (either term, 3-0-0). An overview of the art and archaeology of Ancient Greece and/or Ancient Italy within its historical and social context.

**§ CLASS 261 Women in the Ancient World**

★3 (*fi 6*) (either term, 3-0-0). An introduction to the role of women in the Ancient World as approached through the study of literature, law, religion, and art. Formerly CLASS 361.

**§ CLASS 270 Greek Civilization**

★3 (*fi 6*) (either term, 3-0-0). An introduction to Greek social history illustrated by reference to contemporary literature and archaeological discoveries: the Bronze Age, rise of the city, trade and colonization, Athens, Sparta, and warfare. Formerly CLASS 250.

**§ CLASS 271 Roman Civilization**

★3 (*fi 6*) (either term, 3-0-0). An introduction to Roman social history illustrated by reference to contemporary literature and archaeological discoveries. The

course is organized thematically, covering such topics as family, education, law, government, agriculture, and entertainment. Formerly CLASS 251.

**D CLASS 294 Ancient Science, Technology, and Medicine**

★3 (*fi 6*) (either term, 3-0-0). An introduction to the development of science, technology, and medicine in the ancient world with particular reference to the civilizations of Greece and Rome. Not available for those who have successfully completed CLASS 141.

**S CLASS 302 Classical Myth and Religion**

★3 (*fi 6*) (either term, 3-0-0). The background and origin of classical mythology and religion; Mycenaean and Near Eastern sources; religious festivals and usages; modern scholarship. Formerly CLASS 357. Prerequisite: CLASS 102 or consent or Department.

**S CLASS 321 Greek Literature in Translation**

★3 (*fi 6*) (either term, 3-0-0). A study of representative works of Greek literature. Formerly CLASS 349/359. Prerequisite: CLASS 102 or consent of Department.

**S CLASS 322 Latin Literature in Translation**

★3 (*fi 6*) (either term, 3-0-0). A study of representative works of Latin literature. Formerly CLASS 351. Prerequisite: CLASS 102 or consent or Department.

**S CLASS 352 Greek Art**

★3 (*fi 6*) (either term, 3-0-0). The origin and development of Greek Art and Architecture and its relation to, and reflection of, the cultural and political history of the times. Formerly CLASS 367. Prerequisite: CLASS 102, or any 200- or 300-level CLASS course, or consent of Department.

**S CLASS 353 Roman Art**

★3 (*fi 6*) (either term, 3-0-0). The development and role of Art and Architecture in the Hellenistic kingdoms and the Roman Republic; the evolution of Roman Imperial Art. Formerly CLASS 368. Prerequisite: CLASS 102, or any 200- or 300-level CLASS course, or consent of Department.

**S CLASS 365 Early Roman History**

★3 (*fi 6*) (either term, 3-0-0). The origins and rise of Roman power to 133 BC, with special attention to the influence of Etruscan civilization, the wars with Carthage and the beginnings of Roman imperialism. Note: Not open to students with credit in CLASS 373.

**S CLASS 366 History of the Later Roman Republic**

★3 (*fi 6*) (either term, 3-0-0). The crisis of the Roman Republic (133 - 44 BC), considered in the light of imperial expansion in the Mediterranean, with special attention to the careers of Marius, Sulla, Pompey, and Julius Caesar. Note: Not open to students with credit in CLASS 373.

**S CLASS 371 History of Ancient Greece I**

★3 (*fi 6*) (either term, 3-0-0). The Hellenic world from its beginnings in the Bronze Age until the Persian Wars, with special attention to the organization of the city state, Sparta, and the rise of Athenian democracy. Formerly CLASS 363 Prerequisite: CLASS 110, or any 200- or 300-level CLASS course, or consent of Department.

**S CLASS 372 History of Ancient Greece II**

★3 (*fi 6*) (either term, 3-0-0). The Hellenic world from the Persian Wars, including the Athenian Empire, the Peloponnesian War, the various hegemonies in the 4th century to the death of Alexander the Great. Formerly CLASS 364. Prerequisite: CLASS 110, or any 200- or 300-level CLASS course, or consent of Department.

**S CLASS 373 History of Ancient Greece III**

★3 (*fi 6*) (either term, 3-0-0). The Hellenistic World from the death of Alexander the Great to 30 BC, with special attention to Alexander's successors and the development of the Hellenistic kingdoms. Prerequisite: CLASS 110, or any 200- or 300-level CLASS courses, or consent of Department.

**S CLASS 374 History of the Roman Empire**

★6 (*fi 12*) (full session, 3-0-0). The Roman Empire from Augustus to the death of Constantine, with particular attention to developments in government, law and civilization. Note: Not open to students with credit in CLASS 371 and/or 372.

**S CLASS 375 History of Medicine in the Ancient World**

★3 (*fi 6*) (either term, 3-0-0). A survey of medical science from Prehistoric times through Egyptian, Mesopotamian, Greek, and Roman times to the end of the Roman Empire. Normally offered in Intersession.

**S CLASS 376 Early Civilization I**

★3 (*fi 6*) (either term, 3-0-0). A survey of the beginnings and development of civilization in the Near East, including Sumer, Babylon, Assyria, and the Hebrews. Formerly CLASS 369.

**S CLASS 377 Early Civilization II**

★3 (*fi 6*) (either term, 3-0-0). The development of civilization in the western half of the Fertile Crescent, including the rise and decline of the Egyptian, Hittite, and Phoenician cultures. Formerly CLASS 370.

**S CLASS 399 Topics in the Ancient World**

★3 (*fi 6*) (either term, 3-0-0).

**S CLASS 460 Topics in Ancient Near Eastern History**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisite: Any one of CLASS 369, 370, or consent of Department.

**S CLASS 461 Topics in Roman Imperial History**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisite: Any one of CLASS 376, 377, or consent of Department.

**S CLASS 463 Topics in Roman Republican History**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisites: CLASS 373, 374 or consent of Department.

**S CLASS 467 Topics in Greek History**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisite: Any one of CLASS 363, 364, or consent of Department.

**S CLASS 473 Topics in Classical Archaeology**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisite: Any one of CLASS 371, 372, 352 or consent of Department.

**S CLASS 475 Practical Methods in Classical Archaeology**

★3 (*fi 6*) (either term, 0-10L-0) or ★6 (*fi 12*) (full session, 0-10L-0). The techniques of excavation and recording in Classical Archaeology. Note: Offered only for field work in the archaeology of the Greek and Roman world and restricted to those participating in an excavation sponsored by the Department. Prerequisites: Any 300-level CLASS, GREEK, or LATIN course and consent of Department.

**S CLASS 476 Advanced Field Techniques in Classical Archaeology**

★3 (*fi 6*) (either term, 0-10L-0) or ★6 (*fi 12*) (full session, 0-10L-0). Advanced field application of Classical archaeological theory. Prerequisites: CLASS 475 or equivalent and consent of Department. Note: Offered in summer only for field work in the archaeology of the Greek and Roman world and restricted to those participating in an excavation sponsored by the Department.

**S CLASS 477 Topics in Greek Art**

★3 (*fi 6*) (either term, 0-3s-0). In-depth study of aspects of Greek art. Prerequisite: CLASS 352 or consent of Instructor.

**S CLASS 478 Topics in Roman Art**

★3 (*fi 6*) (either term, 0-3s-0). In-depth study of aspects of Roman art. Prerequisite: CLASS 353 or consent of Department.

**S CLASS 480 Topics in the Archaeology of the Roman Provinces**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisite: Any of CLASS 353, 373, 374, or consent of Department.

**S CLASS 489 Studies in Classical Literary Criticism**

★3 (*fi 6*) (either term, 0-3s-0).

**S CLASS 497 Topics on Women in Classical Antiquity**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisite: Any 300-level course in Classics or any 300-level cross-listed course in Women's Studies, or consent of Department.

**S CLASS 498 Individual Study of Literary Problems**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisite: Any one of CLASS 261, 321, 322, 351, or consent of Department.

**S CLASS 499 Individual Study of Historical and Archaeological Problems**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisite: consent of Department.

**CLASS 500 Fourth-Year Honors Tutorial**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisite: consent of Department.

**S CLASS 510 Readings in Classical Archaeology**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisite: consent of Department.

## 211.42.2 Graduate Courses

**CLASS 511 Topics in the Iron Age in Italy**

★3 (*fi 6*) (either term, 0-3s-0). The native cultures of the Italian peninsula from the beginning of the first millennium BC until the end of the Samnitic wars. Prerequisite: consent of Department.

**CLASS 512 Topics in the Archaeology of Magna Graecia**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisite: consent of Department.

**CLASS 513 Topics in the Archaeology of Roman Italy**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisite: consent of Department.

**CLASS 514 Topics in the Archaeology of Egypt and the Ancient Near East**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisite: consent of Department.

**CLASS 515 Topics in the Archaeology of Greece**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisite: consent of Department.

**CLASS 516 Topics in the Archaeology of the Roman Provinces**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisite: consent of Department.

**CLASS 520 Readings in Historical Sources**

★3 (*fi 6*) (either term, 0-3s-0). Prerequisite: consent of Department.

**CLASS 522 Studies in Ancient History**

★3 (fi 6) (either term, 0-3s-0). Prerequisite: consent of Department.

**CLASS 525 Topics in Greek and Latin Literature**

★3 (fi 6) (either term, 0-3s-0). Prerequisite: consent of Department.

**CLASS 601 Studies in Classical Archaeology I**

★3 (fi 6) (either term, 0-3s-0).

**CLASS 602 Studies in Classical Archaeology II**

★3 (fi 6) (either term, 0-3s-0).

**CLASS 699 Conference Course (Thesis)**

★3 (fi 6) (either term, 0-3s-0). Prerequisite: consent of Department.

**211.43 Community Health**

Department of Public Health Services  
Faculty of Medicine and Oral Health Sciences

**Note:** CO ME courses are open to MD students only.

**CO ME 411 Introduction to Epidemiology**

★2 (fi 4) (first term, 27 hours). Epidemiological methods are introduced as the basis of clinical evaluation, preventive medicine, and public health. One example of critically appraising the health sciences research literature is included to foster lifetime learning skills. Prerequisite is a one-semester statistics course. Available to medical students only.

**CO ME 421 Small Group Discussion**

★1 (fi 2) (full session, 18 hours). A series of small group discussions are designed to acquaint students with (1) the impact of an illness on an individual; (2) the patient's perception of members of the various health professions; (3) the medical/hospital milieu in determining patient behavior; and (4) the special problems of the terminally ill. Available to medical students only.

**CO ME 431 Public Health, Prevention, and Health Promotion**

★1 (fi 2) (first term, 13 hours). This course will develop an understanding of the philosophy of public health and will involve the application of the theoretical framework underlying public health and health promotion to local public health problems.

**CO ME 432 Occupational and Environmental Health**

★1 (fi 2) (full session, 13 hours). This is a self-contained course in the common and important disorders associated with exposures in the work place, the appropriate assessment of fitness to work and of functional impairment, and the role of the physician in identifying and managing occupational health problems. These situations are common in most specialities treating adults and often raise difficult questions of science, clinical management, and ethics.

**211.44 Comparative Literature**

(Division of Comparative Studies in Literature, Film,  
and Religion)  
Department of Modern Languages and Comparative Studies  
Faculty of Arts

**Note:** Courses in the Department of Comparative Literature teach a number of literatures from an international perspective with the help of translations as necessary.

**211.44.1 Undergraduate Courses****S C LIT 100 World Literature**

★6 (fi 12) (full session, 3-0-0). An introduction to major works of the world's literary heritage, presented in their historical, social, and cultural contexts. This course is designed to acquaint students with literature as a mediation of human experience and to provide a foundation for senior and advanced courses in literature, as well as background for studies in the humanities and social sciences. Note: Not to be taken by students with credit in C LIT 201/202.

**S C LIT 171 Introduction to the Comparative Study of the Canadian Literatures I**

★3 (fi 6) (first term, 3-0-0). An introductory course designed to compare the basic texts of English-Canadian and French-Canadian literatures. Note: This course is not intended to replace C LIT 100 as a prerequisite for senior courses. Formerly C LIT 271.

**S C LIT 172 Introduction to the Comparative Study of the Canadian Literatures II**

★3 (fi 6) (second term, 3-0-0). An introductory course designed to compare the basic texts of English-Canadian and French-Canadian literatures. Note: This course is not intended to replace C LIT 100 as a prerequisite for senior courses. Formerly C LIT 272.

**S C LIT 201 Literature of the European Tradition I**

★3 (fi 6) (either term, 3-0-0). Major works of European literature in English translations representing the more important periods and genres from antiquity to the Renaissance. Prerequisite: C LIT 100, or ENGL 101, or equivalent. Formerly C LIT 301.

**S C LIT 202 Literature of the European Tradition II**

★3 (fi 6) (either term, 3-0-0). Major works of European literature in English translations representing the more important periods and genres since the Renaissance. Prerequisite: C LIT 100, ENGL 101, or equivalent. Formerly C LIT 302.

**S C LIT 266 Women in World Literature**

★3 (fi 6) (either term, 3-0-0). An examination of major works of world literature (in English translation), by and about women, from antiquity to the present. Prerequisite: C LIT 100, or ENGL 101, or equivalent. Formerly C LIT 366.

**S C LIT 320 Introduction to Medieval Literature**

★3 (fi 6) (either term, 3-0-0). This course is designed to introduce students to the major kinds of medieval literature (epic, romance, lyric, and drama) within a European context. Prerequisite: C LIT 101, or ENGL 101 or equivalent. Note: Not to be taken by students with credit in C LIT 321.

**S C LIT 338 Cross-Cultural Studies in Literature**

★3 (fi 6) (either term, 3-0-0). The focus of this course will vary from year to year. Topics may include: immigrant literature, literature of the diaspora. Prerequisite: C LIT 100, or ENGL 101, or equivalent.

**S C LIT 342 Introduction to Science Fiction**

★3 (fi 6) (either term, 3-0-0). A comparative survey of major works and tendencies in science fiction, as an international phenomenon, combined with a theoretical examination of the genre. Prerequisite: C LIT 100, or ENGL 101, or equivalent or consent of Department.

**S C LIT 343 Introduction to Fairy Tales and Folk Tales**

★3 (fi 6) (either term, 3-0-0). A survey of European fairy tales, in English translation, as well as an introduction to major critical and theoretical approaches to the folk tale in general and the fairy tale in particular.

**S C LIT 344 The Forms of Narrative**

★3 (fi 6) (first term, 3-0-0). A systematic survey of the main components of narrative with the major emphasis placed on Continental theories. Prerequisite: C LIT 100, or ENGL 101, or equivalent. Formerly C LIT 244.

**S C LIT 345 The Forms of Poetry**

★3 (fi 6) (second term, 3-0-0). The elements and levels of the poetic text with the major emphasis placed on Continental theories. Prerequisite: C LIT 100, ENGL 101, or equivalent. Formerly C LIT 245.

**S C LIT 346 The Forms of Drama**

★3 (fi 6) (either term, 3-0-0). A systematic survey of the basic components of dramatic structure with emphasis on European literatures and theories. Prerequisite: C LIT 100, or ENGL 101 or equivalent. Formerly C LIT 246.

**S C LIT 349 Introduction to the Western Tradition in Literary Criticism II**

★3 (fi 6) (either term, 3-0-0). An international survey of the major developments in Western literary criticism from neoclassicism to the romantic age. Prerequisite: C LIT 348.

**S C LIT 354 Classical Indian Literature and World Literature**

★3 (fi 6) (either term, 3-0-0). A survey of classical works in Sanskrit, Pali, and Prakrit in translation that influenced the literatures of East Asia, Central Asia, and the Western World. The emphasis will be on how the narratives and motives undergo a metamorphosis in crossing cultural and linguistic boundaries. Prerequisite: either C LIT 100 or RELIG 101, or consent of Division.

**S C LIT 356 Comparative Third-World Literatures**

★3 (fi 6) (either term, 3-0-0). Introduction to the comparative study of the literatures of Asia, Africa, and Latin America (including the Caribbean). Prerequisite: C LIT 100, or ENGL 101, or equivalent.

**S C LIT 357 Modern Middle Eastern Literature**

★3 (fi 6) (either term, 3-0-0). A survey, in translation, of trends in modern Arabic, Persian and Turkish literature. Prerequisite: C LIT 100, or ENGL 101, or equivalent.

**S C LIT 358 Introduction to the Study of Themes and Motifs**

★3 (fi 6) (either term, 3-0-0). The study of selected international themes and motifs, their origin, and their literary development. Prerequisite: C LIT 100, or ENGL 101, or equivalent.

**S C LIT 360 Marginalized Literatures**

★3 (fi 6) (either term, 3-0-0). An introduction to lesser known literatures. Prerequisite: C LIT 100, or ENGL 101, or equivalent.

**S C LIT 362 International Movements in Contemporary Literature**

★3 (fi 6) (either term, 3-0-0). This course is designed to introduce the student to such topics as literature of the absurd, existential literature, and surrealism. Prerequisite: C LIT 100, or ENGL 101, or equivalent.