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All courses in this Calendar will be offered in 2001-02 unless a ● appears to the left of the course number. No description will appear after the title if the course is not given in the current year, descriptions can usually be found in preceding Calendars.

The letters which form part of course numbers have the following significance:

- A – fall term
- B – winter term
- D – fall term and winter term
- C – summer session courses starting in May
- L – summer session courses starting in June
- T – summer session courses starting in July
- E – winter term and summer session
- G – summer session and fall term
- H – fall term, winter term and summer session
- J – winter term, summer session and fall term
- K – summer session, fall term and winter term
- N – winter term and fall term

1 Agricultural and Biosystems Engineering

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Chair — G.S.V. Raghavan

1.1 Staff

Emeritus Professor

R.S. Broughton; B.S.A., B.A.Sc.(Tor.), S.M.(M.I.T.), Ph.D.(McG.),
LL.D.(Dal.)

Professors

S. Barrington; B.Sc.(Agr. Eng.), Ph.D.(McG.)

R. Kok; B.E.Sc., Ph.D.(W.Ont.)

C.A. Madramootoo; B.Sc.(Agr. Eng.), M.Sc., Ph.D.(McG.) (*James
McGill Professor*)

E. McKyes; B.Eng., M.Eng., Ph.D.(McG.)

S.O. Prasher; B.Tech, M.Tech.(Punj.), Ph.D.(Br.Col.)

G.S.V. Raghavan; B.Eng.(B'lore), M.Sc.(Guelph), Ph.D.(Colo.St.)

Associate Professors

E.R. Norris; B.S.A.(Tor.), M.Sc.(Guelph), Ph.D.(Mich. St.)

J. Sheppard; B.Sc.(Eng.)(Guelph), M.E.Sc.(W.Ont.), Ph.D.(McG.)

Brace Centre for Water Resources Management

Associate Professor

R.B. Bonnell; B.Sc.(Geo.), B.Sc.(Agr.Eng.), M.Sc., Ph.D.(McG.)

Assistant Professors

S. Babarutsi; B.Sc.(Agr.Eng.), M.Eng., Ph.D.(McG.)
(Special Category, Part-time)

J.A. Landry; B.Sc.(Agr.Eng.), Ph.D.(McG.)

M.O. Ngadi; B.Eng.(Agr.Eng.), M.A.Sc., Ph.D.(Dal.Tech.)

Auxiliary Professors

N.B. McLaughlin, B. Paterson, A. Shady, G. Sunahara,

C. Vigneault

Research Associates

P. Enright, V. Orsat

1.2 Programs Offered

The Department offers facilities for research in the areas of bio-systems engineering, agricultural structures, plant and animal environment, hydrology, irrigation, drainage, farm water supply for people and livestock, water quality, waste management, environmental pollution from agrochemicals, bio-remediation of industrial

English, by appropriate exams, e.g. TOEFL (minimum score 550 on the paper-based test or 213 on the computer-based test) or IELTS (minimum 6.5). The MCHE is not considered equivalent. Results must be submitted as part of the application. The University code is 0935 (McGill University, Montreal); department code is 31 (graduate schools), Biological Sciences - Agriculture.

Graduate Record Exam (GRE) – The GRE is not required, but it is highly recommended.

Financial aid is very limited and highly competitive. It is suggested that students give serious consideration to their financial planning before submitting an application.

Acceptance to all programs depends on a staff member agreeing to serve as the student's supervisor and the student obtaining financial support. Normally, a student will not be accepted unless adequate financial support can be provided by the student and/or the student's supervisor. Academic units cannot guarantee financial support via teaching assistantships or other funds.

Qualifying Students – Some applicants whose academic degrees and standing entitle them to serious consideration for admission to graduate studies, but who are considered inadequately prepared in the subject selected may be admitted to a *Qualifying Program* if they have met the Faculty of Graduate Studies and Research minimum CGPA of 3.0/4.0. The course(s) to be taken in a *Qualifying Program* will be prescribed by the academic unit concerned. *Qualifying students* are registered in the Faculty of Graduate Studies and Research, **but not as candidates for a degree**. Only one qualifying year is permitted. **Successful completion of a qualifying program does not guarantee admission to a degree program.**

1.5 Program Requirements

M.Sc.

biosystem engineering (design, construction, maintenance, operation, expansion), especially in agroecosystems. Topics include: neural networks rule-based expert systems, databases, control networks, artificial life.

- **336-504B INSTRUMENTATION AND CONTROL.** (3) (3 hours lectures and 2 hours lab)
- **336-506A,B,C ADVANCES IN DRAINAGE AND WATER MANAGEMENT.** (3) (Three weeks intensive course.)
- **336-509A,B HYDROLOGIC SYSTEMS AND MODELLING.** (3) (3 hours lectures)
- **336-512B SOIL CUTTING, TILLAGE AND TRENCHING.** (3) (2 hours lectures and 2 hours lab)
- 336-514B DRAIN PIPE AND ENVELOPE MATERIALS.** (3) Plastic, concrete, ceramic and geotextile drainage materials. Production, processing and management sciences. Quality control, testing, inventory management, handling, uses. Granular media for drainage.
- 336-515B COMPUTER MODELS IN DRAINAGE ENGINEERING.** (3) A review of computer simulation models of designing subsurface drainage systems. Use of CAD systems in design and drafting drainage plans. In depth discussion and applications of DRAINMOD and SWATRE, two microcomputer based models for designing and evaluating drainage water management systems for soils with high water tables, analysis of climatic and parametric uncertainties in the design.
- **336-516A PREPARATION AND APPRAISAL OF DRAINAGE PROJECTS.** (3)
- **336-517A DRAINAGE PROJECT CONTRACTS, INSTALLATION AND MANAGEMENT.** (3)
- 336-518A POLLUTION CONTROL FOR AGRICULTURE.** (3) (3 hours lectures) Special topics concerning control of pollution agents from the agri-food industry; odour control, waste treatment including biological and chemical treatments, land disposal and wet lands.
- 336-519A ADVANCED FOOD ENGINEERING.** (3) Advanced topics in food engineering concepts of mathematical modelling and research methodologies in food engineering. Topics include heat and mass transfer in food systems, packaging and distribution of food products, thermal and non-thermal processing, rheology and kinetics of food transformations.
- 336-525B VENTILATION OF AGRICULTURAL STRUCTURES.** (3) The analyses of heat and water vapour transfer through the structure of buildings are used to design heating, ventilation and refrigeration systems. Heat conduction, convection and radiation are included in the analysis of heat transfer. Ventilation systems are designed for livestock shelters, produce storages and greenhouses.
- 336-530B FERMENTATION ENGINEERING.** (3) (3 lectures and one 3-hour lab) (Prerequisite 336-325 or equivalent) Advanced topics in food and fermentation engineering are covered, emphasizing bioreactor engineering and bioprocess control in the development and optimization of new food and fermentation processes.
- **336-605A FUNCTIONAL ANALYSIS OF AGRICULTURAL MACHINES.** (3) (3 hours lectures)
- **336-607B ENGINEERING ASPECTS OF PLANT ENVIRONMENT.** (3) (3 hours lectures)
- 336-608A,B,C SPECIAL PROBLEMS IN AGRICULTURAL ENGINEERING.** (3) (2 conferences, either term) Laboratory, field and library

336-752A,B,C DEPARTMENTAL SEMINAR PH.D. II. To give seminars and participate in discussions.

336-753A,B,C. DEPARTMENTAL SEMINAR PH.D. III. To give seminars and participate in discussions

336-754A,B,C DEPARTMENTAL SEMINAR PH.D. IV. To give seminars and participate in discussions

336-755A,B,C DEPARTMENTAL SEMINAR PH.D. V. To give seminars and participate in discussions

● **360-612B MATHEMATICAL METHODS.** (3) (3 hours lectures)

2 Agricultural Economics

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Chair — J.C. Henning

2.1 Staff

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J.C. Henning; B.Sc., Ph.D.(Guelph)

P.J. Thomassin; B.Sc.(McG.), M.S., Ph.D.(Hawaii)

Assistant Professors

L.B.B. Baker; S.D.A., D.C.P.(Edin.), D.F.B.O.M.(Aberd.),
M.Sc.(Man.), Ph.D.(McG.)

M. Brown; B.A.(St-Mary's), M.A., Ph.D.(McM.)

Adjunct Professors

Joan Marshall, Peter Goldsmith

2.2 Programs Offered

The Department of Agricultural Economics offers programs leading to the M.Sc. and, with the Faculty of Management, a joint M.Sc./M.B.A. in Agricultural Economics. Students who complete all the degree requirements of the joint program will be awarded two degrees, an M.Sc. and an M.B.A.

It is possible for students to pursue doctoral studies through the

English, by appropriate exams, e.g. TOEFL (minimum score 570 on the paper-based test or 230 on the computer-based test) or IELTS (minimum 7 overall band). The MCHÉ is not considered equivalent. Results must be submitted as part of the application. The University code is 0935 (McGill University, Montreal); department code is 31 (graduate schools), Biological Sciences - Agriculture.

Graduate Record Exam (GRE) – The GRE is not required, but it is highly recommended.

Financial aid is very limited and highly competitive. It is

Application Fee (non-refundable) – A fee of \$60 Canadian must accompany each application (including McGill students), *otherwise it cannot be considered*. This sum must be remitted using one of the following methods:

1. **Certified** personal cheque in Cdn.\$ drawn on a Canadian bank;
2. **Certified** personal cheque in U.S.\$ drawn on a U.S. bank;
3. Canadian Money order in Cdn.\$;
4. U.S. Money Order in U.S.\$;
5. Bank draft in Cdn.\$ drawn on a Canadian bank;
6. Bank draft in U.S.\$ drawn on a U.S. bank, negotiable in Canada;
7. Credit card (by completing the appropriate section of the application form).

Transcripts – Two official copies of all transcripts are required for admission. Transcripts written in a language other than English or French must be accompanied by a certified translation. An explanation of the grading system used by the applicant's university is essential. It is the applicant's responsibility to arrange for transcripts to be sent. **DOCUMENTS SUBMITTED WILL NOT BE RETURNED.**

It is desirable to submit a list of the titles of courses taken in the major subject, since transcripts often give code numbers only. Applicants must be graduates of a university of recognized reputation and hold a Bachelor's degree equivalent to a McGill Honours degree in a subject closely related to the one selected for graduate work. This implies that about one-third of all undergraduate courses should have been devoted to the subject itself and another third to cognate subjects.

The minimum cumulative grade point average (CGPA) is 3.0/4.0 (second-class upper) or 3.2/4.0 during the last two full-time years of university study. High grades are expected in courses

342-504A POPULATION G342-504A P

of literature in relation to the student's proposed research and an experimental design of the research to be conducted.

342-798A,B ANIMAL SCIENCE SEMINAR IV. (1 hour) One of two seminars to be given by all students in a Ph.D. program. Presentation of a current scientific topic which is not related to the student's research. The topic for the presentation should be cleared by the thesis supervisor.

342-701D DOCTORAL COMPREHENSIVE EXAMINATION. (See Faculty Regulations)

360-610A STATISTICAL METHODS II. (3) (3 hours lectures and 2 hours lab) (Prerequisite: 360-310A or equivalent) Principles of linear models, multiple regression equations and classification models. Introduction to Analysis of Variance and common statistical designs used in agricultural and environmental sciences. Emphasis on balanced and unbalanced designs and data structures; their analysis and tests of statistical significance.

5 Anthropology

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M.A. Degree with Research Paper (45 credits)

The Master's degree with research paper is a 45-credit program: 5 courses (15 credits), a Proseminar (6 credits) and the research paper (24 credits).

The student's program of work is developed in consultation with the student's supervisor and the two other members of his or her advisory committee. It consists of: five courses (seminars or tutorials), only one of which is optional, a research paper proposal and the research paper. They must also attend the Proseminar. The research paper will normally be based on library research but can involve limited and preferably local fieldwork. The research paper should demonstrate the student's ability to define a problem, place it in a theoretical and factual context, collect and analyze data, and write up a report.

M.A. Degree in Medical Anthropology (48 credits)

The M.A. program in Medical Anthropology is given jointly by the Department of Anthropology and the Department of Social Studies

- 151-605A,B,D CULTURE AREA. (3)
- 151-607D PROSEMINAR IN ARCHAEOLOGY. (6)
- 151-609D PROSEMINAR IN ANTHROPOLOGY. (6)
- 151-610A,B,D SOCIAL ORGANIZATION. (3)
- 151-611A,B,D RESEARCH DESIGN. (3)
- 151-612A,B,D KINSHIP. (3)
- 151-614A,B,D ECONOMIC ANTHROPOLOGY. (3)
- 151-615A,B,D SEMINAR IN MEDICAL ANTHROPOLOGY. (3)
- 151-616A,B,D POLITICAL ANTHROPOLOGY. (3)
- 151-618A,B,D STRATIFICATION. (3)
- 151-620A,B,D ETHNICITY. (3)
- 151-625A,B,D CULTURAL ECOLOGY. (3)
- 151-630A,B,D SOCIAL CHANGE. (3)
- 151-631A,B,D SYMBOLIC ANTHROPOLOGY. (3)
- 151-633A,B,D WOMEN AND DEVELOPMENT. (3)
- 151-634A,B,D ANTHROPOLOGY OF DEVELOPMENT I. (3)
- 151-635A,B,D ANTHROPOLOGY OF DEVELOPMENT II. (3)
- 151-636A,B,D URBANIZATION. (3)
- 151-638A,B,D COMPLEX SOCIETIES. (3)
- 151-640A,B,D PSYCHOLOGICAL ANTHROPOLOGY. (3)
- 151-642A,B,D ANTHROPOLOGY OF EDUCATION. (3)
- 151-646A,B,D COGNITIVE ANTHROPOLOGY. (3)
- 151-647A,B,D PEOPLING OF THE AMERICAS. (3)
- 151-648A,B,D STRUCTURAL ANTHROPOLOGY. (3)
- 151-650A,B,D ANTHROPOLOGY OF RELIGION. (3)
- 151-651A,B,D ANTHROPOLOGY AND HISTORY. (3)
- 151-652A,B,D ANTHROPOLOGY AND GENDER. (3)
- 151-653A,B,D ANTHROPOLOGY, LANGUAGE AND COGNITION. (3)
- 151-654A,B,D ANTHROPOLOGY OF CHINA. (3)
- 151-656A,B,D ANTHROPOLOGY OF ART. (3)
- 151-660A,B,D RESEARCH METHODS. (3)
- 151-665A,B,D QUANTITATIVE METHODS IN ANTHROPOLOGY. (3)
- 151-670A,B,D ARCHAEOLOGICAL THEORY I. (3)
- 151-671A,B,D ARCHAEOLOGICAL THEORY II. (3)
- 151-673A,B,D ARCHAEOLOGICAL FIELD METHODS. (3)
- 151-674A,B,D ARCHAEOLOGICAL LABORATORY METHODS. (3)
- 151-676A,B,D ARCHAEOLOGICAL AREA. (3)
- 151-678A,B,D ETHNOHISTORY. (3)
- 151-680A,B,D M.A. TUTORIAL READING. (3)
- 151-681A,B,D M.A. TUTORIAL READING. (3)
- 151-682A,B,D M.A. TUTORIAL READING. (3)
- 151-683A,B,D M.A. TUTORIAL READING. (3)
- 151-684A,B,D M.A. TUTORIAL READING. (3)
- 151-685A,B,D RESEARCH TUTORIAL 1. (3)
- 151-686A,B,D RESEARCH TUTORIAL 2. (3)
- 151-687A,B,D RESEARCH TUTORIAL 3. (3)
- 151-688A,B,D RESEARCH TUTORIAL 4. (3)
- 151-690A RESEARCH PAPER I. (6)
- 151-691B RESEARCH PAPER II. (6)
- 151-692B RESEARCH PAPER III. (6)
- 151-693B RESEARCH PAPER IV. (6)
- 151-694A,B M.A. THESIS TUTORIAL I. (6)
- 151-695A,B M.A. THESIS TUTORIAL II. (6)
- 151-696A,B,D M.A. RESEARCH PAPER. (15)
- 151-699A,B,D M.A. THESIS. (24)
- 151-700D PH.D. PRELIMINARY EXAMINATION.
- 151-702A,B,D ADVANCED ANTHROPOLOGICAL THEORY. (3)
- 151-760A,B,D ADVANCED ANTHROPOLOGICAL METHODS. (3)
- 151-770A,B,D ADVANCED ARCHAEOLOGICAL THEORY. (3)
- 151-773A,B,D ADVANCED ARCHAEOLOGICAL METHODS. (3)

301-679 (1) Architectural Journalism
 301-680 (1) Sketching School II
 6 credits of complementaries/electives, of which a minimum of 3 credits must be from an architectural complementary.

Unless otherwise indicated, the above courses are restricted to students in the professional program.

M.Arch.II

The post-professional Masters (M.Arch.II) is open to applicants who have a professional degree in architecture. Students holding the McGill B.Arch. (former) or M.Arch.I (new) degree, or an equivalent professional qualification, with a CGPA of at least 3.0 on a 4.0 point scale, are eligible for admission to the graduate programs. In special cases, applicants with a degree in a related field may be considered. The primary requirement for the M.Arch.II is 30 credits of course work, to be completed in the first two terms, and a 15-credit project report that can be completed during the summer, or in the following fall term. The residence requirement for the M.Arch.II degree is three academic semesters, making it possible for students who elect to work on their project report in the summer term to obtain their degree after twelve calendar months in the program.

Ph.D.

Doctoral candidates must have their thesis proposal approved by their advisor (301-700) before embarking on their research. A Thesis Advisory Committee is then struck and is responsible for monitoring the student's research. For course number 301-701, a comprehensive research proposal is required, as well as a demonstration of broad knowledge in the field. Candidates will submit two further reports in formal meetings with the Advisory Committee, who will review the work in progress (301-702 and 301-703). The final meeting takes place after the Committee has reviewed the full draft of the dissertation. If approved, the dissertation will then be submitted in its final form to the Thesis Office. Acceptance of the thesis by the examiners is followed by an oral defense.

Graduate Diploma in Housing

The Graduate Diploma in Housing is open to applicants who have a professional degree in architecture. The Diploma program is a two-semester program which is intended for professionals who have worked in the area of housing in North America or in the developing world. The program is designed for those who, while wishing to advance their knowledge in the housing field, are not able, or inclined, to undertake studies towards a Master's degree.

6.6 Courses

The names of course instructors are listed on the Course Timetable available on [infoMcGill](http://www.mcgill.ca/students/courses/) via the Web <http://www.mcgill.ca/students/courses/>.

The course credit weight is given in parentheses after the title.

- Denotes courses not offered 2001-02.

301-520B MONTREAL: URBAN MORPHOLOGY. 3(2-1-6) (Prerequisite: 301-251B) Historical, geographical, demographical, and regional evolution of the metropolis of Montreal. Topics include: important *quartiers*, the Montreal urban grid, industrialization, reform movements, geographical diversity, and urban culture, local building techniques and materials, basic concepts of urban morphology and their relationships to the contemporary urban context. Section 01 reserved for Architecture students. Section 02 reserved for others, limited enrolment.

- **301-521B STRUCTURE OF CITIES.** 3(2-0-7)

301-522A HISTORY OF DOMESTIC ARCH. IN QUEBEC. 3(2-0-7) (Prerequisite: 301-251B) The architecture of houses in Quebec from 1650 to the present. Distinguished buildings are reviewed from the point of view of form, style, siting and material, as influenced by climate, culture and architectural antecedents in France, England and the United States. The course material is presented through alternating bi-weekly lectures and seminars. Limited enrolment; password card required.

- **301-523B SIGNIFICANT TEXTS & BUILDINGS.** 3(2-0-7) (Prerequisite: 301-251B) (Alternating with 301-524B)

301-524B SEMINAR ON ARCHITECTURAL CRITICISM. 3(2-0-7) (Prerequisite: 301-251B) (Alternating with 301-523B) The development and current role of architectural criticism with particular reference to its affinities with art and literary criticism. Limited enrolment; password card required.

301-525A SEMINAR ON ANALYSIS AND THEORY. 3(2-0-7) Analysis and evaluation of significant architectural projects with reference to contemporary architectural theories. Limited enrolment; password card required.

301-526B PHILOSOPHY OF STRUCTURE. 3(2-0-7) (Prerequisite: 301-202B or permission of instructor.) Philosophy of Structure aims to investigate structure in its broadest sense. The course is divided in two halves; the first one gives an overview of the development of theoretical structural frameworks such as mathematics and geometry, while the second one highlights physical structures constructed by nature (geology, turbulence), man or animals. Section 01 reserved for Architecture students. Section 02 reserved for others; password card required.

301-527B CIVIC DESIGN. 3(2-0-7) The elements of form in buildings and their siting design in the urban setting. Section 01 reserved for Architecture students. Section 02 reserved for others.

301-528A HISTORY OF HOUSING. 3(2-0-7) Indigenous housing both transient and permanent, from the standpoint of individual structure and pattern of settlements. Principal historic examples of habitat including housing in the age of industrial revolution, and contemporary housing. Section 01 reserved for B.Sc.(Arch.) students. Section 02 reserved for Masters of Architecture students. Section 03 reserved for Urban Planning students. Section 04 reserved for Urban Systems students. Section 05 reserved for Engineering students.

301-529B HOUSING THEORY. 3(2-0-7) (Prerequisite: 301-528A) A review of environmental alternatives in housing; contemporary housing and the physical and sociological determinants that shape it; Canadian housing. Section 01 reserved for Architecture students. Section 02 reserved for others.

301-531A ARCH. INTENTIONS FROM VITRUVIUS TO RENAISSANCE. 3(2-0-7) (Prerequisite: 301-251B) Architectural intentions embodied in buildings and writings of architects from Antiquity to the Renaissance. Special emphasis is placed on the cultural connections of architecture to science and philosophy. Section 01 reserved for Architecture students. Section 02 reserved for others.

301-532B ORIGINS OF MODERN ARCHITECTURE. 3(2-0-7) (Prerequisite: 301-251B) Examination of architectural intentions (theory and practice) in the European context (especially France, Italy and England), during the crucial period that marks the beginning of the modern era. Section 01 reserved for Architecture students. Section 02 reserved for others.

301-540A,B SELECTED TOPICS IN ARCHITECTURE I. 3(2-0-7) A course to allow the introduction of new topics in Architecture as needs arise, by regular and visiting staff.

301-541A,B SELECTED TOPICS IN ARCHITECTURE II. 3(2-0-7) A course to allow the introduction of new topics in Architecture as needs arise, by regular and visiting staff.

301-550B URBAN PLANNING I. 3(2-0-7) (Prerequisite: B.Sc.(Arch.) or permission of instructor.) Theory and practice. An examination of different basic approaches to urban planning with special reference to Quebec. Section 01 reserved for Architecture students. Section 02 reserved for others, limited enrolment, password card required.

301-551A URBAN PLANNING II. 3(2-0-7) (Prerequisite: 301-550B) Urban design and project development, theory and practice. Detailed analysis of selected examples of the development process and of current techniques in urban design. Includes case studies from Quebec and elsewhere. Section 01 reserved for Architecture students. Section 02 reserved for others, limited enrolment, password card required.

7 Art History

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Chair — Christine Ross (*on leave Jan.-Dec. 2001*)

Director, Graduate Programs in Art History — Hans J. Böker

Director, Graduate Programs in Communication — Will Straw

7.1 Staff

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George Galavaris; M.A.(Athens), M.F.A., Ph.D.(Prin.), F.R.S.C.
George Szanto; B.A.(Dart.), Ph.D.(Harv.)

Professor

Hans J. Böker; Ph.D.(Saarbrücken), Dr. Ing.-habil(Hannover)

Associate Professors

David Crowley; B.A.(Johns H.), M.Sc.(Penns.), Ph.D.(McG.)
Christine Ross; M.A.(C' dia.), Ph.D.(Paris I) (*on leave Jan. to June 2001*)

Will Straw; B.A.(Carl.), M.A., Ph.D.(McG.)

Assistant Professors

Ting Chang; B.A.(McG.), M.A.(Tor.), Ph.D.(Sussex)
Sheryl N. Hamilton; L.L.B.(Sask.), B.A., M.A.(Carl.), Ph.D.(C' dia)
Bronwen Wilson; B.A., M.A.(U.B.C.), Ph.D.(Northwestern)

Assistant Professor (Special Category)

Johanne Sloan; B.F.A.(C' dia), M.A.(Montr.), Ph.D.(Kent)

Adjunct Professors

David W. Booth; B.A., M.A., M.Phil., Ph.D.(Tor.)
Johanne Lamoureux; B.A., M.A.(Montr.), Ph.D.(E.H.E.S.S., Paris)
Louis De Moura Sobral; M.A., Ph.D.(Louvain)
Grant McCracken; B.A.(Antioch), M.A., Ph.D.(Chic.)
Don McGregor; B.A.(Tor.), M.A.(Carl.), Federal Government
Interchange Canada
Constance Naubert-Riser; B.A., M.A.(Ott.), Ph.D.(Lyon III)
Jocelyne Picot; B.A.(Montr.), M.A.(Con.), Ph.D.(S. Fraser)

7.2 Programs Offered

M.A. and Ph.D.

Areas of Specialization:

1. Classical and Aegean Archaeology
2. Greek Epigraphy
3. Archaeological Methods and Archaeometry
4. Western Medieval Art
5. Medieval Architecture
6. Post Medieval Architecture
7. Renaissance Art
8. Baroque Art
9. Late Eighteenth, Nineteenth and Early Twentieth-Century Art
10. The Art of W.W. I to the Present
11. Canadian Art
12. Methodology
13. Feminist Art History

For programs in Communications refer to [section 18](#).

7.3 Admission Requirements

Entrance into either the M.A. or Ph.D. programs is limited to the best qualified applicants. A minimum CGPA of 3.3 or the equivalent, i.e. 75%, is required.

To apply to the M.A. program, candidates are normally expected to have a B.A. Honours degree either in Art History alone or in

include large scale air/sea interaction, air/sea-ice interaction, inter-annual and longer term variability of the atmosphere and oceans, and cloud-radiation climate interaction.

Other faculty members are associated with the Cooperative Centre for Research in Mesometeorology which also includes researchers in several other departments at McGill, in the Département de Physique at the Université du Québec à Montréal, and in Montreal offices of the Meteorological Service of Canada. The objective of the Centre is to study the evolution, maintenance and decay of mesoscale precipitation systems. Such systems, whose sizes range from 10 to 300 km, are important for the precipitation climatology of southern Quebec.

Facilities include the J. Stewart Marshall Radar Observatory, a radar wind profiler and a laser ceilometer and several years of global atmospheric data. Graduate students have access to large and small computers, including the NEC supercomputer of the Meteorological Service of Canada. Financial assistance in the form of research or teaching assistantships is available for all qualified graduate students.

8.3 Admission Requirements

Applicants for the M.Sc. program must meet the general requirements of the Faculty of Graduate Studies and Research and hold a bachelor's degree with high standing in atmospheric science, physics, mathematics, engineering, or equivalent.

The normal requirement for admission to the Ph.D. program is an M.Sc. degree in atmospheric science, physical oceanography, or related discipline with acceptably high standing. Students without a Master's degree in Atmospheric Science (Meteorology) or Physical Oceanography but with a strong background in related disciplines (physics, mathematics, engineering) may be admitted to the Ph.D. program. They enter at the Ph.D. I rather than the Ph.D. II level, and devote the first year of the program mainly to course work.

Inquiries should be addressed directly to the Chair of Admissions, Department of Atmospheric and Oceanic Sciences.

8.4 Program Requirements

M.Sc. Degree

Depending on their background, students must take from 9 to 27 credits of courses chosen from any course offered by the Department at the 500 and 600 levels, up to but not including 195-691. In some instances, courses in this Department may be replaced by courses given by other departments at the 500 level or higher with the approval of the Department. Usually, students with no previous background in atmospheric science (or physical oceanography) are required to take 27 credits of courses, while students with a strong B.Sc. or Diploma in meteorology or a related field may take as few as 9 credits of courses.

Students must also complete a minimum of 24 thesis-research credits from 195-691, 195-692, 195-693, 195-694, 195-695, 195-696 and 195-699. All students must take seminar course 195-694 and complete 195-699. The M.Sc. degree requires a minimum of 45 credits in total. This includes course credits, a minimum of 12 thesis credits and the completion of a thesis satisfying all the requirements of the Faculty of Graduate Studies and Research. Normally the equivalent of 12 months of full-time work is required to obtain these thesis-research credits, in addition to the time needed for the courses mentioned in the preceding paragraph. It is possible for students to write a thesis based on research in atmospheric, oceanic, or climate topics.

Ph.D. Degree

The Ph.D. program consists of supervised research and normally a minimum of two approved courses. Candidates are required to submit a written thesis proposal, to present a Ph.D. proposal seminar and to take the Ph.D. oral comprehensive examination. The ordinary Faculty requirements concerning a thesis must be satisfied.

Ph.D. students may also register in the Collaborative McGill-UQAM Ph.D. program. These students register at McGill

University but are supervised by a faculty member at l'Université du Québec à Montréal. Further details are available from the Department's Graduate Coordinator and from the Chair.

8.5 Courses for Higher Degrees

NOTE: All undergraduate courses administered by the Faculties of Arts and of Science (courses at the 100- to 500-level) have limited enrolment.

The names of course instructors are listed on the Course Timetable available on *infoMcGill* via the Web <http://www.mcgill.ca/students/courses/>.

The course credit weight is given in parentheses after the title.

- Denotes courses not offered 2001-02.

195-512A ATMOSPHERIC AND OCEANIC DYNAMICS. (3) (3 hours) Introduction to the fluid dynamics of large-scale flows of the atmosphere and oceans. Stratification of atmosphere and oceans. Equations of state, thermodynamics and momentum. Kinematics, circulation, and vorticity. Hydrostatic and quasi-geostrophic flows. Brief introduction to wave motions, flow over topography, Ekman boundary layers, turbulence.

195-513B WAVES AND STABILITY. (3) (3 hours) Linear theory of waves in rotating and stratified media. Geostrophic adjustment and model initialization. Wave propagation in slowly varying media. Mountain waves; waves in shear flows. Barotropic, baroclinic, symmetric, and Kelvin-Helmholtz instability. Wave-mean flow interaction. Equatorially trapped waves.

● **195-515B TURBULENCE IN THE ATMOSPHERE AND OCEANS.** (3) (3 hours)

195-530A CLIMATE DYNAMICS I. (3) (3 hours) Introduction to the components of the climate system. Review of paleoclimates. Physical processes and models of climate and climate change.

195-531B CLIMATE DYNAMICS II. (3) (3 hours) The general circulation of the atmosphere and oceans. Atmospheric and oceanic general circulation models. Observations and models of the El Niño and Southern Oscillation phenomena.

195-540A SYNOPTIC METEOROLOGY I. (3) (2-hour lecture, 2-hour lab) Analysis of current meteorological data. Description of a geostrophic, hydrostatic atmosphere. Ageostrophic circulations and hydrostatic instabilities. Kinematic and thermodynamic methods of computing vertical motions. Tropical and extratropical condensation rates. Barotropic and equivalent barotropic atmospheres.

● **195-541B SYNOPTIC METEOROLOGY II.** (3) (2-hour lecture, 2-hour lab)

195-546B CURRENT WEATHER DISCUSSION. (1) (1.5 hours) Thrice-weekly briefings on atmospheric general circulation and current weather around the world using satellite data, radar observations, conventional weather maps, and analyses and forecasts produced by computer.

195-550A SPECIAL TOPICS IN METEOROLOGY AND OCEANOGRAPHY I. (1) (1 hour) Lectures and seminars on special topics such as hydrology, agricultural meteorology, the limits of predictability, planetary atmospheres, atmospheric and oceanic pollution, coastal currents, and research reviews.

● **195-551B SPECIAL TOPICS IN METEOROLOGY AND OCEANOGRAPHY II.** (1) (1 hour)

● **195-558B NUMERICAL METHODS AND LABORATORY.** (3) (1 hour lecture; 4 hours lab)

195-568B OCEAN PHYSICS. (3) (3 hours) (Prerequisite: 195-512A or permission of instructor) Research methods in physical oceanography including data analysis and literature review. Course will be divided into five separate modules focussing on temperature-salinity patterns, ocean circulation, boundary layers, wave phenomena and tides.

● **195-616A OR B TOPICS IN GEOPHYSICAL FLUID DYNAMICS.** (3) (3 hours)

★ **195-619B ADVANCED ATMOSPHERIC CHEMISTRY.** (4) (3 hours) (Prerequisites: 180-213, 180-273, 189-222 and 189-315 or equiv-

Marc Therrien (*Clin. Res. Inst.*); Andrew C. Storer (*B.R.I.*);
André Veillette (*Clin. Res. Inst.*); Lee A. Wall (*U. de Mtl.*)

9.2 Programs Offered

The Department of Biochemistry offers training at both the M.Sc. and Ph.D. levels. There are a wide variety of areas in which specialized training for the Ph.D. can be obtained.

The Department concentrates on the following key areas of research: signal transduction; molecular genetics; gene regulation; oncogenes; structure, function & regulation of proteins; membrane structure, function and assembly; intracellular protein targeting; embryonic development and cellular neurobiology. A summary of the research interest of faculty members is available on the Department homepage at <http://www.biochem.mcgill.ca>.

Funding

All graduate students in Biochemistry receive financial support.

advances in our understanding of gene function and its control in normal and diseased cellular systems will be discussed in depth. Course given based on minimum registration of 10 students. Contact Student Affairs Officer for information.

● ★ **507-604A MACROMOLECULAR STRUCTURE.** (3) (Prerequisite: 507-450A or equivalent) (Lectures in French and English)

507-696A,B,C RESEARCH SEMINAR. (3) (Open to M.Sc. Biochemistry students only.) Compulsory participation in the departmental seminar series. Graded pass/fail, based on participation.

507-697A,B,C THESIS RESEARCH I. (9)

507-698A,B,C THESIS RESEARCH II. (12)

507-699A,B,C THESIS RESEARCH III. (15)

507-701A,B RESEARCH SEMINAR I. (Biochemistry graduate students.) Presentation on original current laboratory research carried out by student.

507-702A,B PH.D. THESIS PROPOSAL. (Biochemistry graduate students.) Dissertation presented to Committee.

507-703A,B RESEARCH SEMINAR II. (Ph.D. students in Biochemistry.) Presentation of the planned thesis including central findings and original contribution to knowledge in the field of research.

516-615B MEMBRANE CARBOHYDRATES. (3) The structure, function and biosynthesis of glycoproteins, glycolipids and glycoaminoglycans, and the biological role of complex carbohydrates at the cell surface.

ADVANCED UNDERGRADUATE COURSES

507-311A METABOLIC BIOCHEMISTRY. (3) (Prerequisites: 177-200A, 177-201B, or 507-212B, 180-222A,B) The generation of metabolic energy in higher organisms with an emphasis on its regulation at the molecular, cellular and organ level. Chemical concepts and mechanisms of enzymatic catalysis are also emphasized. Included: selected topics in carbohydrate, lipid and nitrogen metabolism; complex lipid and biological membranes; hormonal signal transduction.

507-312B BIOCHEMISTRY OF MACROMOLECULES. (3) (Prerequisites: 507-311A, 177-200A, 507-212B or 177-201B) Gene expression from the start of transcription to the synthesis of proteins, their modifications and degradation. Topics covered: purine and pyrimidine metabolism; transcription and its regulation; mRNA processing; translation; targeting of proteins to specific cellular sites; protein glycosylation; protein phosphorylation; protein turn-over; programmed cell death (apoptosis).

507-404B BIOPHYSICAL CHEMISTRY. (3) (Prerequisites: 180-204A,B, 180-214B or equivalent.) (This course is also listed as Chemistry 180-404B. Not open to students who have taken or are taking 180-404B) Hydrodynamic and electrophoretic methods for separation and characterization of macromolecules. Optical and magnetic resonance spectroscopy of biopolymers, and applications to biological systems.

507-450A PROTEIN STRUCTURE AND FUNCTION. (3) (Prerequisites: 507-311A, 507-312B and/or sufficient organic chemistry. Intended primarily for students at the U3 level.) Primary, secondary, tertiary, and quaternary structure of enzymes. Active site mapping and site-specific mutagenesis of enzymes. Enzyme kinetics and mechanisms of catalysis. Multienzyme complexes.

507-454A NUCLEIC ACIDS. (3) (Prerequisites: 507-311A, 507-312B or permission of the instructor.) Chemistry of RNA and DNA, transcription and splicing of RNA and their control, enzymology of DNA replication. Special topics on transgenics, genetic diseases, and cancer.

507-455B NEUROCHEMISTRY. (3) (Prerequisites: 507-311A, 507-312B or permission of instructor.) Covers biochemical mechanisms underlying central nervous system function. Introduces basic neuroanatomy, CNS cell types and morphology, neuronal excitability, chemically mediated transmission, glial function. Biochemistry of specific neurotransmitters, endocrine effects on brain, brain energy metabolism and cerebral ischemia (stroke).

With examples, where relevant, of biochemical processes disrupted in human CNS disease.

507-458B MEMBRANES AND CELLULAR SIGNALING. (3) (Prerequisites: 507-212B, 504-262B; one of 552-201A, 552-209A or 177-205B; one of 507-312B or 504-365A; and 507-311A or permission of instructors.) (This course is also listed as 504-458B. Not open to students who have taken or are taking 504-458B or 507-456B.) An integrated treatment of the properties of biological membranes and of intracellular signaling, including the major role that membranes play in transducing and integrating cellular regulatory signals. Biological membrane organization and dynamics: membrane transport; membrane receptors and their associated effectors; mechanisms of regulation of cell growth, morphology, differentiation and death.

10 Bioethics

For information, write to:
Chair, Master's Specialization in Bioethics
Biomedical Ethics Unit
3690 Peel Street
Montreal, QC H3A 1W9
Canada
Telephone: (514) 398-6980 or (514) 398-7406
Fax: (514) 398-8349
Email: bioethics@falaw.lan.mcgill.ca
Website: <http://www.biomedicalethicsunit.mcgill.ca>

Chair — W. Glannon

10.1 Staff

E. Bereza, N. Gilmore, W. Glannon, K. Glass, D. Jones, L. Turner, K. Young

10.2 Programs Offered

Master's Specialization in Bioethics

The Master's Specialization in Bioethics is sponsored by the:
Faculty of Medicine, Department of Experimental Medicine;
Faculty of Law, Institute of Comparative Law;
Faculty of Religious Studies; and
Faculty of Arts, Department of Philosophy.

Students receive an M.A., LL.M. or M.Sc. degree in the discipline chosen with a specialization in Bioethics.

10.3 Admission Requirements

M.D., bachelor's level professional training in a health science, or bachelor's degree in law, philosophy or religious studies. Other students may be considered on an individual basis.
Enrolment is limited to 12 students.

10.4 Application Procedures

Applications are made initially through the Biomedical Ethics Unit in the Faculty of Medicine, which administers the program and teaches the core courses.

Applicants must be accepted first by the appropriate Faculty and then by the Bioethics Graduate Studies Advisory Committee.

10.5 Program Requirements

The curriculum is composed of required courses (for 6 credits) offered in the Biomedical Ethics Unit, bioethics courses (3 credit minimum) offered by the base faculty or d DPPPxççe&CThe ççuPLIdAe5parôPblpar8f

Assistant Professors

Thomas E. Bureau; B.Sc.(Calif), Ph.D.(Texas)
Joseph Dent; B.Sc.(Mich), Ph.D.(Colo.)
Kevin McCann; B.A.(Dart), M.Sc., Ph.D.(Guelph)
Laura Nilson; B.A.(Colgate), Ph.D.(Yale)
Richard Roy; B.Sc.(Bishop's), Ph.D.(Laval)
Amanda Vincent; B.Sc.(W. Ont.), M.Sc.(U.B.C), Ph.D.(Camb.)
(*William Dawson Scholar*)

Associate Members

Salvatore Carbonetto (*Mtl. General Hospital*); Hugh Clarke (*Royal Victoria Hospital*); Pierre Drapeau (*Mtl. General Hospital*); Robert Dunn (*Mtl. General Hospital*); Michael Ferns (*Mtl. General Hospital*); David Green (*Redpath Museum*); Kenneth Hastings (*Mtl. Neurological Ins.*); Paul Holland (*Mtl. Neurological Inst.*); Roberta Palmour (*Allan Memorial Institute*); David Rosenblatt (*Royal Victoria Hospital*); Guy Rouleau (*Mtl. General Hospital*); Charles R. Scriver (*Mtl. Children's Hospital Research Inst.*); Teruko Taketo (*Royal Victoria Hospital*); Harriet S. Tenenhouse (*Mtl. Children's Hospital Research Inst.*); David Y.Thomas (*Biochemistry Dept.*)

Adjunct Professors

Wing Y. Cheung (DNA Landmarks); Wayne Hunte (U. West Indies); Benoit S. Landry (DNA Landmarks); William C. Leggett B.A., M.Sc. (Wat), Ph.D.(McG.), F.R.S.C. (Queen's University);

● ★**177-530B NEURAL BASIS OF BEHAVIOUR.** (3) (1 hour lecture, 2 hours seminar) (Prerequisite: 177-306A or 552-311A or 204-308A. Not open to students who have taken 177-430.)

177-531A NEUROBIOLOGY LEARNING MEMORY. (3) (3 hours lecture and discussion) (Prerequisite: 177-306A or permission. Not open to students who have taken 177-431.) Properties of nerve cells that are responsible for learning and memory. Recent advances in the understanding of neurophysiological, biochemical and structural processes relevant to neural plasticity. Emphasis on a few selected model systems involving both vertebrate and invertebrate animals. (Awaiting University Approval)

177-532B DEVELOPMENTAL NEUROBIOLOGY

Associate Members

J. Gotman (*Neurology & Neurosurgery*); B.N. Segal (*Otolaryngology*); T. Steffen (*Surgery*); C. Thompson (*Neurology & Neurosurgery*)

Adjunct Professors

J.H.T. Bates (VT); W.F. Decraemer (U. Antwerp); I.W. Hunter (M.I.T.), T.M. Peters (U.W.O.), P.L. Weiss (Hebrew)

Research Associates

C. Baker, D. Guitton, A. Katsarkas

12.2 Programs Offered

The Department offers a graduate training program leading to Master's (M.Eng.) and Ph.D. degrees in Biomedical Engineering.

It provides instruction and opportunities for interdisciplinary research in the application of engineering, mathematics, and the physical sciences to problems in medicine and the life sciences. Courses are offered for graduate students in the life sciences and in engineering and the physical sciences.

Excellent laboratory facilities for basic and applied research are available in the Department and in the laboratories of associated staff located elsewhere in the Medical Faculty. The Department operates a network of high performance workstations and well-equipped mechanical and electronics workshops.

Basic research in the Department concentrates on the application of quantitative engineering analysis methods to basic biomedical research problems. Currently active areas of research include: neuromuscular and postural control, muscle mechanics, the vestibular system, oculomotor control, the auditory system, joint prosthetics, biomaterials, artificial cells and organs, and medical imaging. Staff members are also active in more applied research related to the development of quantitative analysis tools and instruments for biomedical research. Areas of activity here include: signal analysis, system identification, modeling, simulation and parameter estimation, image processing, pattern recognition, ultrasound, and biorobotics.

12.3 Admission Requirements

See minimum admission requirements in Section 5 of the General Information section of the Graduate Faculty Calendar.

12.4 Application Procedures

Please address enquiries directly to the Department.

12.5 Program Requirements

Master's degrees (M.Eng.) require students to complete a minimum of 45 credits (24 thesis credits and 21 graduate course credits).

Graduate students may also be registered through departments of Medicine, Science and Engineering, and must then fulfill the requirements for advanced degrees imposed by their respective departments.

In addition, all students are required, through course work and independent study, to achieve a degree of inter-disciplinary competence appropriate to their area of specialization.

12.6 Courses for Higher Degrees

The names of course instructors are listed on the Course Timetable available on [infoMcGill](http://www.mcgill.ca/students/courses/) via the Web <http://www.mcgill.ca/students/courses/>.

The course credit weight is given in parentheses after the title.

399-501A SELECTED TOPICS IN BIOMEDICAL ENGINEERING. (3)

An overview of how techniques from engineering and the physical sciences are applied to the study of selected physiological systems and biological signals. Using specific biological examples, systems will be studied using: signal or finite-element analysis, system analysis and identification, modelling and simulation, computer control of experiments and data acquisition.

399-502B BME MODELING AND IDENTIFICATION. (3) (Prerequisites: Undergraduate basic statistics and: either 399-519A, or

Signals and Systems (e.g., 304-303 & 304-304) or equivalent). Methodologies in biological control systems or distributed multi-dimensional biological processes, with interactive sessions using real biological data in a Matlab environment. System themes include parametric vs non-parametric system representations; linear/non-linear; noise, transients and time variation; and relevant identification approaches in continuous and discrete time formulations.

399-503B BIOMEDICAL INSTRUMENTATION AND MEASUREMENT

TECHNIQUE. (3) (2 hours lecture, 1 hour laboratory) A review of the principles and practice of making biological measurements in the laboratory, including theory of linear systems, data sampling, computer interfaces, basic electronic circuit design and machining. Laboratory facilities allow students to experiment with computer-based data acquisition.

399-519A ANALYSIS OF BIOMEDICAL SYSTEMS AND SIGNALS. (3)

(Prerequisites: Satisfactory standing in U3 Honours Physiology (Neurophysiology option); or U3 Major in Physics-Physiology; or permission of instructor.) An introduction to the theoretical framework, experimental techniques and analysis procedures available for the quantitative analysis of biomedical systems and signals. Lectures plus laboratory work using the Biomedical Engineering computer system. Topics include: amplitude and frequency structure of signals, filtering, sampling, correlation functions, time and frequency-domain descriptions of systems.

563-607A INTRODUCTION TO MEDICAL IMAGING. (3) (3 hours lectures/week) A review of the principles of medical imaging as applied to conventional diagnostic radiography, digital subtraction radiography, computed tomography and magnetic resonance imaging. The course emphasizes a linear system approach to the formation, processing and display of medical images.

399-650B ADVANCED MEDICAL IMAGING. (3) (Prerequisite: 563-607A) Review of advanced techniques in medical imaging including: fast magnetic resonance imaging (MRI), functional MRI, MR angiography and quantitative flow measurement, spiral and dynamic x-ray computed tomography, 2D/3D positron emission tomography (PET), basic PET physiology, tracer kinetics, surgical planning and guidance, functional and anatomical brain mapping, 2D and 3D ultrasound imaging, and medical image processing.

399-690 THESIS RESEARCH I. (3)**399-691 THESIS RESEARCH II. (3)****399-692 THESIS RESEARCH III. (3)****399-693 THESIS RESEARCH IV. (6)****399-694 THESIS RESEARCH V. (6)****399-695 THESIS SUBMISSION. (12)**

Related courses offered in other departments include the following:

Computer Science

308-538B Person-Machine Communication. (3)

308-540B Matrix Computations. (3)

Electrical Engineering

304-512A Digital Signal Processing I. (3)

304-523B Speech Communications. (3)

304-526B Artificial Intelligence. (3)

304-529A Image Processing & Communication. (3)

304-626B Computer Vision. (4)

Mechanical Engineering

305-561B Biomechanics of Musculoskeletal Systems. (3)

Physiology

552-423A Physiological Dynamics. (3)

552-502B Exercise Physiology. (3)

552-517B Artificial Internal Organs. (3)

552-518A Artificial Cells. (3)

For full course descriptions refer to appropriate Calendar entry.

Other courses can be found in related departments.

NOTE: All undergraduate courses administered by the Faculties of Arts and of Science (courses at the 100- to 500-level) have limited enrolment.

13 Chemical Engineering

Department of Chemical Engineering
M.H. Wong Building
3610 University Street
Montreal, QC H3A 2B2
Canada

Telephone: (514) 398-4494

Fax: (514) 398-6678

Email: dept@chemeng.lan.mcgill.ca

Website: <http://www.mcgill.ca/chemeng>

Chair — R.J. Munz

mcgill.ca. The completed preliminary application form is evaluated by the Admissions Committee who send the formal application form only if there is a reasonable probability of admission.

Applications will be considered when the Graduate Admissions Committee has received:

1. application form of the Faculty of Graduate Studies and Research;

polymers, extrusion, injection molding, fiber spinning, film blowing, blow molding, thermoforming, miscellaneous other processes. Lectures, plant visits, problem assignments.

302-685A POLYMER PRODUCT AND PROCESS DESIGN PROJECT. (3) Principles of product design, optimization and processing conditions for the production of plastics articles. Selection of resins, process and equipment and tool design, considering cost, safety and environmental aspects of production. Students undertake projects to define specifications for the manufacture of selected plastics articles.

302-686A POLYMER ENGINEERING LABORATORY. (3) Study of experimental aspects of polymer characterization. Areas of study are selected from molecular weight determination, polymer morphology, mechanical and rheological behaviour. Polymer processing areas available for study include extrusion, mixing and injection and compression molding.

302-690A,B,T RESEARCH TECHNIQUES. (3) This course introduces techniques and develops skills necessary for commencing a particular thesis research project. A written report is required.

302-692A,B,T SELECTED TOPICS IN CHEMICAL ENGINEERING. (2)

302-693A,B,T SELECTED TOPICS IN CHEMICAL ENGINEERING. (3)

302-694A,B,T SELECTED TOPICS IN CHEMICAL ENGINEERING. (4)

302-695A,B,T PROJECT IN CHEMICAL ENGINEERING. (6) Independent work under the general direction of a full-time staff member, on a problem of industrially-oriented design or research leading to a comprehensive report.

302-696A,B,T EXTENDED PROJECT. (6) Extended independent work on a problem of industrially-oriented design or research, leading to a comprehensive project report.

302-697A,B,T THESIS PROPOSAL. (6) Independent work under the supervision of the thesis advisor(s) leading to a thesis proposal.

302-698A,B,T THESIS RESEARCH I. (12) (Prerequisite 302-697) Ongoing research pertaining to thesis.

302-699A,B,T THESIS RESEARCH II. (15) (Prerequisite 302-698) Ongoing research pertaining to thesis.

302-795A,B,T PH.D. THESIS PROPOSAL. Independent work under the supervision of the thesis advisor(s) leading to a thesis proposal.

302-796A,B,T PH.D. PROPOSAL DEFENCE. Presentation and defence of thesis proposal at an oral examination.

302-797A,B,T PH.D. SEMINAR. (Prerequisite 302-796) Required for all Ph.D. candidates. Presentation of a seminar on an aspect of their thesis work.

14 Chemistry

Department of Chemistry
Otto Maass Chemistry Building
801 Sherbrooke Street West
Montreal, QC H3A 2K6
Canada

Telephone: (514) 398-6999
Fax: (514) 398-3797
Email: chemistry@chemistry.mcgill.ca
Website: <http://www.mcgill.ca/chemistry>

Chair — D.N. Harpp

Director of Graduate Studies — M. Dahma

14.1 Staff

Emeritus Professors

B.C. Eu; B.Sc.(Seoul), Ph.D.(Brown)
J.F. Harrod; B.Sc., Ph.D.(Birm.)
A.S. Hay; B.Sc.(Alta.), Ph.D.(Ill.), F.R.S.
M. Onyszchuk; B.Sc.(McG.), M.Sc.(W.Ont.), Ph.D.(Cantab),
Ph.D.(McG.), F.C.I.C.

D. Patterson; M.Sc.(McG.)

A.S. Perlin; M.Sc., Ph.D.(McG.), F.C.I.C., F.R.S.C.

W.C. Purdy; B.A.(Amh.), Ph.D.(M.I.T.), F.C.I.C.

L.E. St-Pierre; B.Sc.(Alta.), Ph.D.(Notre Dame), F.C.I.C.

M.A. Whitehead; B.Sc., Ph.D., D.Sc.(Lond.), F.C.I.C.

Professors

I.S. Butler; B.Sc., Ph.D.(Brist.), F.C.I.C.

T.H. Chan; B.Sc.(Tor.), M.A., Ph.D.(Prin.), F.C.I.C., F.R.S.C.

M. Damha; B.Sc., Ph.D.(McG.)

A. Eisenberg; B.S.(Wor. Poly.), M.A., Ph.D.(Prin.), F.C.I.C.

P.G. Farrell; B.Sc., Ph.D., D.Sc.(Ex.)

D.F.R. Gilson; B.Sc.(Lond.), M.Sc., Ph.D.(Br.Col.), F.C.I.C.

D.N. Harpp; A.B.(Middlebury), M.A.(Wesleyan),

Ph.D.(N.Carolina), F.C.I.C.

G.E. Just; Ing.Chem.(E.T.H. Zürich), Ph.D.(W.Ont.), F.C.I.C.

R.B. Lennox; B.Sc., M.Sc., Ph.D.(Tor.)

R.H. Marchessault; B.Sc.(Montr.), Ph.D.(McG.), F.C.I.C., F.R.S.C.

D.M. Ronis; B.Sc.(McG.), Ph.D.(M.I.T.)

E.D. Salin; B.Sc.(Calif.), Ph.D.(Oregon)

B.C. Sanctuary; B.Sc., Ph.D.(Br.Col.)

A.G. Shaver; B.Sc.(Carl.), Ph.D.(M.I.T.)

Associate Professors

M.P. Andrews; B.Sc., M.Sc., Ph.D.(Tor.)

D.H. Burns; B.Sc.(Puget Sound), Ph.D.(Wash.)

W.C. Galley; B.Sc.(McG.), Ph.D.(Calif.)

A. Kakkar; B.Sc., M.Sc.(Chan. U., India), Ph.D.(Wat.)

R.J. Kazlauskas; B.Sc.(Clev. State), Ph.D.(M.I.T.)

J.F. Power; B.Sc., Ph.D.(C'dia)

L. Reven; B.A.(Carl.), Ph.D.(Ill.)

Assistant Professors

P. Ariya; B.Sc., Ph.D.(York)

B.A. Arndtsen; B.A.(Carl.), Ph.D.(Stan.)

C.J. Barrett; B.Sc., M.Sc., Ph.D.(Queen's)

J.L. Gleason; B.Sc.(McG.), Ph.D.(Va.)

H. Sleiman; B.Sc.(A.U.B.), Ph.D.(Stanford)

Lecturers

J. Finkenbine, G. Wilczek

Paprican Adjunct Professors

D. Argyropoulos, D.G. Gray, R. St. John Manley,

T.G.M. Van de Ven

Associate Members

J.A. Finch (Mining and Metallurgical Engineering),

O.A. Mamer (University Clinic, RVH), B.I. Posner (Medicine)

K. Gehring (Biochemistry)

Adjunct Professors

G.R. Brown, A. Fenster, Y. Guindon, J. Schwarcz, Y. Tsantrizos,

I. Wharf, R. Zamboni

14.2 Programs Offered

M.Sc., Ph.D. and the M.Sc. (Applied).

Research in Chemistry

Members of the Department are active in directing research in the following fields:

Analytical – Atomic and molecular spectroscopy; laboratory automation; artificial intelligence; instrument design; optimization of data processing techniques; application of modern analytical techniques to biochemical and medical systems; detectors for liquid chromatography; photothermal analytical methods; thermal wave imaging; development of analytical techniques for studies of diffusion and photodegradation in thin films. Technique development for quantitative spectroscopy in scattering media. Micronano-sensors; Chemoinformatics. Analytical spectroscopy of bioenergetics.

Bio-organic – Enzyme chemistry; protein and nucleic acid structure and function; drug design and modification; active site stereochemistry; molecular basis of regulation and pharmacological action; lipid and lipid analogue chemistry.

Biophysical – Excited electronic states of proteins and nucleic acids; spectroscopic probes of biopolymer conformation; sensi-

tized photochemistry in biopolymers; dynamics of protein and nucleic acid conformations. Spectroscopic analysis of oxygen transport in aerobic metabolism.

Colloid and Polymer – Monomolecular layers; solution properties of high polymers; molecular morphology; rheology and stability of dispersions; phase transitions in polymers and polymer blends; polymer reinforcement; radiation effects and solid-state

549-303 or permission of instructor.) Selected thematic blocks covering chemistry, mechanisms of action and steps in drug development. Lectures and discussions will convey ideas, principles

- **180-626D THE FUNDAMENTALS OF MEDICINAL CHEMISTRY.** (4)

- **180-627B SPECIAL TOPICS II.** (5)

180-629B ORGANIC SYNTHESIS. (5) An advanced course in the synthesis of organic molecules with an emphasis on stereoselective transformations. Topics will include multiple bond formation, functional group interconversions, carbon-carbon bond formation and stereoselective oxidations and reductions.

180-631D SELECTED TOPICS IN ANALYTICAL

15 Civil Engineering and Applied Mechanics

Department of Civil Engineering and Applied Mechanics
Macdonald Engineering Building
817 Sherbrooke Street West
Montreal, QC H3A 2K6
Canada

Telephone: (514) 398-6858
Fax: (514) 398-7361
Email: Sandy@civil.lan.mcgill.ca
Website: <http://www.mcgill.ca/civil/>

Chair — D. Mitchell

Chair of Graduate Program — TBA

15.1 Staff

Emeritus Professors

Louis J. Arcand; B.Sc., M.Eng.(McG.), Q.L.S., M.C.I.S., M.A.S.P.
Philip J. Harris; B.Sc.(Man.), M.Eng., Ph.D.(McG.), F.E.I.C.,
F.C.S.C.E., Eng.
Stuart B. Savage; B.Eng.(McG.), M.S.Eng.(Cal.Tech.),
Ph.D.(McG.), F.R.S.C.

Professors

V.H. Chu; B.S.Eng.(Taiwan), M.A.Sc.(Tor.), Ph.D.(M.I.T.), Eng.
M.S. Mirza; M.S., B.Eng.(Karachi), M.Eng., Ph.D.(McG.), F.E.I.C.,
F.C.S.C.E., F.A.C.I., Hon.F.I.E.P., Eng.
D. Mitchell; B.A.Sc., M.A.Sc., Ph.D.(Tor.), F.A.C.I., Eng.
V.T.V. Nguyen; B.M.E.(Vietnam), M.C.E.(A.I.T.), D.A.Sc.(Montr.),
Eng. (on leave 2001-02)
A.P.S. Selvadurai; M.S.(Stan.), Ph.D., D.Sc.(Nott.), F.E.I.C.,
F.I.M.A., F.C.S.C.E., P.Eng.
S.C. Shrivastava; B.Sc.(Eng.) (Vikram), M.C.E.(Del.), Sc.D.(Col.),
Eng.

Associate Professors

L. Chouinard; B.Eng., M.Eng.(Montr.), B.C.L.(McG.), Sc.D.(M.I.T.),
Eng.
R. Gehr; B.Sc.(Eng.) (Witw.), M.A.Sc., Ph.D.(Tor.), P.Eng.
G. McClure; B.Eng.(Mont.), S.M.C.E.(M.I.T.), Ph.D.(Mont.), Eng.
(on leave 2001-02)
J. Nicell; B.A.Sc., M.A.Sc., Ph.D.(Windsor), P.Eng.

Assistant Professors

S.J. Gaskin; B.Sc.(Eng.) (Queen's), Ph.D.(Cant.)
S. Ghoshal; B.C.E.(India), M.S.(Missouri), Ph.D.(Carnegie Mellon)
C. Rogers; B.A.Sc., M.A.Sc. (Waterloo), Ph.D.(Sydney), P.Eng.
Y. Shao; B.Sc., M.S.(Tongji), Ph.D.(Northwestern)

Adjunct Professors

S. Babarutsi, A. Beaubien, P. Boucher, S. Guiot, J. Gussow,
L. Hervieux, G. Holder, R.D. Japp, J. Mirza, R. G. Redwood,
S.B. Savage, P. Trottier, A. Zaki, R. Zaloum

15.2 Programs Offered

Advanced courses of instruction and laboratory facilities are available for engineering graduate students desiring to proceed to the degrees of M.Eng., M.Sc. and Ph.D.

Graduate studies and research are at present being conducted in the fields of structures and structural mechanics, rehabilitation, fluid mechanics and hydraulics, materials engineering, soil behaviour, soil mechanics and foundations, water resources engineering, and environmental engineering.

M.Eng. (Project) Degree in Civil Engineering – Option in Rehabilitation of Urban Infrastructure

This program is offered to students with a university undergraduate degree in engineering who want to specialize in the field of maintenance and rehabilitation of urban infrastructures. It is offered jointly by McGill University and École de Technologie Supérieure, École Polytechnique de Montréal, and Institut National de la Recherche Scientifique - Urbanisation. A student

registered at McGill is required to take courses at the other four institutions.

M. Eng. (Environmental Engineering Option) Degree

This program is offered to students with a university undergraduate degree in Cod, 8]ç\$eçio graduate s0S),Lbifiqulo take coPLLgçake coPLLgçak1Sdilita

Project Option program requires a minimum of 30 credits of course work plus a project, the total amounting to 45 credits. The credits assigned to the project can vary between 5 and 15 depending on the amount of work involved.

Both programs normally require that at least 12 of the coursework credits be at the 600 level. The above minimum course requirements for both options pertain to well prepared students; others may be required to take additional courses as a condition of acceptance or as determined in consultation with their director of studies or research.

Three terms of resident study at McGill are required for the degree. This is a minimum requirement and usually a longer period will be necessary. This residence requirement can also be satisfied by Project Option students through part-time (evening) studies over a period of three or more years.

Master of Engineering (Environmental Engineering Option) Degree

The program consists of a minimum of 45 credits, of which, depending on the student's home department, a minimum of 5 and a maximum of 15 may be allotted to the project. The balance is earned by coursework, of which one to three approved undergraduate (below 500-level) courses are allowed.

To complete the option, students must:

- complete four (4) required core courses (see section A below);
- complete a minimum of two (2) engineering courses (see section B below);
- complete a minimum of two (2) non-engineering courses (each course should be chosen from a different department) (see section C below)
- complete a design or research project of 5 to 15 credits
- complete all the remaining courses (to a total of at least 45 credits) as required in the student's departmental program (these courses must be approved by the student's Academic Advisor); and
- obtain a grade of 65% (or B-) or better in all required and approved courses

Prerequisite

(Not credited to the Master Environmental Engineering Option Program) 303-225B Environmental Engineering or equivalent environmental engineering courses

A. Required Core Courses

302-591B Environmental Bioremediation
 303-555B Environmental Data Analysis
 or 360-611B Experimental Designs
 303-615A Environmental Engineering
 392-612A Principles of Toxicology
 or 333-505B Health Risks of Toxicants

B. Elective Engineering Courses

These are to be chosen from a list of specific courses offered by the following Engineering Departments:

Agricultural and Biosystems Engineering
 Chemical Engineering
 Civil Engineering and Applied Mechanics
 Mechanical Engineering
 Mining and Metallurgical Engineering

C. Elective Non-engineering Courses

These are to be chosen from a list of specific courses offered by the following faculties and Departments:

Faculty of Agricultural and Environmental Sciences
 Department of Atmospheric and Ocean Sciences
 Department of Biology
 Department of Chemistry
 Department of Earth and Planetary Sciences
 Department of Economics
 Department of Epidemiology and Biostatistics
 Department of Geography
 Faculty of Law
 Faculty of Management
 Department of Occupational Health

Department of Political Science
 Department of Religious Studies
 Department of Sociology
 School of Urban Planning

The environmental Engineering Option Program is administered by the Faculty of Engineering. Further information may be obtained from the Program Coordinator, Department of Civil Engineering and Applied Mechanics.

M.Eng. (Project) Degree in Civil Engineering – Option in Rehabilitation of Urban Infrastructure

This program is offered jointly by McGill University and École de Technologie Supérieure, École Polytechnique de Montréal, and Institut National de la Recherche Scientifique - Urbanisation. A student registered at McGill is required to take courses at the other four institutions.

The program leads to a professional non-thesis (Project Option) degree with a minimum of 45 credits divided in three modules described below. Depending on their background and interests, students would specialize in one or two out of three possible areas: (1) underground water supply and drainage systems; (2) road infrastructure; (3) bridges, overpasses and tunnels. Students registered at McGill can specialize in area 3 or jointly in areas 2 and 3: students interested in other program scenarios are encouraged to register at one of the other four participating institutions.

Module 1 Required courses

M.Sc. Degree

Candidates with a Bachelor's degree in a discipline other than Engineering, such as Science or Arts, may be accepted into a M.Sc. program in the Department. Such students would typically study in the fluid mechanics, water resources, or environmental engineering areas, and would follow the Thesis Option program, as outlined above.

Ph.D. Degree

303-587B PAVEMENT DESIGN. (3) Properties of bituminous materials, design of bituminous concrete mixes, construction control; evaluation of design parameters, factors controlling their variability; soil stabilization; frost effects; stresses and displacements in layered systems, analysis of rigid and flexible pavement systems; design of highway and airport pavements; pavement evaluation and strengthening; recycling.

303-602B FINITE ELEMENT ANALYSIS. (4) (Prerequisite: 303-514A) Development of displacement based simple and high order, one, two and three dimensional elements for linear elastic stress analysis. Variational and other methods for element formulation. Plate bending and shell elements. Finite element programming. Use of package programs in static analysis of structures.

303-603B STRUCTURAL DYNAMICS. (4) Dynamic loads on structures; equations of motion of linear single- and multiple-degree-of-freedom systems and of continuous systems; free and forced vibrations; damping in structures; modal superposition and time-history analysis; earthquake effects; provisions of the National Building Code of Canada for seismic analysis.

● **303-604B THEORY OF PLATES AND SHELLS.** (4)

303-605B STABILITY OF STRUCTURES. (4) Buckling of elastic columns by equilibrium analysis. Buckling of inelastic columns. Energy analysis and approximate methods. Stability of frames. Torsional buckling of columns and flexural-torsional buckling of beams. Buckling of plates and axially compressed circular cylindrical shells. Stability analysis using the finite element method.

303-607A ADVANCED DESIGN IN METALS. (4) Physical properties of metals, residual stresses, design concepts. Column theories, column strength, beam-column design, structural frames. Plastic design concepts, ultimate strength, axial forces with bending, shear forces with bending. Economic design considerations.

303-609B RISK ENGINEERING. (4) Quantitative analysis of uncertainty in planning, design, construction, operation and rehabilitation of engineered facilities. Interprets fundamentals of probabilities, random processes, statistics, and decision analysis in the context of engineering applications, in particular description of variability of loads and environmental conditions, material properties performance prediction, system reliability analysis, and risk-based decision analysis.

● **303-610A,B SPECIAL TOPICS IN STRUCTURAL MECHANICS.** (4)

303-612A EARTHQUAKE-RESISTANT DESIGN OF STRUCTURES. (4) Static and dynamic analyses, design codes, effects of local ground conditions, ductility demands on structural components. Inelastic behaviour of beams, columns, joints, shear walls and bracing under cyclic loading of steel concrete and masonry structures. Design applications.

● **303-613A,B NUMERICAL METHODS** infyCVEQW,W52TmT5,2TQov2v2VLv,VY25YWLYV-V2-0vLYVM

303-683A ADVANCED FOUNDATION DESIGN. (4) Design of shallow foundations, bearing capacity and settlement, combined footings and rafts; eccentric and inclined loads, footings in slopes, machine foundations. Deep foundations; caissons and piers, piles, pile groups, tension piles. Tunnels and tunnel linings, flexible culverts. Earth pressures, retaining walls, sheeting and bracing, cofferdams. Case records of foundation performance including failures.

The Graduate Units section is divided into six parts, for access to the others click on the link below to return to the Front Page of the Calendar.