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## 1 Agricultural and Biosystems Engineering

Department of Agricultural and Biosystems Engineering  
Macdonald Campus  
21,111 Lakeshore Road  
Sainte-Anne-de-Bellevue, QC H9X 3V9  
Canada

Telephone: (514) 398-7774  
Fax: (514) 398-8387  
Email: [raghavan@macdonald.mcgill.ca](mailto:raghavan@macdonald.mcgill.ca)  
Website: <http://www.agrenv.mcgill.ca/agreng>

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.) (*James McGill Professor*)

#### 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)  
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 contaminated sites, agricultural machinery, soil-machine mechanics, computers in agriculture, artificial intelligence, machine vision, control systems, expert systems, precision agriculture, post-harvest technology, food processing and fermentation engineering leading to the degrees of Master of Science and Doctor of Philosophy.

The interdisciplinary nature of agricultural and biosystems engineering often requires candidates for higher degrees to work in association with, or attend courses given by a number of other departments at both the McGill University Macdonald Campus and the Downtown Campus.

### 1.3 Admission Requirements

Candidates for M.Sc. and Ph.D. degrees should indicate in some detail their fields of special interest when applying for admission. An equivalent cumulative grade point average of 3.0/4.0 (Second Class-Upper division) is required at the Bachelor's level. Experience after the undergraduate degree is an additional asset.

### 1.4 Application Procedures

Applicants for graduate studies through academic units in the Faculty of Agricultural and Environmental Sciences may submit on-line applications via the Web at <http://www.mcgill.ca/applying/graduate> or printed applications. Supporting documents must be sent to:

Student Affairs Office (Graduate Studies)  
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Canada

Telephone: (514) 398-7925  
Fax: (514) 398-7968  
Email: [grad@macdonald.mcgill.ca](mailto:grad@macdonald.mcgill.ca)

Applications will be considered upon receipt of a signed and completed application form, \$60 application fee, all official transcripts, two signed original letters of reference on official letterhead of originating institution, and (if required) proof of competency in oral and written English by appropriate exams. DOCUMENTS SUBMITTED WILL NOT BE RETURNED.

**Deadlines** – Applications, including all supporting documents must reach the Student Affairs Office no later than June 15 (March 1 for International) for the *September session*; October 15 (July 1 for International) for the *January session*; February 15 (November 1 for International) for the *Summer session*. It may be necessary to delay review of the applicant's file until the following admittance period if application materials including supporting documents are received after these dates. International applicants are advised to apply well in advance of the deadline because immigration procedures may be lengthy. Applicants are encouraged to make use of the web-based application form on the McGill website <http://www.mcgill.ca/applying/graduate>.

**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. Credit card (by completing the appropriate section of the application form). NB: on-line applications must be paid for by credit card.
2. **Certified** cheque in Cdn.\$ drawn on a Canadian bank.
3. **Certified** cheque in U.S.\$ drawn on a U.S. bank.
4. Canadian Money order in Cdn.\$.
5. U.S. Money Order in U.S.\$.
6. An international draft in Canadian funds drawn on a Canadian bank requested from the applicant's bank in his/her own country.

**Transcripts** – Two official copies of all transcripts with proof of degree(s) granted 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.

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 considered by the academic unit to be preparatory to the graduate program.

**Letters of Recommendation** – Two letters of recommendation *on letterhead (official paper) or bearing the university seal* and with original signatures from two instructors familiar with the applicant's work, preferably in the applicant's area of specializa-

tion, are required. It is the applicant's responsibility to arrange for these letters to be sent.

**Competency in English** – Non-Canadian applicants whose mother tongue is not English and who have not completed an undergraduate degree using the English language are required to submit documented proof of competency in oral and written 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); please use department code 31 (graduate schools), Biological Sciences - Agriculture to ensure that your TOEFL reaches this Office without delay.

**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 Graduate and Postdoctoral Studies Office 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 graduate studies, **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.

At least 12 months of full-time study are required for this degree. A student may complete the requirements by obtaining 46 credits under the requirements of the thesis or non-thesis options.

### M.Sc. Thesis Option

This option for the M.Sc. degree is oriented towards individuals who intend to develop a career in agricultural and biosystems engineering research. The requirements for this option are:

1. completion and final acceptance of a supervised research thesis in one of the areas described above, according to the regulations of the Graduate and Postdoctoral Studies Office. This work is represented by courses M.Sc. Thesis 1 through 8, described below and equivalent to four credits each, for a total of 32 credits allotted to thesis work (ABEN 691 to ABEN 698).
2. 12 credits of postgraduate course work in agricultural and biosystems engineering and other fields to be determined in consultation with the research director. It is required that the candidate include the scientific publication course in this category of credits.
3. Participation in graduate seminar during two semesters.

### M.Sc. Thesis Option – Neotropical Environment

The requirements for this option are:

1. completion and final acceptance of a supervised research thesis according to the regulations of the Graduate and Postdoctoral Studies Office. This work is represented by courses M.Sc. Thesis 1 through 8, described below and equivalent to four credits each, for a total of 32 credits allotted to thesis work (ABEN 691 to ABEN 698).
2. 11 credits of required courses: ENVR 610, BIOL 640, ABEN 651, ABEN 652 and ABEN 699.

3. 3 credits chosen from POLI 644; SOCI 565, ENVR 611, ENVR 612, ENVR 680, BIOL 553, BIOL 641, GEOG 498, AGRI 550.
4. Participation in the MSE-Panama Symposium presentation in Montreal is required.

### M.Sc. Applied – Non-thesis Option

The non-thesis option is aimed towards individuals already employed in industry or seeking to improve their skills in specific areas (soil and water/structures and environment/waste management/and environment protection/post harvest technology/food process engineering/environmental engineering) in order to enter the engineering profession at a higher level. The requirements for a candidate registering for this option are:

1. a minimum of 2 project courses of 6 credits each (ABEN 671 and ABEN 672).
2. 31 additional credits in graduate courses from the Agricultural and Biosystems Engineering Department or courses from other departments relevant to project topics which must be approved by the academic advisor. Selection of courses in each area can follow the format of the example shown below for the Food Process Engineering area: this option is offered under the regulations of the non-thesis degree in cooperation with the Department of Food Science and Agricultural Chemistry and the Department of Chemical Engineering. The candidate is expected to obtain 12 of the 31 non-project credits in the cooperating departments. The division of these 12 credits between the two departments should be decided between the candidate and the supervisors of the projects undertaken. In some cases, necessary senior undergraduate courses in the collaborative departments can be taken for credit towards the M.Sc., Applied.
3. participation in graduate seminar during two semesters.

Candidates must meet the qualifications of a professional engineer either before or during their M.Sc., Applied program.

Each candidate for this option is expected to establish and maintain contact with his/her academic advisor in the Department of Agricultural and Biosystems Engineering some time before registration in order to clarify objectives, investigate project possibilities and plan a program of study.

### M.Sc. Applied – Non-thesis Option – Neotropical Environment

The program consists of a minimum of 45 credits. The requirements for a candidate registering for this option are:

1. 20 credits of required courses: ENVR 610, BIOL 640, ABEN 651, ABEN 652, ABEN 671 and ABEN 672.
2. 3 credits must be chosen from POLI 644; SOCI 565, ENVR 611, ENVR 612, ENVR 680, BIOL 553, BIOL 641, GEOG 498, AGRI 550.
3. 22 additional credits in graduate courses chosen in consultation with the academic advisor.
4. Participation in the MSE-Panama Symposium presentation in Montreal is required.

### M.Sc. Applied in Environmental Engineering

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. Candidates must possess a Bachelor's degree in engineering with superior academic achievement (a minimum cumulative grade point average of 3.0 out of a possible 4.0).

To complete the program, students must:

1. complete four required core courses;
2. complete a minimum of two engineering courses;
3. complete a minimum of two non-engineering courses (each course should be chosen from a different department);
4. complete a design or research project of 5 to 15 credits;
5. 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

6. obtain a grade of B- (or 65%) or better in all required and approved courses.

#### Ph.D.

Candidates for the Ph.D. degree will normally register for the M.Sc. degree in the first instance. In cases where the research work is proceeding very satisfactorily, or where the equivalent of the M.Sc. degree has been completed, candidates may be permitted to proceed directly to the Ph.D. degree.

Courses of study selected for a Ph.D. program will depend on the existing academic qualifications of the candidate and on those needed for effective pursuit of research in the chosen field. Candidates are encouraged to take an additional course of study of their own choice in some field of the humanities, sciences or engineering not directly related to their research. The program will be established by consultation of the candidate with a committee that will include the Research Director and at least one other professor.

A comprehensive examination, Agricultural and Biosystems Engineering ABEN 701, will be taken either late in the first, or early in the second, registration year to qualify to proceed to the completion of the Ph.D. degree.

Participation in graduate seminar during four semesters.

#### Ph.D. – Neotropical Environment

The requirements for a candidate registering for this option are: 6 credits of required courses: ENVR 610 and BIOL 640.

3 credits chosen from POLI 644; SOCI 565, ENVR 611, ENVR 612, ENVR 680, BIOL 553, BIOL 641, GEOG 498, AGRI 550.

Participation in the MSE-Panama Symposium presentation in Montreal.

Participation in graduate seminar during four semesters.

A comprehensive examination, Agricultural and Biosystems Engineering ABEN 701, will be taken either late in the first, or early in the second, registration year to qualify to proceed to the completion of the Ph.D. degree.

### 1.6 Courses

For the term (Fall and/or Winter), days, and times when courses will be offered, please refer to the 2002-2003 Class Schedule on the Web, <http://www.mcgill.ca/minerva-students/class/>. Class locations and names of instructors are also provided.

Students preparing to register are advised to consult the Class Schedule website for the most up-to-date list of courses available. New courses may have been added or courses rescheduled after this Calendar went to press.

The schedule of courses to be offered in Summer 2003, will be available on the website in January 2003.

ABEN has replaced 336 as the prefix for Agricultural and Biosystems Engineering courses.

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

- Denotes courses not offered in 2002-03

★ Denotes courses taught only in alternate years.

- **ABEN 500 ADVANCED APPLICATIONS: COMPUTING IN AGRICULTURE.** (3) (3 lectures and one 2-hour lab) (Prerequisite: ABEN 251 or ABEN 252)

- **ABEN 504 INSTRUMENTATION AND CONTROL.** (3) (3 lectures and one 2-hour lab)

- **ABEN 506 ADVANCES IN DRAINAGE MANAGEMENT.** (3) (3 weeks intensive course)

**ABEN 509 HYDROLOGIC SYSTEMS AND MODELLING.** (3) (3 hour lectures) Use of deterministic and stochastic models to analyze components of the hydrologic cycle on agricultural and forested watersheds, floods frequency analysis, hydrograph analysis, infiltration, runoff, overland flow, flood routing, erosion and sediment

transport. Effects of land-use changes and farm and recreational water management systems on the hydrologic regime.

- ★ **ABEN 512 SOIL CUTTING AND TILLAGE.** (3) (2 lectures and one 2-hour lab)

- **ABEN 514 DRAIN PIPE AND ENVELOPE MATERIALS.** (3) (3 lectures)

**ABEN 515 COMPUTER MODELS IN DRAINAGE ENGINEERING.** (3) (3 lectures and one 3-hour lab) 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, a microcomputer based model for designing and evaluating drainage water management systems for soils with high water tables.

- **ABEN 516 PREPARATION AND APPRAISAL OF DRAINAGE PROJECTS.** (3) (3 lectures)

- **ABEN 517 DRAINAGE PROJECT CONTRACTS.** (3) (3 lectures)

- ★ **ABEN 518 POLLUTION CONTROL FOR AGRICULTURE.** (3) (One 3 hour lecture)

- **ABEN 519 ADVANCED FOOD ENGINEERING.** (3) (3 lectures and one 2-hour lab) (Prerequisites: ABEN 325 and MECH 426, or permission of instructor)

- ★ **ABEN 525 VENTILATION OF AGRICULTURAL STRUCTURES.** (3) (3 lectures and one 3-hour lab) (Prerequisite: ABEN 301)

- ★ **ABEN 530 FERMENTATION ENGINEERING.** (3) (3 lectures and one 3-hour lab)

- **ABEN 602 ENVIRONMENTAL CONTROL IN AGRICULTURAL STRUCTURES.** (3)

- **ABEN 605 FUNCTIONAL ANALYSIS OF AGRICULTURAL MACHINES.** (3) (3 lectures)

- **ABEN 607 ENGINEERING ASPECTS OF PLANT ENVIRONMENT.** (3) (3 lectures)

**ABEN 608 SPECIAL PROBLEMS IN AGRICULTURAL ENGINEERING.** (3) (2 conferences, either term) Laboratory, field and library studies and reports on special problems related to agricultural and biosystems engineering that are not covered in regular course work.

- **ABEN 611 ADVANCES IN IRRIGATION ENGINEERING.** (3) (3 hours lectures)

- **ABEN 612 SIMULATION AND MODELLING.** (3) (3 lectures)

- **ABEN 614 ENGINEERING DECISION ANALYSIS.** (3) (3 hours lectures)

- **ABEN 616 ADVANCED SOIL AND WATER ENGINEERING.** (3) (3 lectures)

- **ABEN 617 SPECIAL DRAINAGE APPLICATIONS.** (3)

- **ABEN 619 DRAINAGE AND RECLAMATION OF IRRIGATED LANDS.** (3)

- ★ **ABEN 621 ADVANCES IN POST-HARVEST TECHNOLOGY - DRYING.** (3) (3 hours lectures) Heat and moisture transfer with respect to drying of agricultural commodities; techniques of enhancement of heat and mass transfer; drying efficiency and scale-up problems.

- ★ **ABEN 622 ADVANCES IN POST-HARVEST TECHNOLOGY - STORAGE.** (3) (3 hours lectures)

**ABEN 623 PROPOSAL PREPARATION.** (3) (3 hours conferences) Critiques of proposals prepared by others. Preparation and defense of draft proposals for funding agencies.

**ABEN 651 DEPARTMENTAL SEMINAR M.Sc. 1.** (1) To give seminars and participate in discussions.

May also be available as: **ABEN 651D1, ABEN 651D2.**

**ABEN 652 DEPARTMENTAL SEMINAR M.Sc. 2.** (1) To give seminars and participate in discussions.

**ABEN 653 DEPARTMENTAL SEMINAR M.Sc. 3.** (1) To give seminars and participate in discussions.

**ABEN 671 PROJECT 1.** (6) Prepare project outline, execute and report. This project relates to the M.Sc. (Applied) degree.

May also be available as: **ABEN 671D1, ABEN 671D2.**

**ABEN 672 PROJECT 2.** (6) Prepare project outline, execute and report. This project relates to the M.Sc. (Applied) degree.  
**May also be available as: ABEN 672D1, ABEN 672D2.**

**ABEN 691 M.Sc. THESIS 1.** (4) Problem definition and literature Review.

**ABEN 692 M.Sc. THESIS 2.** (4)

**ABEN 693 M.Sc. THESIS 3.** (4) Methodology development.

**ABEN 694 M.Sc. THESIS 4.** (4) Experimentation 1.

**ABEN 695 M.Sc. THESIS 5.** (4) Experimentation 2.

**ABEN 696 M.Sc. THESIS 6.** (4) Data analysis.

**ABEN 697 M.Sc. THESIS 7.** (4) Draft thesis preparation.

**ABEN 698 M.Sc. THESIS 8.** (4) Thesis completion and acceptance.

**ABEN 699 SCIENTIFIC PUBLICATION.** (3) (Periodic conferences) Review and critique papers that are published in field of the candidate. Prepare draft paper(s) following the format of leading journals in field of study undertaken.

**ABEN 701 Ph.D. COMPREHENSIVE EXAMINATION.** (0)  
**May also be available as: ABEN 701D1, ABEN 701D2.**

**ABEN 702 SPECIAL PROBLEMS IN AGRICULTURAL ENGINEERING 2.** (3) (2 conferences, either term) Advanced level laboratory, field and library studies and reports on special problems related to agricultural and biosystems engineering which are not covered in regular course work. Designed for doctoral level students with experience in postgraduate studies.

- **ABEN 703D1 ADVANCES IN AGRICULTURAL ENGINEERING.** (1.5)
- **ABEN 703D2 ADVANCES IN AGRICULTURAL ENGINEERING.** (1.5)
- **ABEN 703N1 ADVANCES IN AGRICULTURAL ENGINEERING.** (1.5)
- **ABEN 703N2 ADVANCES IN AGRICULTURAL ENGINEERING.** (1.5)

**ABEN 751 DEPARTMENTAL SEMINAR Ph.D. 1.** (0) To give seminars and participate in discussions.

**ABEN 752 DEPARTMENTAL SEMINAR Ph.D. 2.** (0) To give seminars and participate in discussions.

**ABEN 753 DEPARTMENTAL SEMINAR Ph.D. 3.** (0) To give seminars and participate in discussion.

**ABEN 754 DEPARTMENTAL SEMINAR Ph.D. 4.** (0) To give seminars and participate in discussions.

- **ABEN 755 DEPARTMENTAL SEMINAR Ph.D. 5.** (0)

## 2 Agricultural Economics

Department of Agricultural Economics  
 Macdonald Campus  
 21,111 Lakeshore Road  
 Sainte-Anne-de-Bellevue, QC H9X 3V9  
 Canada

Telephone: (514) 398-7820

Fax: (514) 398-8130

Email: [atkinson@macdonald.mcgill.ca](mailto:atkinson@macdonald.mcgill.ca)

Website: <http://www.agrenv.mcgill.ca/agrecon>

Chair — J.C. Henning

### 2.1 Staff

#### Associate Professors

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

K.R. Gunjal; B.Sc.(Poona), M.Sc.(New Delhi), Ph.D.(Iowa St.)

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

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

#### Assistant Professor

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

#### Adjunct Professor

Joan Marshall

### 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 Department of Economics which offers Agricultural Economics as an area of specialization. For specific requirements of that graduate program see the Department of Economics.

### 2.3 Admission Requirements

#### M.Sc.

Direct admission to the M.Sc. requires the completion of a B.Sc. in Agricultural Economics or a closely related area, with the equivalent cumulative grade point average of 3.0/4.0 (Second Class-Upper).

The ideal preparation includes courses in agricultural economics, economic theory (intermediate micro and macro), calculus, linear algebra, and statistics. Students with deficiencies in these areas will be required to take additional courses as part of their degree program.

#### M.Sc./M.B.A.

Students must fulfill the admission requirements for both the M.Sc. degree in Agricultural Economics and the M.B.A. degree in the Faculty of Management.

### 2.4 Application Procedures

Applicants for graduate studies through academic units in the Faculty of Agricultural and Environmental Sciences may submit on-line applications via the Web at <http://www.mcgill.ca/applying/graduate> or printed applications. Supporting documents must be sent to:

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 Canada

Telephone: (514) 398-7925

Fax: (514) 398-7968

Email: [grad@macdonald.mcgill.ca](mailto:grad@macdonald.mcgill.ca)

Applications will be considered upon receipt of a signed and completed application form, \$60 application fee, all official transcripts, two signed original letters of reference on official letterhead of originating institution, and (if required) proof of competency in oral and written English by appropriate exams. DOCUMENTS SUBMITTED WILL NOT BE RETURNED.

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**Application Fee (non-refundable)** – A fee of \$60 (\$100 M.Sc./M.B.A.) Canadian must accompany each application (including McGill students), *otherwise it cannot be considered*. This sum must be remitted using one of the following methods:

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2. **Certified** cheque in Cdn.\$ drawn on a Canadian bank.

3. **Certified** cheque in U.S.\$ drawn on a U.S. bank.
4. Canadian Money order in Cdn.\$.
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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 considered by the academic unit to be preparatory to the graduate program.

**Letters of Recommendation** – Two letters of recommendation **on letterhead (official paper) or bearing the university seal** and with original signatures from two instructors familiar with the applicant's work, preferably in the applicant's area of specialization, are required. It is the applicant's responsibility to arrange for these letters to be sent.

**Competency in English** – Non-Canadian applicants whose mother tongue is not English and who have not completed an undergraduate degree using the English language are required to submit documented proof of competency in oral and written 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 MCHE is not considered equivalent. Results must be submitted as part of the application. The University code is 0935 (McGill University, Montreal); please use Department code 31 (Graduate Schools), Biological Sciences-Agriculture, to ensure that your TOEFL reaches this office without delay.

**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.**

**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 Graduate and Postdoctoral Studies Office 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 graduate studies, **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.**

## 2.5 Program Requirements

### M.Sc.

A minimum of 19 graduate course credits and the completion of a research thesis (27 credits) are required for the M.Sc. Students may specialize, by way of their research program, in agribusiness, development, finance, marketing and trade, policy, and resource and ecological economics.

Specific requirements are as follows:

1. Economic Theory (Micro and/or Macro) – 2 courses (6 credits)
2. Quantitative Methods – 1 course (3 credits)
3. Three other courses chosen in consultation with the Agricultural Economics Advisor with a minimum of one course in the Department of Agricultural Economics (9 credits).
4. Seminar (AGEC 690) (1 credit)
5. M.Sc. Thesis 1, 2, 3, 4, 5 (27 credits)

### M.Sc./M.B.A.

A minimum of 19 graduate course credits and the completion of a research thesis (26 credits) are required for the M.Sc. degree which includes 5 credits of internship. The M.B.A. component of this joint program requires 45 credits.

The specific course requirements for the M.Sc. degree are:

1. Economic Theory – 1 course (3 credits)
2. Quantitative Methods – 1 course (3 credits)
3. Four other courses chosen in consultation with the Agricultural Economics Advisor with a minimum of one course in the Department of Agricultural Economics (12 credits).
4. Seminar (AGEC 690) (1 credit)
5. Thesis requirement (26 credits).

The course requirements for the M.B.A degree are:

1. First year of the M.B.A. program (three trimesters - 30 credits).
2. 15 additional credits of M.B.A. courses.

(See the Faculty of Management M.B.A. program for additional details).

## 2.6 Graduate Courses

**For the term (Fall and/or Winter), days, and times when courses will be offered, please refer to the 2002-2003 Class Schedule on the Web, <http://www.mcgill.ca/minerva-students/class/>. Class locations and names of instructors are also provided.**

**Students preparing to register are advised to consult the Class Schedule website for the most up-to-date list of courses available. New courses may have been added or courses rescheduled after this Calendar went to press.**

**The schedule of courses to be offered in Summer 2003, will be available on the website in January 2003.**

AGEC has replaced 334 as the prefix for Agricultural Economics courses.

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

- Denotes courses not offered in 2002-03

**AGEC 611 PRICE ANALYSIS.** (3) Topics in advanced microeconomic theory with applications in agricultural economics.

- **AGEC 630 FOOD AND AGRICULTURAL POLICY.** (3)

**AGEC 633 ENVIRONMENTAL AND NATURAL RESOURCE ECONOMICS.** (3) An advanced course in the theory and problems of environmental and resource economics and in the analytical techniques used to assess environmental and resource use issues.

**AGEC 642 ECONOMICS OF AGRICULTURAL DEVELOPMENT.** (3) This course focuses on the role of agriculture in economic development. Topics covered will be - development theories, economic efficiency, employment, technology adoption and structural change in developing countries. Also, agriculture, food and development policies and implications for long term planning will be discussed.

**AGEC 679 FINANCING: ALTERNATIVE STRATEGIES.** (3) An in-depth study of the relationship between financing, asset acquisition, tenure, and property rights and obligations for farm businesses. Emphasis will be placed on the potential for the use of non-debt financial instruments such as Community Based Land Trusts (CBLT) and Community Supported Agriculture (CSA).

**AGEC 685 SELECTED TOPICS IN AGRICULTURAL ECONOMICS. (3)**

This course is designed to permit students to explore agricultural economics topics that are not covered in other courses. Students may be asked to prepare a presentation or lead discussion on the selected topic for the benefit of other students and staff. (Pass/Fail grading.)

**AGEC 690 SEMINAR. (1)** This course will focus on current research on economic problems of agriculture through presentations by staff, students and special guests. All graduate students are required to register for this course, and make at least one major presentation.

**AGEC 691 M.Sc. THESIS 1. (6)**

**AGEC 692 M.Sc. THESIS 2. (3)**

**AGEC 693 M.Sc. THESIS 3. (6)**

**AGEC 694 M.Sc. THESIS 4. (6)**

**AGEC 695 M.Sc. THESIS 5. (6)**

### 3 Anatomy and Cell Biology

Department of Anatomy and Cell Biology  
Strathcona Anatomy and Dentistry Building  
3640 University Street  
Montreal, QC H3A 2B2  
Canada

Telephone: (514) 398-6335

Fax: (514) 398-5047

Website: <http://mercury.medserv.mcgill.ca/anatomy>

Chair — J.J.M. Bergeron

#### 3.1 Staff

##### *Emeritus Professors*

Y. Clermont; B.Sc.(Montr.), M.Sc., Ph.D.(McG.)  
D.G. Osmond; B.Sc., M.B., Ch.B., D.Sc.(Brist.), F.R.S.C.  
H. Warshawsky; B.Sc.(Sir G.Wms), M.Sc., Ph.D.(McG.)

##### *Professors*

A. Beudet\*; M.Sc., Ph.D., M.D.(Montr.)  
G.C. Bennett; B.A., B.Sc.(Sir G.Wms.), M.Sc., Ph.D.(McG.)  
J.J.M. Bergeron; B.Sc.(McG.), D.Phil.(Oxon.)  
J.R. Braver; B.S.(Tufts), Ph.D.(Harv.)  
M. Burnier\*; M.D., M.Sc., Ph.D.(Brazil)  
L. Hermo; B.A.(Montr.), M.Sc., Ph.D.(McG.)  
C.P. Leblond; M.D.(Paris), Ph.D.(Montr.), D.Sc.(Sorbonne)  
S.C. Miller; B.Sc.(Sir G.Wms.), M.Sc., Ph.D.(McG.)  
C.R. Morales; D.V.M.(Argentina), Ph.D.(McG.)  
B. Posner\*; M.D.(Man.), Ph.D.(Iowa)  
C.E. Smith\*; D.D.S., Ph.D.(McG.)

##### *Associate Professors*

P. Barker\*; B.Sc.(S.Fraser), Ph.D.(Alta.)  
O.W. Blaschuk\*; B.Sc.(Winn.), M.Sc.(Man.), Ph.D.(Tor.)  
C. Chalk; M.D., B.Sc.(Ont.)  
C. Cuello; M.D., (Buenos Aires), D.Sc.(Oxon), F.R.S.C.  
E. Daniels; M.Sc., Ph.D.(Man.)  
S. David\*; Ph.D.(Man.)  
J. Henderson; B.Sc., Ph.D.  
A. Koromilas\*; B.Sc., Ph.D.(Aristotelian U., Greece)  
M.F. Lalli; B.S., M.A.(Bowling Green), Ph.D.(McG.)  
P. Lasko\*; A.B.(Harv.), Ph.D.(M.I.T.)  
M. McKee\*; B.Sc., M.Sc., Ph.D.(McG.)  
P. McPherson\*; M.Sc.(Man.), Ph.D.(Iowa)  
A. Ribeiro-da-Silva\*; M.D., Ph.D.(Oporto)  
P. Sequeira; Ph.D.  
S. Stifani\*; Ph.D.(Rome), Ph.D.(Alta.)  
H. Vali\*; B.Sc., M.Sc., Ph.D.(Munich)  
D. Walker\*; B.Sc.(Geneva), Ph.D.(Salk), Ph.D.(Geneva)  
G. Wild\*; B.Sc., Ph.D., M.D., C.M.(McG.)

##### *Assistant Professors*

C. Autexier; B.Sc.(C'dia) Ph.D.(McG.)  
M. Greenwood\*; B.Sc., M.Sc.(C'dia), Ph.D.(McG.)  
T. Kennedy\*; B.Sc.(McM.), M.Phil., Ph.D.(Col.)  
N. Lamarche-Vane; B.Sc., Ph.D.(Montr.)  
J.F. Presley; B.A., Ph.D.(Texas)  
W. Sossin\*; S.B.(M.I.T.), Ph.D.(Stan.)

##### *Adjunct Professors*

D. Cyr; B.Sc., M.Sc.(C'dia), Ph.D.(Man.)  
J. Drouin; B.Sc., D.Sc.(Laval)  
S. Inoue; M.Sc., Ph.D.(Hok. U.)  
A. Nantel; B.Sc., M.Sc.(Laval), Ph.D.(Chapel Hill)  
J. Snipes\*; Ph.D., M.D.(Vanderbilt)  
D. Thomas\*; B.Sc.(Brist.), M.Sc., Ph.D.(Lond.)

\* Denotes cross or joint appointees.

#### 3.2 Programs Offered

Graduate research activities leading to the presentation of the M.Sc. and Ph.D. thesis involve original experimental work in one of the areas being actively investigated by the Department's Research Supervisors. Current research projects include: cell biology of secretion; cell biology of endocytosis; signal transduction of cell receptors for growth factors and hormones; synthesis and migration of glycoproteins; subcomponents of the Golgi apparatus and their function; biogenesis and function of lysosomes; cell turnover in various tissues; control of cell growth and proliferation; molecular biology of extracellular matrix; structure, composition and function of basement membranes and connective tissue microfibrils; cell and microfibrils; cell and molecular biology of spermatogenesis; genetic expression of proteins in the formation of cytoskeletal components of spermatozoa; role of endocytosis and secretion by epididymal cells in sperm maturation; molecular biology of Sertoli cell secretions and their interaction with germ cells; synchronization of sperm production; transferrin, transferrin receptors and iron in germinal cells; differentiation of B lymphocytes in bone marrow in relation to mechanisms of humoral immunity, immunodeficiency states and B cell neoplasias; control mechanisms and cytokines in B lymphopoiesis; in situ organization and stromal cell-interactions of B lineage precursor cells in bone marrow; microenvironmental regulation of hemopoiesis; differentiation and regulation of cells mediating natural tumor immunosurveillance; tumor-cell biology; cell and molecular biology of the formation of dental enamel, dentin and bone; structure of organic matrices and inorganic crystals of dental enamel; role of hormones and their binding sites with calcified tissues; secretion and degradation of the proteins of enamel matrix, hypothalamo-pituitary function and gonadotropin patterns in ovarian follicular development; polycystic ovarian disease; computer assisted modeling of morphometric and kinetic data; cell biology and molecular genetics of ageing; senescence and cell cycle-specific genes and their products.

**Research in the Department** investigates the dynamics and organization of molecules, organelles, cells and tissues in several major systems of the body. The work makes fundamental contributions to a number of established and emerging multidisciplinary fields: cell and molecular biology, cellular immunology and hematology, reproductive biology, calcified tissue biology, tumor cell biology, developmental biology, neurobiology and ageing.

The Department offers contemporary facilities for the wide range of techniques currently employed in research. Modern methods of cell and molecular biology, immunology and biochemistry are used in conjunction with specialized microscopy in a variety of experimental systems. Techniques used by Department members include labeling with radioisotopes and other tracers, radioautography, immunocytochemistry, histochemistry, cryo immune microscopy, fluorescence microscopy, high resolution electron microscopy, scanning electron microscopy, backscattered electron imaging, confocal microscopy, microinjection, video-microscopy in living cells, X-ray microanalysis, electron diffraction, freeze-fracture replication, computer reconstruction and quantitation, chromatography, subcellular fractionation, recom-

binant DNA technology, in situ hybridization, tissue grafting, cell and tissue culture, mutant and transgenic mice, hybridomas, and monoclonal antibodies.

The Department has one of the largest electron microscope facilities in Canada. Currently in use are three modern electron microscopes, including a high voltage instrument, the JEOL 2000FX. Combined with some of these microscopes are computer-aided analytical equipment capable of elemental microanalysis, histomorphometry, reconstruction and quantitation. The high voltage microscope is particularly useful for certain analytical electron optical procedures such as electron diffraction, lattice imaging and stereo electron microscopy.

### 3.3 Admission Requirements

#### M.Sc. and Ph.D. Programs

1. A B.Sc. degree in life sciences or any of M.D., D.D.S. or D.V.M. degrees from a university of recognized reputation.
2. Evidence of a high academic achievement with a minimum Cumulative Grade Point Average (CGPA) of 3.3 on 4.0.

#### Admission to a Qualifying Program

Applicants whose academic degree and standing entitle them to serious consideration for admission to graduate studies, but who are considered inadequately prepared in the area chosen may, upon recommendation of the Graduate Student Affairs Committee and with the permission of the Director of the Graduate and Postdoctoral Studies Office, be admitted to Qualifying Programs. The courses to be taken in qualifying programs will be stipulated by the Graduate Student Affairs Committee. (Note: Only one qualifying program of a maximum of one year is permitted.)

### 3.4 Application Procedures

Application for admission to graduate studies for the degrees of M.Sc. or Ph.D. in Anatomy should be made to the Chair of Graduate Studies, Department of Anatomy and Cell Biology.

Application forms and a brochure giving full details of the Graduate Program are available upon request.

#### Documents Required

1. Two official copies of complete university-level academic records to date (this also applies to McGill University transcripts). It may be desirable to submit a list of the titles of the courses taken, if transcripts give code numbers only. It is the applicant's responsibility to contact the institution(s) attended and request that the transcripts be forwarded directly to the Department of Anatomy.
2. Two letters of recommendation. It is the applicant's responsibility to arrange that these letters are originals, sent directly to the Department of Anatomy from the persons specified by the applicant.
3. Fee of \$60.00 in Canadian funds for processing the application.
4. TOEFL score (where applicable).

Commencing with applications for entry in January 2003, McGill's on-line application form will be available to all graduate program candidates at <http://www.mcgill.ca/applying/graduate>.

### 3.5 Program Requirements

The M.Sc. program is a 48-credit program. Students must complete 15 credits in course work and 33 credits of thesis research (ANAT 698 and ANAT 699).

For the Ph.D. degree, the student must complete a series of courses selected to suit individual requirements. In addition, Ph.D. candidates will write a comprehensive examination after the end of the first year.

For both degrees, the major emphasis is placed on the conduct of original research and the preparation of a thesis.

### 3.6 Courses

For the term (Fall and/or Winter), days, and times when courses will be offered, please refer to the 2002-2003 Class Schedule on the Web, <http://www.mcgill.ca/minerva-students/class/>. Class locations and names of instructors are also provided.

Students preparing to register are advised to consult the Class Schedule website for the most up-to-date list of courses available. New courses may have been added or courses rescheduled after this Calendar went to press.

The schedule of courses to be offered in Summer 2003, will be available on the website in January 2003.

ANAT has replaced 504 as the prefix for Anatomy and Cell Biology courses.

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

Courses with numbers ending D1 and D2 are taught in two consecutive terms (most commonly Fall and Winter). Students must register for both the D1 and D2 components. No credit will be given unless both components (D1 and D2) are successfully completed in consecutive terms.

- Denotes courses not offered in 2002-03

ANAT 614D1 HUMAN ANATOMY AND EMBRYOLOGY. (4.5)

ANAT 614D2 HUMAN ANATOMY AND EMBRYOLOGY. (4.5)

● ANAT 615D1 APPLIED ANATOMY. (3)

● ANAT 615D2 APPLIED ANATOMY. (3)

● ANAT 622 NEURO-ANATOMY. (3)

● ANAT 622D1 NEURO-ANATOMY. (1.5)

● ANAT 622D2 NEURO-ANATOMY. (1.5)

● ANAT 632 EXPERIMENTAL MORPHOLOGY. (6)

● ANAT 632D1 EXPERIMENTAL MORPHOLOGY. (3)

● ANAT 632D2 EXPERIMENTAL MORPHOLOGY. (3)

ANAT 663D1 HISTOLOGY. (4.5) The study of the cytology and structure of tissues and organs.

ANAT 663D2 HISTOLOGY. (4.5)

ANAT 690D1 CELL AND DEVELOPMENTAL BIOLOGY. (3) Current developments in molecular cell biology and developmental biology will be presented by course coordinators and staff from primary papers in the scientific literature. These will be researched and critiqued by students through oral and written presentations. Two term papers are required for students taking the course.

ANAT 690D2 CELL AND DEVELOPMENTAL BIOLOGY. (3)

ANAT 698D1 M.Sc. THESIS RESEARCH 1. (12)

ANAT 698D2 M.Sc. THESIS RESEARCH 1. (12)

ANAT 699D1 M.Sc. THESIS RESEARCH SEMINAR. (4.5)

ANAT 699D2 M.Sc. THESIS RESEARCH SEMINAR. (4.5)

ANAT 701D1 Ph.D. COMPREHENSIVE EXAMINATION. (0)

ANAT 701D2 Ph.D. COMPREHENSIVE EXAMINATION. (0)

## 4 Animal Science

Department of Animal Science  
Macdonald Campus  
21,111 Lakeshore Road  
Sainte-Anne-de-Bellevue, QC H9X 3V9  
Canada

Telephone: (514) 398-7794

Fax: (514) 398-7964

Email: [Info@AnimSci.AgrEnv.McGill.CA](mailto:Info@AnimSci.AgrEnv.McGill.CA)

Website: <http://www.agrenv.mcgill.ca/animal/animal.htm>

Chair — X. Zhao

### 4.1 Staff

*Emeritus Professor*

J.E. Moxley; B.Sc. (Agr.), M.Sc. (McG.), Ph.D. (C'nell)



**Professors**

R.B. Buckland; B.Sc.(Agr.), M.Sc.(McG.), Ph.D.(Maryland)  
 E.R. Chavez; Agr.Eng.(Chile), M.Sc. Ph.D.(Calif.)  
 B.R. Downey; D.V.M.(Tor.), Ph.D.(McG.)  
 J.F. Hayes; B.Agr.Sc., M.Agr.Sc.(Dub.), Ph.D.(N.C.St.)  
 U. Kuhnlein; B.Sc.(Fed. Inst. of Tech., Zurich), Ph.D.(Geneva)  
 K.F. Ng-Kwai-Hang; B.Sc.(Agr.), M.Sc., Ph.D.(McG.)

**Associate Professors**

R.I. Cue; B.Sc.(Newcastle-upon-Tyne), Ph.D.(Edin.)  
 H. Monardes; Ing. Agr.(Concepcion, Chile), M.Sc., Ph.D.(McG.)  
 L.E. Phillip; B.Sc.(Agr.), M.Sc.(Agr.)(McG.), Ph.D.(Guelph)  
 K.M. Wade; B.Sc.(Agr.), M.Sc.(Agr.)(Dublin), Ph.D.(C'nell)  
 D. Zadworny; B.Sc., Ph.D.(Guelph)  
 X. Zhao; B.Sc., M.Sc.(Nanjing), Ph.D.(C'nell) (*William Dawson Scholar*)

**Assistant Professors**

R. Lacroix; B.Sc., M.Sc.(Que.), Ph.D.(McG.) (PT)  
 A.F. Mustafa; B.Sc., M.Sc.(Khartoum), Ph.D.(Sask.)

**Associate Members**

Faculty in the School of Dietetics and Human Nutrition  
 R.C. Chian

**Adjunct Professors**

C. Keefer, P. Lacasse, D. Lefebvre, B. Murphy, D. Petitclerc,  
 J. Turner

**4.2 Programs Offered**

The Department provides laboratory facilities for research work leading to the degrees of Master of Science and Doctor of Philosophy in the disciplines of animal breeding (genetics), nutrition, and reproductive physiology, molecular biology, milk biochemistry and information systems. Within these areas advantage may be taken of strong research programs and expertise in molecular biology and milk biochemistry. Students registered in the Department of Animal Science may develop programs in conjunction with other units at McGill, for example the Nutrition and Food Science Centre or the School of Dietetics and Human Nutrition. Each student has an advisory committee composed of the thesis supervisor and at least two other faculty members.

**4.3 Admission Requirements****M.Sc. (Thesis)**

Candidates are required to have either a Bachelor's degree in Agriculture or a B.Sc. degree in an appropriate, related discipline with an equivalent cumulative grade point average of 3.2/4.0 (Second Class-Upper division) over the past four full-time semesters of study.

**M.Sc. Applied**

All candidates are required to have a B.Sc. degree or equivalent.

**Ph.D.**

Candidates are normally required to have an M.Sc. degree in an area related to the chosen field of specialization for the Ph.D. program.

**4.4 Application Procedures**

Applicants for graduate studies through academic units in the Faculty of Agricultural and Environmental Sciences may submit on-line applications via the Web at <http://www.mcgill.ca/applying/graduate> or printed applications. Supporting documents must be sent to:

Student Affairs Office (Graduate Studies)  
 Macdonald Campus of McGill University  
 21,111 Lakeshore  
 Sainte-Anne-de-Bellevue, QC H9X 3V9  
 Canada  
 Telephone: (514) 398-7925  
 Fax: (514) 398-7968  
 Email: [grad@macdonald.mcgill.ca](mailto:grad@macdonald.mcgill.ca)

Applications will be considered upon receipt of a signed and completed application form, \$60 application fee, all official transcripts, two signed original letters of reference on official letterhead of originating institution, and (if required) proof of competency in oral and written English by appropriate exams. DOCUMENTS SUBMITTED WILL NOT BE RETURNED.

**Deadlines** – Applications, including all supporting documents must reach the Student Affairs Office no later than June 15 (March 1 for International) for the *September session*; October 15 (July 1 for International) for the *January session*; February 15 (November 1 for International) for the *Summer session*. It may be necessary to delay review of the applicant's file until the following admittance period if application materials including supporting documents are received after these dates. International applicants are advised to apply well in advance of the deadline because immigration procedures may be lengthy. Applicants are encouraged to make use of the web-based application form on the McGill website <http://www.mcgill.ca/applying/graduate>.

**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. Credit card (by completing the appropriate section of the application form). NB: on-line applications must be paid for by credit card.
2. **Certified** cheque in Cdn.\$ drawn on a Canadian bank.
3. **Certified** cheque in U.S.\$ drawn on a U.S. bank.
4. Canadian Money order in Cdn.\$.
5. U.S. Money Order in U.S.\$.
6. An international draft in Canadian funds drawn on a Canadian bank requested from the applicant's bank in his/her own country.

**Transcripts** – Two official copies of all transcripts with proof of degree(s) granted 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.

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 considered by the academic unit to be preparatory to the graduate program.

**Letters of Recommendation** – Two letters of recommendation *on letterhead (official paper) or bearing the university seal* and with original signatures from two instructors familiar with the applicant's work, preferably in the applicant's area of specialization, are required. It is the applicant's responsibility to arrange for these letters to be sent.

**Competency in English** – Non-Canadian applicants whose mother tongue is not English and who have not completed an undergraduate degree using the English language are required to submit documented proof of competency in oral and written English, by appropriate exams, e.g. TOEFL (minimum score 550 or 213 on computerized test) or IELTS (minimum 6.5 overall band). The MCHS is not considered equivalent. Results must be submitted as part of the application. The University code is 0935 (McGill University, Montreal); please use Department code 31 (Graduate Schools), Biological Sciences - Agriculture, to ensure that your TOEFL reaches this office without delay.

**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 Graduate and Postdoctoral Studies Office 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 graduate studies, **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.**

#### 4.5 Program Requirements

##### M.Sc. (Thesis)

Four one-semester courses or the equivalent and two seminar courses at the post-graduate level are required, as a minimum, although a student may be advised to take additional courses as specified by his/her advisory committee. Advanced undergraduate courses may be considered for graduate credit if approved by the student's committee and the Graduate and Postdoctoral Studies Office and passed at the graduate level; generally, this will not constitute more than one of the four required courses.

A minimum of 45 credits and completion of an acceptable thesis is required for the M.Sc. degree; 14 credits are for course work and 31 credits for the thesis (ANSC 680, ANSC 681, ANSC 682, and ANSC 683). Exceptional M.Sc. students may be considered for Ph.D. status after one full year in the Department.

##### M.Sc. Applied (45 credits)

The M.Sc. Applied (non-thesis) degree is oriented to animal scientists already working in industry or government, to undergraduate students inspired by concepts in sustainable and integrated animal agriculture, to project leaders interested in animal resource management and to veterinarians. The program aims to provide graduate training in applied areas of animal production with a view towards integrating technology and management in animal production with allied areas of agricultural resource utilisation.

##### Required Course (3 credits)

ANSC 501 (3) Advanced Animal Production Systems.

##### Complementary Courses (27 credits)

9 credits must be in Animal Science at the graduate level

18 credits can be selected from a recommended list where no more than 6 credits can be chosen from undergraduate level courses.

##### Project Component – Required (15 credits)

ANSC 643 (3) Project 1  
ANSC 644 (3) Project 2  
ANSC 645 (3) Project 3  
ANSC 646 (3) Project 4  
ANSC 647 (3) Project 5

##### Ph.D.

Since the Ph.D. is primarily a research degree, the amount of course work required may comprise a smaller portion of the total than is the case for the M.Sc., this will depend on the background of the individual student, and must be approved by the student's advisory committee. This course work must include two seminar courses at the graduate level and the Ph.D. Comprehensive Examination ANSC 701.

The thesis must clearly show originality and be a contribution to knowledge.

#### 4.6 Courses

For the term (Fall and/or Winter), days, and times when courses will be offered, please refer to the 2002-2003 Class Schedule on the Web, <http://www.mcgill.ca/minerva-students/class/>. Class locations and names of instructors are also provided.

Students preparing to register are advised to consult the Class Schedule website for the most up-to-date list of courses available. New courses may have been added or courses rescheduled after this Calendar went to press.

The schedule of courses to be offered in Summer 2003, will be available on the website in January 2003.

**Courses with numbers ending D1 and D2** are taught in two consecutive terms (most commonly Fall and Winter). Students must register for both the D1 and D2 components. No credit will be given unless both components (D1 and D2) are successfully completed in consecutive terms.

ANSC has replaced 342 as the prefix for Animal Science courses. The course credit weight is given in parentheses after the title.

● Denotes courses not offered in 2002-03

**ANSC 501 ADVANCED ANIMAL PRODUCTION SYSTEMS.** (3) (Winter) (3 lectures) An advanced course dealing with current world animal production systems (ruminant and monogastric) emphasizing their practices, constraints and relative efficiencies with a view to developing methods of improving productivity.

**ANSC 504 POPULATION GENETICS.** (3) (Fall) (3 lectures) A consideration of the problems involved in the improvement of animals and the application of genetics in their solution.

**ANSC 551 CARBOHYDRATE AND LIPID METABOLISM.** (3) (Winter) (3 lectures) Comparative aspects of nutrition and metabolism of carbohydrate and lipid from the cellular level through the multi-organ of the whole organism. Main topics will include biothermodynamics, calorimetry, cellular metabolism and functions of carbohydrate and lipid, digestion, absorption and utilization of dietary carbohydrate and lipid.

● **ANSC 552 PROTEIN METABOLISM AND NUTRITION.** (3) (Fall) (3 lectures)

**ANSC 605 ESTIMATION: GENETIC PARAMETERS.** (3) (3 lectures) (Given in alternate years.) General methods for the estimation of components of variance and co-variance are considered, with specific emphasis given to their application to heritability, repeatability and genetic correlation estimation.

● **ANSC 606 SELECTION INDEX AND ANIMAL IMPROVEMENT.** (3) (3 lectures)

**ANSC 607 LINEAR MODELS IN AGRICULTURAL RESEARCH.** (3) (3 lectures) The theory and application of linear models to agricultural research is considered. Special emphasis is given to the analysis of experimental and survey data with unequal subclass numbers.

● **ANSC 611 ADVANCED REPRODUCTIVE PHYSIOLOGY.** (3) (2 lectures, 1 seminar) (Given in alternate years.)

**ANSC 622 SELECTED TOPICS IN MOLECULAR BIOLOGY.** (3) (1 lecture and 2 seminars) (Prerequisite: MICR 500 or permission of instructor) Key examples of applications of molecular biology to the study of animal physiology and animal genetics will be drawn from the current literature and discussed in depth. The course has a dual purpose. It will familiarize students with current events at the forefront of molecular biology and will teach them how to read and critically evaluate research publications.

● **ANSC 623 TECHNIQUES MOLECULAR GENETICS: DNA SEQUENCING.** (3)

● **ANSC 624 TECHNIQUES MOLECULAR GENETICS: DNA FINGER-PRINTING.** (3) (Requires previous laboratory experience.)

● **ANSC 625 TECHNIQUES MOLECULAR GENETICS: POLYMERASE CHAIN REACTION.** (3)

**ANSC 630 EXPERIMENTAL TECHNIQUES: ANIMAL SCIENCE: MACRO.** (3) (1 lecture, 1 lab) Lectures and laboratories dealing with animal experimentation. Emphasis on the design and conduction of ani-

mal studies, selection of experimental animals, chemical and biological assays, statistical analysis, interpretation of data and preparation of technical reports.

**ANSC 635 VITAMINS AND MINERALS IN NUTRITION.** (3) (3 lectures) Modularised course dealing with advanced topics in Nutrition. The core of the course will focus on vitamins and minerals.

**ANSC 636 ANALYSIS - ANIMAL BREEDING RESEARCH DATA.** (3) (3 lectures) An advanced graduate course to give training and experience in statistical techniques applied to quantitative genetics and animal breeding. To consider aspects of data handling of large data sets (100,000 observations), checks for consistency and connectedness in data. Considerations in choosing efficient analytical procedures in fitting these models and development of efficient numerical algorithms to apply these procedures.

**ANSC 643 PROJECT 1.** (3) Review of the literature and design of the project. This project relates to the M.Sc. Applied (non-thesis) degree.

**ANSC 644 PROJECT 2.** (3) Continuation of the review of the literature and design of project. This project relates to the M.Sc. Applied (non-thesis) degree.

**ANSC 645 PROJECT 3.** (3) Execution and write-up of project. This project relates to the M.Sc. Applied (non-thesis) degree.

**ANSC 646 PROJECT 4.** (3) Continuation of write-up and submission of project. This project relates to the M.Sc. Applied (non-thesis) degree.

**ANSC 647 PROJECT 5.** (3) Seminar and project presentations. This oral presentation of the project relates to the M.Sc. Applied (non-thesis) degree.

**ANSC 680 M.Sc. THESIS 1.** (7) Independent research under the direction of a supervisor toward completion of M.Sc. thesis.

**ANSC 681 M.Sc. THESIS 2.** (7) Independent research under the direction of a supervisor toward completion of M.Sc. thesis.

**ANSC 682 M.Sc. THESIS 3.** (7) Independent research under the direction of a supervisor toward completion of M.Sc. thesis.

**ANSC 683 M.Sc. THESIS 4.** (10) Final submission and approval of M.Sc. thesis.

● **ANSC 691 SPECIAL TOPIC: ANIMAL SCIENCES.** (3)

**ANSC 691D1 SPECIAL TOPIC: ANIMAL SCIENCES.** (1.5) Prescribed reading, conference or practical work on a selected topic in the student's area of specialization, not otherwise available in other courses; under staff supervision. An approved course outline must be on file in the Departmental office prior to registration deadline.

**ANSC 691D2 SPECIAL TOPIC: ANIMAL SCIENCES.** (1.5)

**May also be available as:**

**ANSC 691N1, ANSC 691N2.**

● **ANSC 692 TOPIC IN ANIMAL SCIENCES 1.** (3)

**ANSC 692D1 TOPIC IN ANIMAL SCIENCES 1.** (1.5) Prescribed reading, conference or practical work on a selected topic in the student's area of specialization, not otherwise available in other courses; under staff supervision. An approved course outline must be on file in the Departmental office prior to registration deadline.

**ANSC 692D2 TOPIC IN ANIMAL SCIENCES 1.** (1.5)

**May also be available as:**

**ANSC 692N1, ANSC 692N2.**

**ANSC 693D1 TOPIC IN ANIMAL SCIENCES 2.** (1.5) (Prescribed reading, conference or practical work on a selected topic in the student's area of specialization, not otherwise available in other courses; under staff supervision. An approved course outline must be on file in the Departmental office prior to registration deadline.

**ANSC 693D2 TOPIC IN ANIMAL SCIENCES 2.** (1.5)

**May also be available as:**

**ANSC 693N1, ANSC 693N2.**

**ANSC 695 ANIMAL SCIENCE SEMINAR 1.** (1) (1 hour) One of two seminars to be given by all students in an M.Sc. program. Consists of a review of literature in relation to the student's proposed

research and an experimental design of the research to be conducted.

**ANSC 696 ANIMAL SCIENCE SEMINAR 2.** (1) (1 hour) One of two seminars to be given by all students in an M.Sc. 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.

● **ANSC 701 DOCTORAL COMPREHENSIVE EXAMINATION.** (0)

**ANSC 701D1 DOCTORAL COMPREHENSIVE EXAMINATION.** (0) (See Faculty Regulations)

**ANSC 701D2 DOCTORAL COMPREHENSIVE EXAMINATION.** (0)

**ANSC 797 ANIMAL SCIENCE SEMINAR 3.** (1) (1 hour) One of two seminars to be given by all students in a Ph.D. program. Review of literature in relation to the student's proposed research and an experimental design of the research to be conducted.

**ANSC 798 ANIMAL SCIENCE SEMINAR 4.** (1) (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.

**AEMA 610 STATISTICAL METHODS 2.** (3) (3 lectures and one 2-hour lab) (Prerequisite: AEMA 310 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

Department of Anthropology  
Stephen Leacock Building  
855 Sherbrooke Street W., Room 717  
Montreal, QC H3A 2T7  
Canada

Telephone: (514) 398-4300

Fax: (514) 398-7476

Website: <http://www.arts.mcgill.ca/programs/anthro>

*Acting Chair* — John G. Galaty

### 5.1 Staff

#### *Professors*

Donald W. Attwood; A.B.(Calif.), Ph.D.(McG.) (*on leave 2002-03*)  
Fumiko Ikawa-Smith; B.A.(Tsuda), A.M.(Radcliffe), Ph.D.(Harv.)  
Margaret Lock; B.Sc.(Leeds), M.A., Ph.D.(Calif.) (*joint appt. with Social Studies of Medicine*)

J rome Rousseau; M.A.(Montr.), Ph.D.(Cantab.)

Philip Carl Salzman; A.B.(Antioch), M.A., Ph.D.(Chic.)

Bruce G. Trigger; B.A.(Tor.), Ph.D.(Yale), F.R.S.C. (*James McGill Professor*)

Allan Young; B.A.(Penn.), M.A.(Wash.), Ph.D.(Penn.) (*joint appt. with Social Studies of Medicine*)

#### *Associate Professors*

Michael S. Bisson; B.A., M.A., Ph.D.(Calif.) (*on leave 2002-03*)

Laurel Bossen; B.A.(Barnard), M.A., Ph.D.(SUNY, Albany)

Ellen Corin; B.A., M.A., Ph.D.(Louvain) (*joint appt. with Psychiatry*)

John Galaty; M.A., Ph.D.(Chic.)

Carmen Lambert; B.A.(Montr.), M.A., Ph.D.(McG.)

Toby Morantz; B.A.(Man.), M.A.(Br.Col.), Ph.D.(Tor.)

Kristin Norget; B.A.(Vic., B.C.), M.Phil., D.Phil.(Cantab.)

James M. Savelle; B.Sc., M.Sc.(Ott.), M.A.(Ark.), Ph.D.(Alta.)

Colin H. Scott; B.A.(Regina), M.A., Ph.D.(McG.)

#### *Assistant Professor*

Sandra T. Hyde; B.A.(U.C. Santa Cruz), M.P.H.(Hawaii), Ph.D.(U.C. Berkeley)

## 5.2 Programs Offered

The Department offers training leading to the M.A. and Ph.D. in Anthropology. Admission is to the M.A. program, except when a student already holds a Master's degree. It is expected, however, that most applicants will be oriented towards achievement of the Ph.D.

The Department offers several alternative M.A. programs:

1. M.A. with thesis;
2. M.A. with research paper;
3. M.A. in Medical Anthropology, with or without thesis.

## 5.3 Admission Requirements

### Master's

Admission to the M.A. program is open competitively to students holding an Honours or Major B.A. in Anthropology. Outstanding candidates with B.A. degrees in other disciplines but with substantial background related to anthropology are sometimes admitted on the condition that they complete a specified number of additional courses in Anthropology.

The applicants admitted usually have undergraduate Grade Point Averages of 3.5 or above on a 4.0 point scale.

### Ph.D.

Admission to the Ph.D. program is open competitively to students with a Master's degree in Anthropology. In very special circumstances candidates with Master's degrees in related disciplines may be admitted.

## 5.4 Application Procedures

The deadlines for receipt of all application material for September admission is January 1.

Applications will be considered upon receipt of:

1. Graduate Application Form;
2. application fee (\$60), official transcripts;
3. two letters of recommendation;
4. statement of research interests (including reasons for wanting to pursue them at McGill); and
5. test results (GRE, TOEFL), if required.  
(Canadian applicants are exempted from the GRE.)  
(For international students, a minimum TOEFL score of 550 or 213 on computer-based test is required.)

The Department admissions committee announces its selections by mid-March.

A number of teaching assistantships are available to graduate students in the Department. Applicants who wish to be considered for an assistantship, a McGill Recruitment Fellowship, or for Differential Fee Waivers (for international students) should include a note to that effect with their applications. For information regarding a variety of other fellowship programs, see the "Graduate Fellowships and Awards" section of the Graduate and Postdoctoral Studies Calendar.

Application packets, including a brochure on the Department, are available directly from the Administrative Assistant of the Department. Online applications are available through the Department website.

## 5.5 Program Requirements

### M.A. Degree

The purpose of the M.A. program is to provide advanced level training in anthropology and to prepare students for research at the Ph.D. level.

### M.A. Degree with Thesis (48 credits)

The Master's degree with thesis is a 48-credit program: 4 courses (12 credits) and the M.A. thesis (36 credits).

The student's program of work, which is based on his/her research interests, is developed in consultation with the student's supervisor and the two other members of his or her advisory committee. Students are required to take four courses in the form of

seminars and/or tutorials. The set of four courses should be directed toward and converge in the thesis research. M.A. thesis research may take the form of fieldwork but a library thesis is strongly advised so that students can proceed more rapidly to the Ph.D.

### 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 of Medicine (SSOM). For additional information, including seminar offerings, please refer to the SSOM section.

The program is open to students with backgrounds in the social sciences, the medical professions, or the medical sciences. The M.A. degree is awarded by the Anthropology Department and admission is granted by a joint admissions committee made up of representatives from Anthropology and SSOM. Within the medical anthropology program, candidates will apply for permission to take one of the following courses of study:

#### a) M.A. with Thesis

This course of study is taken by students with an academic background in anthropology. Course and thesis requirements are the same as described in the M.A. in Anthropology, with thesis, with the following differences: students are required to take two Seminars in Medical Anthropology (HSSM 605, ANTH 615), as two of their four courses.

#### b) M.A. with Research Paper

This option is offered as an alternative for students with a background in Anthropology. Students are required to take five courses: two Seminars in Medical Anthropology (HSSM 605, ANTH 615) as well as the following courses in anthropology: Theory 1, Research Methods, and Quantitative Methods. They must also attend the Anthropology Proseminar. In addition, students are required to write a research paper.

#### c) Special M.A. with Research Paper

This course of study is taken by students who lack a strong academic background in anthropology. These students are required to take eight courses (24 credits), including two seminars in Medical Anthropology (HSSM 605, ANTH 615) and at least five additional graduate courses in anthropology (Theory 1 and Research Methods are recommended). In addition, students are required to write a research paper.

### Ph.D. Degree

The purpose of the Ph.D. program is to enable a student to make an original contribution to anthropological research in the form of a doctoral thesis. This must be based on a comprehensive understanding of prior research relevant to the topic investigated.

All requirements for the M.A. must be completed. Students holding an M.A. from another department may be requested to take seminars covering deficiencies in their previous training. Those who hold an M.A. without thesis are required to take 2 extra courses (Advanced Theory and Advanced Methods) in either Anthropology or Archaeology.

Candidates must (1) pass a language exam; (2) demonstrate comprehensive understanding of prior research in three subfields of anthropology through the successful completion of three courses; these courses are the Ph.D. Tutorials listed below;

(3) submit and orally defend a research proposal; and (4) carry out field research and submit an original thesis for examination and oral defense.

- 1) A language examination, normally French, must be passed before an oral examination of the research proposal may be scheduled. Francophone students can satisfy the language requirement by demonstrating competency in English. The purpose of the language requirement is to ensure that the student has access to anthropological literature in at least two languages. Under special circumstances, a language other than English or French may be substituted, provided that there is sufficient anthropological literature on the student's research topic in that language.
- 2) Within the first year of Ph.D. study, students will select a thesis supervisor and at least two other thesis committee members. One of the latter may be from outside the Department. The committee as a whole helps the student to develop a topic for research, to learn the state of the art regarding the topic, and to write a research proposal. To ensure that students understand prior research, they must define three subfields which intersect with the thesis topic. One of these subfields is usually the literature on the geographic region where fieldwork will be carried out. One or more committee members will tutor the student in each selected subfield, and the student will prepare a bibliography of works read and discussed as well as a concise evaluation of the material covered in each. This written work will demonstrate understanding of prior research in each subfield.
- 3) The thesis proposal is also prepared in consultation with the committee members and under the direction of the thesis supervisor. It contains a brief review of the literature and controversies in the three relevant subfields, and a discussion of the proposed research (background, methods and hypotheses to be tested). When the proposal is finished, it must be read and approved by all members of the committee before it is submitted for oral examination. Copies of the proposal and of the bibliographies relating to the three subfields must be made available to all professors in the Department at least one week before the hearing.  
The oral examination of the proposal and the three subfields is open to all staff and students. The first part of the examination will explore the student's general understanding of the three subfields selected. In the second part, the student may be questioned on the merits of any part of the proposal: theoretical assumptions, hypotheses, methods, understanding of the literature.
- 4) If the proposal is passed, the student will then carry out field research and write a thesis. Thesis drafts are read and commented on by the thesis committee. When the thesis is ready for examination, it is submitted to the Graduate and Postdoctoral Studies Office, which appoints an internal examiner (usually from within the Department) and an external examiner (an acknowledged authority in the field from outside the university). If both examiners approve the thesis, an oral defense is arranged before a committee appointed by GPSO.

## 5.6 Courses for Higher Degrees

For the term (Fall and/or Winter), days, and times when courses will be offered, please refer to the 2002-2003 Class Schedule on the Web, <http://www.mcgill.ca/minerva-students/class/>. Class locations and names of instructors are also provided.

Students preparing to register are advised to consult the Class Schedule website for the most up-to-date list of courses available. New courses may have been added or courses rescheduled after this Calendar went to press.

The schedule of courses to be offered in Summer 2003, will be available on the website in January 2003.

Courses with numbers ending D1 and D2 are taught in two consecutive terms (most commonly Fall and Winter). Students must register for both the D1 and D2 components. No credit will be

given unless both components (D1 and D2) are successfully completed in consecutive terms.

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

ANTH has replaced 151 as the prefix for Anthropology courses. The course credit weight is given in parentheses after the title.

- Denotes courses not offered in 2002-03

**ANTH 551 ADVANCED TOPICS: ARCHAEOLOGICAL RESEARCH.** (3)  
(Requires departmental approval) Examination and discussion of topics of current theoretical or methodological interest in archaeology. Topics will be announced at the beginning of term.

● **ANTH 552 PROBLEMS: PREHISTORY NORTH EASTERN AMERICA.** (3) (Prerequisite: Permission of instructor)

● **ANTH 555 ADVANCED TOPICS IN ETHNOLOGY.** (3)

● **ANTH 560 ARCHAEOLOGICAL FIELDWORK IN JAPAN.** (6)

● **ANTH 602 THEORY 1.** (3)

**ANTH 603 THEORY 2.** (3)

**ANTH 605 CULTURE AREA.** (3)

**ANTH 607D1 PROSEMINAR IN ARCHAEOLOGY.** (3)

**ANTH 607D2 PROSEMINAR IN ARCHAEOLOGY.** (3)

**ANTH 609D1 PROSEMINAR IN ANTHROPOLOGY.** (3)

**ANTH 609D2 PROSEMINAR IN ANTHROPOLOGY.** (3)

**ANTH 610 SOCIAL ORGANIZATION.** (3)

● **ANTH 611 RESEARCH DESIGN.** (3)

● **ANTH 612 KINSHIP.** (3)

**ANTH 614 ECONOMIC ANTHROPOLOGY.** (3)

**ANTH 615 SEMINAR IN MEDICAL ANTHROPOLOGY.** (3)

**ANTH 616 POLITICAL ANTHROPOLOGY.** (3)

● **ANTH 618 STRATIFICATION.** (3)

● **ANTH 620 ETHNICITY.** (3)

● **ANTH 625 CULTURAL ECOLOGY.** (3)

● **ANTH 630 SOCIAL CHANGE.** (3)

**ANTH 631 SYMBOLIC ANTHROPOLOGY.** (3)

● **ANTH 633 WOMEN AND DEVELOPMENT.** (3)

**ANTH 634 ANTHROPOLOGY OF DEVELOPMENT 1.** (3)

● **ANTH 635 ANTHROPOLOGY OF DEVELOPMENT 2.** (3)

**ANTH 636 URBANIZATION.** (3)

● **ANTH 638 COMPLEX SOCIETIES.** (3)

**ANTH 640 PSYCHOLOGICAL ANTHROPOLOGY.** (3)

● **ANTH 642 ANTHROPOLOGY OF EDUCATION.** (3)

● **ANTH 646 COGNITIVE ANTHROPOLOGY.** (3)

● **ANTH 647 PEOPLING OF THE AMERICAS.** (3)

**ANTH 648 STRUCTURAL ANTHROPOLOGY.** (3)

● **ANTH 650 ANTHROPOLOGY OF RELIGION.** (3)

● **ANTH 651 ANTHROPOLOGY AND HISTORY.** (3)

● **ANTH 652 ANTHROPOLOGY AND GENDER.** (3)

● **ANTH 653 ANTHROPOLOGY, LANGUAGE AND COGNITION.** (3)

● **ANTH 654 ANTHROPOLOGY OF CHINA.** (3)

● **ANTH 656 ANTHROPOLOGY OF ART.** (3)

● **ANTH 660 RESEARCH METHODS.** (3)

● **ANTH 665 QUANTITATIVE METHODS.** (3)

**ANTH 670 ARCHAEOLOGICAL THEORY 1.** (3)

May also be available as: **ANTH 670D1, ANTH 670D2.**

**ANTH 671 ARCHAEOLOGICAL THEORY 2.** (3)

May also be available as: **ANTH 671D1, ANTH 671D2.**

**ANTH 673 ARCHAEOLOGICAL FIELD METHODS.** (3)

● **ANTH 674 ARCHAEOLOGICAL LABORATORY METHODS.** (3)

- ANTH 676 ARCHAEOLOGICAL AREA. (3)
- ANTH 678 ETHNOHISTORY. (3)
- ANTH 680 TUTORIAL READING 1. (3)  
May also be available as: ANTH 680D1, ANTH 680D2.
- ANTH 681 TUTORIAL READING 2. (3)  
May also be available as: ANTH 681D1, ANTH 681D2.
- ANTH 682 TUTORIAL READING 3 (3)  
May also be available as: ANTH 682D1, ANTH 682D2.
- ANTH 683 TUTORIAL READING 4. (3)  
May also be available as: ANTH 683D1, ANTH 683D2.
- ANTH 684 TUTORIAL READING 5. (3)  
May also be available as: ANTH 684D1, ANTH 684D2.
- ANTH 685 RESEARCH TUTORIAL 1. (3)
- ANTH 686 RESEARCH TUTORIAL 2. (3)
- ANTH 690 RESEARCH PAPER 1. (6)
- ANTH 691 RESEARCH PAPER 2. (6)
- ANTH 692 RESEARCH PAPER 3. (6)
- ANTH 693 RESEARCH PAPER 4. (6)
- ANTH 694 M.A. THESIS TUTORIAL 1. (6)
- ANTH 695 M.A. THESIS TUTORIAL 2. (6)
- ANTH 696 M.A. RESEARCH PAPER. (15)
- ANTH 699 M.A. THESIS. (24)  
May also be available as: ANTH 699D1, ANTH 699D2.
- ANTH 700 Ph.D. PRELIMINARY EXAMINATION. (6)  
May also be available as: ANTH 700D1, ANTH 700D2.
- ANTH 702 ADVANCED ANTHROPOLOGICAL THEORY. (3)
- ANTH 705D1 CULTURE AREA. (1.5)
- ANTH 705D2 CULTURE AREA. (1.5)
- ANTH 723 SEM CONT SOC INST IN AFRICA. (3)
- ANTH 725 SEMINAR: NORTHERN RESEARCH. (3)
- ANTH 730D1 ANTHROPOLOGY WORKSHOP. (1.5)
- ANTH 730D2 ANTHROPOLOGY WORKSHOP. (1.5)
- ANTH 760 ADVANCED ANTHROPOLOGICAL METHODS. (3)
- ANTH 770 ADVANCED ARCHAEOLOGICAL THEORY. (3)
- ANTH 773 ADVANCED ARCHAEOLOGICAL METHODS. (3)
- ANTH 780 READING AND RESEARCH. (3)  
May also be available as: ANTH 780D1, ANTH 790D.
- ANTH 781 READING AND RESEARCH. (3)  
AMay also be available as: ANTH 781D1, ANTH 791D.
- ANTH 783 SEMINAR: MIGRATION. (3)
- ANTH 790 Ph.D. TUTORIAL 1. (3)  
May also be available as: ANTH 790D1, ANTH 790D2;  
ANTH 790N1, ANTH 790N2.
- ANTH 791 Ph.D. TUTORIAL 2. (3)  
May also be available as: ANTH 791D1, ANTH 791D2;  
ANTH 791N1, ANTH 791N2.
- ANTH 792 Ph.D. TUTORIAL 3. (3)  
May also be available as: ANTH 792D1, ANTH 792D2;  
ANTH 792N1, ANTH 792N2.

## 6 Architecture

School of Architecture  
Macdonald Harrington Building  
815 Sherbrooke Street West  
Montreal, QC H3A 2K6  
Canada

Telephone: (514) 398-6700  
Fax: (514) 398-7372  
Website: <http://www.mcgill.ca/arch>

Director — David Covo

Graduate Program Co-ordinator — Alberto Pérez-Gómez (Acting)

### 6.1 Staff

#### Emeritus Professor

Harold Spence-Sales; B.A.(Well.), A.A.Dipl., L.L.D.(S. Fraser)

#### Professors

Bruce Anderson; B.Arch.(McG.), M.Arch.(Harv.), F.R.A.I.C.,  
O.A.Q., A.A.P.P.Q.  
Vikram Bhatt; N.Dip Arch.(Ahmed.), M.Arch.(McG.), M.R.A.I.C.  
Derek Drummond; B.Arch.(McG.), F.R.A.I.C., O.A.Q., O.A.A.  
(William C. Macdonald Professor of Architecture)  
Alberto Pérez-Gómez; Dipl.Eng.(Nat.Pol.Inst.Mexico), M.A.,  
Ph.D.(Essex) (Saidye Rosner Bronfman Professor of  
Architectural History)  
Radoslav Zuk; B.Arch.(McG.), M.Arch.(M.I.T.), D.Sc.(U.A.A.),  
F.R.A.I.C., O.A.Q., O.A.A.

#### Associate Professors

Annamarie Adams; B.A.(McG.), M.Arch., Ph.D.(Calif.), M.R.A.I.C.  
(William Dawson Scholar)  
Martin Bressani; B.Sc.(McG.), B.Arch.(McG), M.Sc.(Arch.)(MIT),  
D.E.A.(Paris-Sorbonne), Docteur (Paris-Sorbonne - Paris IV),  
O.A.Q.  
Ricardo Castro; B.Arch.(Los Andes, Col.), M.Arch., M.A.(Oregon),  
M.R.A.I.C.  
David Covo; B.Sc.(Arch.), B.Arch.(McG.), F.R.A.I.C., O.A.Q.  
Avi Friedman; B.Arch.(Technion), M.Arch.(McG.), Ph.D.(Montr.),  
O.A.Q., I.A.A.  
Robert Mellin; B.Arch., M.Sc.(Arch.) (Penn.State), M.Arch.(McG.),  
M.Sc., Ph.D.(U.Penn.), M.R.A.I.C., N.A.A.  
Adrian Sheppard; B.Arch.(McG.), M.Arch.(Yale), O.A.Q.,  
A.A.P.P.Q., F.R.A.I.C.  
Pieter Sijpkens; B.Sc.(Arch.), B.Arch.(McG.)

#### Course Lecturers

Manon Asselin, Jean D'Aragnon, David Theodore, Roland Ulfig

#### Adjunct Professors

Cecile Baird, Ewa Bieniecka, Lawrence Bird, Julia Bourke,  
Michael Carroll, Nathalie David, Howard Davies, Georges Drolet,  
François Dufaux, Gordon Edwards, François Émond, Martin Fiset,  
Julia Gersovitz, Mark Ginocchio, Robert Hamilton, Dan Hanganu,  
Phyllis Lambert, Annie Lebel, Seymour Levine, Anna Mainella,  
Harry Mayerovitch, Serge Melanson, Rosanne Moss,  
Carl Mulvey, Joanna Nash, Louise Pelletier, Mark Poddubiuk,  
Richard Russell, Robert Stanley, Sheila Theophanides,  
Fred Weiser, Samson Yip, Jozef Zorko

### 6.2 Programs Offered

M.Arch.I (professional), M.Arch. II (post-professional), Graduate  
Diploma in Housing, Ph.D.

The professional M.Arch.I is accredited by the Canadian Archi-  
tectural Certification Board (CACB), and is recognized as accred-  
ited by the National Council of Architectural Registration Boards  
(NCARB) in the U.S.A.

There are two areas of study in the M.Arch.II and Ph.D.  
programs: Architectural History and Theory, and Housing (which  
includes Affordable Homes, Domestic Environments, and Mini-  
mum Cost Housing).

Information concerning the duration of programs, documents required of applicants, etc., may be obtained from: [profdegree.architecture@mcgill.ca](mailto:profdegree.architecture@mcgill.ca) (M.Arch.I), [postprofmaster.architecture@mcgill.ca](mailto:postprofmaster.architecture@mcgill.ca) (M.Arch.II and Graduate Diploma in Housing), or [phd.architecture@mcgill.ca](mailto:phd.architecture@mcgill.ca) (Ph.D.).

### Architectural Certification in Canada

In Canada, all provincial associations recommend a degree from an accredited professional degree program as a prerequisite for licensure. The Canadian Architectural Certification Board (CACB), which is the sole agency authorized to accredit Canadian professional degree programs in architecture, recognizes two types of accredited degrees: the Bachelor of Architecture and the Master of Architecture. A program may be granted a five-year, three-year, or two-year term of accreditation, depending on its degree of conformance with established educational standards.

Masters degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree, which, when earned sequentially, comprise an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

Since all provincial associations in Canada recommend any applicant for licensure to have graduated from a CACB-accredited program, obtaining such a degree is an essential aspect of preparing for the professional practice for architecture. While graduation from a CACB-accredited program does not assure registration, the accrediting process is intended to verify that each accredited program substantially meets those standards that, as a whole, comprise an appropriate education for an architect.

## 6.3 Admission Requirements

### M.Arch. I (professional) Program

Students holding the McGill B.Sc.(Arch.) degree, or equivalent, with a cumulative grade point average of at least 3.0 on a scale of 4.0, are eligible to apply for admission.

### M.Arch. II (post-professional) and Graduate Diploma in Housing

Students holding an accredited professional degree in architecture, or equivalent, with a cumulative grade point average of at least 3.0 on a scale of 4.0, are eligible to apply for admission. In special cases, candidates with a degree in a related field may be considered.

### Ph.D.

Candidates with high standing in McGill's M.Arch.II, or who hold an equivalent degree from another university, are eligible to apply to this program. Those who do not have an appropriate background in the chosen research area may be admitted to Ph.D.I. Candidates who have an adequate background at the post-professional Master's level in the proposed area of research will be admitted to Ph.D.II.

A working knowledge of a language or languages relevant to the area of research may be required.

## 6.4 Application Procedures

### Professional Master of Architecture: M.Arch.I

#### McGill B.Sc.(Arch.) Graduates:

1. Completed on-line application form accessible from the School's website at <http://www.mcgill.ca/arch> or from <http://www.mcgill.ca/applying/graduate>.
2. Work experience reports.
3. A non-refundable application fee of \$60 (Cdn).

#### Others:

1. Completed on-line application form accessible from the School's website at <http://www.mcgill.ca/arch> or from <http://www.mcgill.ca/applying/graduate>.
2. A non-refundable application fee of \$60 (Cdn).
3. Two sets of official transcripts sent directly by the registrars of all universities attended.
4. Two confidential letters of reference sent directly by the referees to the School of Architecture.

5. Course calendar descriptions of previous college and/or university studies.
6. A portfolio (8 1/2" x 11" format) containing the following:
  - samples of studio work from previous studies (please use Studio Project Description Form),
  - samples of freehand drawing and sketching,
  - samples of professional work.
7. Completed Program Comparison Chart.
8. Proof of English language proficiency – minimum TOEFL score of 550 on the paper-based test (or 213 on the computer-based test). Please refer to the *Graduate and Postdoctoral Studies Calendar*, General Information section 5.3.

### Post-professional programs:

#### M.Arch. II, Ph.D. and Graduate Diploma in Housing

1. Completed on-line application form accessible from the School's website at <http://www.mcgill.ca/arch> or from <http://www.mcgill.ca/applying/graduate>.
2. A non-refundable application fee of \$60 (Cdn).
3. Two sets of official transcripts sent directly by the registrars of all universities attended.
4. Two confidential letters of reference sent directly by the referees to the School of Architecture.
5. A statement indicating the option chosen and the general area of research to be undertaken. Ph.D. applicants must submit a 3-page research proposal.
6. A portfolio (8 1/2" x 11" format) containing at least five examples of the applicant's work. Folded drawings are unacceptable.
7. At least one example of a report or paper written by the applicant.
8. Proof of English language proficiency (TOEFL) – minimum score of 550 on the paper-based test (or 213 on the computer-based test). Please refer to the *Graduate and Postdoctoral Studies Calendar*, General Information section 5.3.

## 6.5 Program Requirements

### M.Arch. I

McGill's professional program in Architecture is structured as a four-and-a-half-year, or nine-semester, course of study divided into two parts. The first part is a six-semester design program leading to a non-professional degree, Bachelor of Science (Architecture). Further information on the B.Sc.(Arch.) program can be found in the Faculty of Engineering section of the *Undergraduate Programs Calendar*, available at <http://www.mcgill.ca>. The second part, for students with the B.Sc.(Arch.) degree, or the equivalent, is the professional Master of Architecture program.

The professional Master of Architecture program is a one-and-a-half year, or three-semester course of studies leading to the M.Arch. I degree.

#### M.Arch.I Program of Study (45 credits)

ARCH 550	(3)	Urban Planning 1
ARCH 551	(3)	Urban Planning 2
ARCH 554	(2)	Mechanical Services
ARCH 555	(2)	Environmental Acoustics
ARCH 671	(4)	Design Research and Methodology
ARCH 672	(6)	Architectural Design 1
ARCH 673	(8)	Architectural Design 2
ARCH 674	(2)	Professional Practice 1
ARCH 675	(2)	Professional Practice 2
ARCH 676	(2)	Specifications and Building Costs
ARCH 678	(3)	Advanced Construction
ARCH 679	(1)	Architectural Journalism
ARCH 680	(1)	Sketching School 2

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 (ARCH 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 ARCH 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 (ARCH 702 and ARCH 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

**For the term (Fall and/or Winter), days, and times when courses will be offered, please refer to the 2002-2003 Class Schedule on the Web, <http://www.mcgill.ca/minerva-students/class/>. Class locations and names of instructors are also provided.**

**Students preparing to register are advised to consult the Class Schedule website for the most up-to-date list of courses available. New courses may have been added or courses rescheduled after this Calendar went to press.**

**The schedule of courses to be offered in Summer 2003, will be available on the website in January 2003.**

ARCH has replaced 301 as the prefix for Architecture courses. The course credit weight is given in parentheses after the title.

- Denotes courses not offered in 2002-03
- Denotes limited enrolment

**ARCH 520 MONTREAL: URBAN MORPHOLOGY.** (3) (2-1-6) (Prerequisite: ARCH 251) Historical, geographical, demographical, and regional evolution of the metropolis of Montreal. Topics include: important quarters, the Montreal urban grid, industrialization, reform movements, geographical diversity, urban culture, local building techniques and materials. Basic concepts of urban morphology and their relationships to the contemporary urban context will be explored.

**ARCH 521 STRUCTURE OF CITIES.** (3) (2-0-7) (Prerequisite: ARCH 202 or permission of instructor) Nature, pattern and life of modern cities. Urban networks, special areas, problems and prospects.

● □ **ARCH 522 HISTORY OF DOMESTIC ARCHITECTURE IN QUEBEC.** (3) (2-0-7) (Prerequisite: ARCH 251)

□ ★ **ARCH 523 SIGNIFICANT TEXTS AND BUILDINGS.** (3) (2-0-7) (Prerequisite: ARCH 251) (Alternating with ARCH 524) (Departmental permission required) Critical study of significant architectural thought since 1750 as it has been expressed in buildings and

texts (treatises, manifestos, criticisms). A specific theme will be addressed every year to allow in-depth interpretations of the material presented and discussed.

● □ ★ **ARCH 524 SEMINAR ON ARCHITECTURAL CRITICISM.** (3) (2-0-7) (Prerequisite: ARCH 251) (Alternating with ARCH 523)

● □ **ARCH 525 SEMINAR ON ANALYSIS AND THEORY.** (3) (2-0-7) (Prerequisite: ARCH 202 or permission of instructor)

**ARCH 526 PHILOSOPHY OF STRUCTURE.** (3) (2-0-7) (Prerequisite: ARCH 202 or permission of Instructor) (Not open to students who have taken ARCH 374) 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.

**ARCH 527 CIVIC DESIGN.** (3) (2-0-7) (Prerequisite: ARCH 378) The elements of form in buildings and their siting design in the urban setting.

**ARCH 528 HISTORY OF HOUSING.** (3) (2-0-7) (Prerequisite: ARCH 251 or permission of instructor) Indigenous housing both transient and permanent, from the standpoint of individual structure and pattern of settlements. The principal historic examples of houses including housing in the age of industrial revolution and contemporary housing.

**ARCH 529 HOUSING THEORY.** (3) (2-0-7) (Prerequisite: ARCH 528 or permission of instructor) A review of environmental alternatives in housing; contemporary housing and the physical and sociological determinants that shape it; Canadian housing.

**ARCH 531 ARCHITECTURAL INTENTIONS VITRUVIUS - RENAISSANCE.** (3) (2-0-7) (Prerequisite: ARCH 251) 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.

**ARCH 532 ORIGINS OF MODERN ARCHITECTURE.** (3) (2-0-7) (Prerequisite: ARCH 251) 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.

● □ **ARCH 533 NEW APPROACHES TO ARCHITECTURAL HISTORY.** (3) (2-0-7) (Prerequisite: ARCH 251 or permission of instructor) (Departmental permission required)

**ARCH 540 SELECTED TOPICS IN ARCHITECTURE 1.** (3) (2-0-7) A course to allow the introduction of new topics in Architecture as needs arise, by regular and visiting staff.

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

**ARCH 550 URBAN PLANNING 1.** (3) (2-0-7) (Prerequisite: B.Sc.(Arch.) or permission of instructor) (Not normally open to Urban Planning students) Theory and practice. An examination of different basic approaches to urban planning with special reference to Quebec.

**ARCH 551 URBAN PLANNING 2.** (3) (2-1-6) (Prerequisite: ARCH 550) 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.

**ARCH 554 MECHANICAL SERVICES.** (2) (2-0-4) (Prerequisite: ARCH 405 or permission of instructor) Problems encountered in providing mechanical services in buildings. Physiological and environmental aspects of heat, ventilation and air conditions, estimation of heating and cooling loads and selection and specification of equipment. Sprinkler systems and plumbing. Construction problems produced by installation of this equipment.

**ARCH 555 ENVIRONMENTAL ACOUSTICS.** (2) (2-0-4) (Prerequisite: ARCH 405 or permission of instructor) Acoustics in architectural design, and in environmental control of buildings. Acoustical requirements in the design of auditoria such as theatres, lecture



halls, opera houses, concert halls, churches, motion picture theatres, studios. Principles of noise and vibration control, sound insulating in building construction. Practical noise control in various types of buildings.

**ARCH 622 CRITICAL WRITING.** (3) (2-1-6) Seminar to critically review an architectural topic.

**ARCH 623 PROJECT PREPARATION.** (3) (2-1-6) Guided background preparation for the project.

**ARCH 624 HISTORY AND THEORY PROJECT.** (15) (0-15-30) Visit of a chosen city for a minimum of 2 weeks. The course work includes three separate stages: 1) surveying, 2) preparation of text and architectural drawings, and 3) development of an alternative guide to the city.

**ARCH 627 RESEARCH METHODS.** (3) (2-1-6) Different approaches and research methods in housing. Setting of goals and objectives, identification of appropriate research methods, collection and evaluation of information, analysis and synthesis of data, and presentation of the findings.

**ARCH 628 HOUSING PROJECT REPORT.** (15) (0-15-30) A supervised project report based on material developed by candidates in the project preparation course. It may include on-site explorations of housing projects, surveying and documentation, critical analysis, and creative mapping of the same, plus an evaluation report.

**ARCH 630 HOUSING SEMINAR 1.** (3) (2-0-7) Strategies for affordable and low-cost housing. Investigation of cost-saving measures both at urban and dwelling unit levels. An analysis of recent low-cost housing projects.

**ARCH 631 HOUSING SEMINAR 2.** (3) (2-0-7) Strategies for affordable and low-cost housing. Investigation of cost-saving measures both at urban and dwelling unit levels. An analysis of recent low-cost housing projects.

**ARCH 634 HOUSING REPORT.** (6) (2-10-6) Human settlements problems in poverty areas; design of components and servicing systems for low cost housing; economic and technological evaluation of housing designs. Lectures and studio work leading to a comprehensive project report.

**ARCH 635 SELECTED TOPICS IN HOUSING 1.** (3) (3-0-6) Special topics related to housing.

**ARCH 636 SELECTED TOPICS IN HOUSING 2.** (3) (3-0-6) Special topics related to housing.

● **ARCH 644 SHELTER FIELD OPERATIONS.** (6) (0-0-18)

**ARCH 645 HOUSING PROJECT 1.** (6) (2-10-6) Innovative housing designs; lectures and studio work leading to a design project.

**ARCH 646 HOUSING PROJECT 2.** (6) (2-10-6) Innovative housing designs; lectures and studio work leading to a design project.

**ARCH 650 ARCHITECTURAL HISTORY SEMINAR 1.** (8) (3-5-16) Western Architectural history from Antiquity to the Renaissance. A hermeneutic reading of primary sources, i.e. a section or chapter of an historical treatise, a frontispiece or image, in the framework of recent scholarship on the subject.

**ARCH 651 ARCHITECTURAL HISTORY SEMINAR 2.** (8) (3-5-16) Early Modern European theory of architecture, 17th - 19th centuries. A hermeneutic reading of primary sources, i.e. a section or chapter of an historical treatise, a frontispiece or image, in the framework of recent scholarship on the subject.

**ARCH 652 ARCHITECTURAL THEORY SEMINAR 1.** (4) (4-0-8) Phenomenology and hermeneutic.

**ARCH 653 ARCHITECTURAL THEORY SEMINAR 2.** (4) (4-0-8) The experience of modernity in cultural criticism, philosophy, literature and art.

**ARCH 671 DESIGN RESEARCH AND METHODOLOGY.** (4) (1-4-7) An architectural design problem is selected, bibliographic research undertaken, site selection established: program developed and theoretical approach evolved in preparation for course 301-673.

**ARCH 672 ARCHITECTURAL DESIGN 1.** (6) (2-10-6) A series of complex architectural and urban design issues are addressed with the intention of improving the student's facility to critically assess

existing design solutions, to seek alternatives and to articulate clearly the rational and the impact of alternative proposals.

**ARCH 673 ARCHITECTURAL DESIGN 2.** (8) (2-14-8) (Prerequisite: ARCH 671 and ARCH 672) An individual, student-selected and faculty-approved study of complex architectural design objectives involving site and building program constraints, the integration of building systems and the demonstration of comprehensive design and presentation skills.

**ARCH 674 PROFESSIONAL PRACTICE 1.** (2) (2-0-4) The architect's relationship to his/her client: responsibility, business conduct, supervision, arbitration, issuing of certificates, competitions, standard forms of contracts, payments, liens, servitudes, public health, building regulations, fees.

**ARCH 675 PROFESSIONAL PRACTICE 2.** (2) (2-0-4) (Prerequisite: ARCH 674) The construction process will be examined. Topics include project and construction management, contracting methods, tendering, sureties, site safety, negotiations, cost control, quality control, delay claims, legal hypothecs. Standard documentation and procedures will be reviewed, including CCDC contract, OAQ forms, CSC MasterFormat.

**ARCH 676 SPECIFICATIONS AND BUILDING COSTS.** (2) (2-0-4) Principles of writing architectural specifications; discussion of actual specifications and practice in specifying for common trades; essays on common building materials; costing of materials and building assemblies.

**ARCH 678 ADVANCED CONSTRUCTION.** (3) (2-0-7) (Prerequisite: ARCH 674) An exploration of construction in relation to architectural design; research in advanced methods of construction and structure related to design problems and built projects; appropriate technologies and alternatives.

**ARCH 679 ARCHITECTURAL JOURNALISM.** (1) (0-0-3) (Prerequisite: ARCH 674) The project deals with the review and criticism of a recently constructed controversial building.

**ARCH 680 SKETCHING SCHOOL 2.** (1) (0-0-3) An eight-day supervised field trip in the late summer to sketch places or things having specific visual characteristics.

**ARCH 700 PRELIMINARY PH.D. EXAMINATION.** (0)

**ARCH 701 PROGRESS REPORT 1.** (0)

**ARCH 702 PROGRESS REPORT 2.** (0)

**ARCH 703 PROGRESS REPORT 3.** (0)

## 7 Art History

Department of Art History and Communication Studies  
Arts Building, W-225 (West Wing, top floor)  
853 Sherbrooke Street West  
Montreal, QC H3A 2T6  
Canada

Telephone: (514) 398-6541

Fax: (514) 398-7247

Email: [ahcs@mcgill.ca](mailto:ahcs@mcgill.ca)

Website: <http://www.arts.mcgill.ca/programs/AHCS>

*Chair* — Christine Ross

*Director, Graduate Programs in Art History* —  
Hans J. Böker (on leave Sept. 2002 - Dec. 2003)

*Acting Director, Graduate Programs in Art History* —  
Christine Ross

*Director, Graduate Programs in Communication* — Will Straw

### 7.1 Staff

*Emeritus Professors*

John M. Fossey; B.A.(Birm.), D.U.(Lyon II), F.S.A., R.P.A.

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)  
(on leave Sept. 2002 - Dec. 2003)

*Associate Professors*

David Crowley; B.A.(Johns H.), M.Sc.(Penn.), Ph.D.(McG.)  
Christine Ross; M.A.(C' dia.), Ph.D.(Paris I)  
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 Professors (Special Category)*

Francesca Dal Lago; B.A.(Univ. of Venice), M.A., Ph.D.(NYU)  
Martha Langford; B.F.A.(N.S.C.A.D.), M.A., Ph.D.(McG.)

*Adjunct Professors*

David W. Booth; B.A., M.A., M.Phil., Ph.D.(Tor.)  
Louis De Moura Sobral; M.A., Ph.D.(Louvain)  
Johanne Lamoureux; B.A., M.A.(Montr.), Ph.D.(E.H.E.S.S., Paris)  
Charles Levin; B.A., M.A.(McG.), Ph.D.(C' dia)  
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

To obtain financial aid information please consult the Graduate and Postdoctoral Studies Office, McGill University, James Administration Building, Room 400, 845 Sherbrooke Street W., Montreal, Quebec, H3A 2T5. Telephone: (514) 398-3990. Website: <http://www.mcgill.ca/fgsr>.

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 out of 4.0 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 Art History and one other closely related field. But regardless of the program, the Department normally requires a minimum of 36 credits (at least 12 courses) in Art History with emphasis on European art and architecture. For candidates from institutions not offering the above number of credits in Art History, provision is made, upon consultation with the Director of Graduate Programs, for a program of study which would then qualify the candidate to apply for M.A. work.

In order to apply to the Ph.D. program, candidates must normally hold an M.A. degree preferably in Art History or an M.A. degree in a closely related field together with an appropriate number of Art History credits such as are described for entrance into the M.A. program. Applicants are strongly encouraged to consult with the Director of Graduate Programs. The number of entrants to the doctoral program is necessarily limited to the most highly qualified applicants.

It should be noted that courses in studio practice, although useful, cannot be counted among the 36 Art History credits for either

the M.A. or Ph.D programs. Also please see as well the language requirements given under the degree programs below.

The Department also requires a 250 word statement outlining the candidate's major interest in Art History as well as an example of written work. Applicants should send complete dossiers by January 15 to the Graduate Administrative Coordinator, Department of Art History and Communication Studies, McGill University, 853 Sherbrooke St. West, Montreal, QC. H3A 2T6.

**7.4 Application Procedures**

Applications will be considered upon receipt of:

1. Completed and signed application form.
2. A non-refundable application 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:
  - a. Credit card (by completing the appropriate section of the application form).
  - b. Certified cheque in Cdn. currency drawn on a Canadian bank.
  - c. Certified cheque in U.S. currency drawn on a U.S. bank.
  - d. Canadian Money Order in Cdn. currency.
  - e. U.S. Money Order in U.S. currency.
  - f. An international draft in Canadian funds drawn on a Canadian bank requested from the applicant's bank in his/her own country.
3. 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.
4. Two letters of recommendation on letterhead or bearing the university seal and with original signatures from two instructors familiar with the applicant's work, preferable in the applicant's area of specialization, are required. It is the applicant's responsibility to arrange for these letters to be sent.
5. Non-Canadian applicants whose mother tongue is not English and who have not completed an undergraduate degree using the English language are required to submit documented proof of competency in oral and written English, by completing the TOEFL exams (minimum score 550 on the paper-based test or 213 on the computer-based test). Results must be submitted as part of the application.
6. Statement of interest of at least 250 words addressing the candidate's major interest in Art History and the proposed area of research.
7. An example of written work.
8. Proof of Citizenship (certified photocopy of passport, birth certificate or equivalent).

Deadline for application is January 15.

Inquiries regarding the Programs should be addressed to the Graduate Administrative Coordinator, Department of Art History and Communication Studies, McGill University, 853 Sherbrooke Street West, Montreal, QC H3A 2T6.

Commencing with applications for entry in January 2003, McGill's on-line application form will be available to all graduate program candidates at <http://www.mcgill.ca/applying/graduate>.

**7.5 Program Requirements****Master of Arts****M.A. Degree (48 credits)**

1. Five 3-credit courses approved by the Department of which, with the approval of the Director of Graduate Programs, not more than two may be taken outside the Department. (15 credits)
2. The M.A. written examinations. (ARTH 601, ARTH 602) (9 credits)

3. Thesis (ARTH 699) on a topic approved by the Department in one of the following areas:  
Classical and Aegean Archaeology, Greek Epigraphy, Archaeological Method and Archaeometry, Western Medieval Art, Medieval Architecture, Post Medieval Architecture, Renaissance Art, Baroque Art, Late Eighteenth, Nineteenth and Early Twentieth-Century Art, The Art of W.W.I to the Present, Canadian Art, Methodology, Feminist Art History (24 credits)

Language requirements for the M.A. degree: reading knowledge of English and French and a minimum of one additional approved classical or modern language, before admission to the second year of the M.A. program.

#### Ph.D. Degree

The Ph.D. requirements are fulfilled progressively with five 3-credit courses of which, with the approval of the Director of Graduate Programs, not more than two may be taken outside the Department. The Ph.D. examinations both written and oral, the Doctoral dissertation and its oral defence.

Language requirements for the Ph.D. degree: reading knowledge of three modern languages and, depending on the field, at least one classical language, approved by the Department.

The Department is prepared to direct dissertations in fields wherein adequate supervision and resources can be provided: see [section 7.2](#). Candidates are also advised to consult the General Information section of the *Graduate and Postdoctoral Studies Calendar*.

## 7.6 Courses for Higher Degrees

For the term (Fall and/or Winter), days, and times when courses will be offered, please refer to the 2002-2003 Class Schedule on the Web, <http://www.mcgill.ca/minerva-students/class/>. Class locations and names of instructors are also provided.

Students preparing to register are advised to consult the Department website (<http://www.arts.mcgill.ca/programs/AHCS>) for the most up-to-date list of courses available. New courses may have been added or courses rescheduled after this Calendar went to press.

ARTH has replaced 123 as the prefix for Art History courses. The course credit weight is given in parentheses after the title.

- Denotes courses not offered in 2002-03

**ARTH 500 PRO-SEMINAR.** (3) (Restriction: for Art History Honours and graduate students only.)

**ARTH 601 MASTERS COMPREHENSIVE PREPARATION.** (3)

**ARTH 602 MASTERS COMPREHENSIVE EXAMINATION.** (6)

**ARTH 605 MASTER'S THESIS PREPARATION.** (3) (Restriction: For Art History students only.) The aim is to introduce the student to research methods specific to his/her area of thesis work.

**ARTH 617 MODERN ART.** (3)

**ARTH 618 ART HISTORY - 1400-1900 1.** (3)

**ARTH 619 ART HISTORY - 1400-1900 2.** (3)

**ARTH 649 ART OF THE ITALIAN RENAISSANCE.** (3)

**ARTH 658 19TH CENTURY PAINTING AND SCULPTURE.** (3)

**ARTH 661 CONTEMPORARY ART AND CRITICISM.** (3)

**ARTH 699D1 THESIS RESEARCH.** (12) (Students must also register for ARTH 699D2) (No credit will be given for this course unless both ARTH 699D1 and ARTH 699D2 are successfully completed in consecutive terms)

**ARTH 699D2 THESIS RESEARCH.** (12) (Prerequisite: ARTH 699D1) (No credit will be given for this course unless both ARTH 699D1 and ARTH 699D2 are successfully completed in consecutive terms)

**May also be available as: ARTH 699N1, ARTH 699N2.**

**ARTH 701 PH.D. COMPREHENSIVE EXAMINATION.** (6)

**May also be available as:**

**ARTH 701D1, ARTH 701D2; ARTH 701N1, ARTH 701N2.**

**ARTH 705 THESIS METHODS.** (3) (Restriction: For Art History graduate students only.) The aim is to introduce the student to research methods specific to his/her area of dissertation work.

**ARTH 730 CURRENT PROBLEMS: ARCHITECTURAL HISTORY 1.** (3)

The following courses will not be offered in 2002-03.

- **ARTH 641 GREEK ART AND ARCHAEOLOGY 1.** (3)
- **ARTH 642 GREEK ART AND ARCHAEOLOGY 2.** (3)
- **ARTH 643 GREEK ART AND ARCHAEOLOGY 3.** (3)
- **ARTH 644 MEDIAEVAL ART AND ARCHAEOLOGY.** (3)
- **ARTH 645 MEDIAEVAL ART AND ARCHAEOLOGY.** (3)
- **ARTH 646 MEDIAEVAL ART AND ARCHAEOLOGY.** (3)
- **ARTH 647 ART OF THE ITALIAN RENAISSANCE.** (3)
- **ARTH 648 ART OF THE ITALIAN RENAISSANCE.** (3)
- **ARTH 650 NORTHERN RENAISSANCE ART.** (3)
- **ARTH 651 NORTHERN RENAISSANCE ART.** (3)
- **ARTH 652 NORTHERN RENAISSANCE ART.** (3)
- **ARTH 653 BAROQUE ART AND ARCHITECTURE.** (3)
- **ARTH 654 BAROQUE ART AND ARCHITECTURE.** (3)
- **ARTH 655 BAROQUE ART AND ARCHITECTURE.** (3)
- **ARTH 656 19TH CENTURY PAINTING AND SCULPTURE.** (3)
- **ARTH 657 19TH CENTURY PAINTING AND SCULPTURE.** (3)
- **ARTH 659 CONTEMPORARY ART AND CRITICISM.** (3)
- **ARTH 660 CONTEMPORARY ART AND CRITICISM.** (3)
- **ARTH 673 RENAISSANCE AND POST-RENAISSANCE 1.** (3)
- **ARTH 674 RENAISSANCE AND POST-RENAISSANCE 1.** (3)
- **ARTH 675 RENAISSANCE AND POST-RENAISSANCE 1.** (3)
- **ARTH 676 RENAISSANCE AND POST-RENAISSANCE 2.** (3)
- **ARTH 677 RENAISSANCE AND POST-RENAISSANCE 2.** (3)
- **ARTH 678 RENAISSANCE AND POST-RENAISSANCE 2.** (3)
- **ARTH 679 ROMAN ART AND ARCHAEOLOGY 1.** (3)
- **ARTH 680 ROMAN ART AND ARCHAEOLOGY 2.** (3)
- **ARTH 681 ROMAN ART AND ARCHAEOLOGY 3.** (3)
- **ARTH 682 SEMINAR IN THE ART OF BYZANTIUM.** (3)
- **ARTH 683 SEMINAR IN THE ART OF BYZANTIUM.** (3)
- **ARTH 684 SEMINAR IN THE ART OF BYZANTIUM.** (3)
- **ARTH 685 PROBLEMS IN WESTERN MEDIEVAL ARCHITECTURE AND SCULPTURE.** (3)
- **ARTH 686 PROBLEMS IN WESTERN MEDIEVAL ARCHITECTURE AND SCULPTURE.** (3)
- **ARTH 687 PROBLEMS IN WESTERN MEDIEVAL ARCHITECTURE AND SCULPTURE.** (3)
- **ARTH 688 STUDIES: MANUSCRIPT ILLUMINATION.** (3)
- **ARTH 689 STUDIES: MANUSCRIPT ILLUMINATION.** (3)
- **ARTH 690 STUDIES: MANUSCRIPT ILLUMINATION.** (3)
- **ARTH 691 ARTISTIC THEORY IN THE RENAISSANCE.** (3)
- **ARTH 692 ARTISTIC THEORY IN THE RENAISSANCE.** (3)
- **ARTH 693 ARTISTIC THEORY IN THE RENAISSANCE.** (3)
- **ARTH 711 STUDIES IN THE GRAPHIC ARTS.** (3)
- **ARTH 712 STUDIES IN THE GRAPHIC ARTS.** (3)
- **ARTH 713 STUDIES IN THE GRAPHIC ARTS.** (3)
- **ARTH 714 RESEARCH: MODERN ARCHITECTURE - 1750 TO PRESENT.** (3)
- **ARTH 715 RESEARCH: MODERN ARCHITECTURE - 1750 TO PRESENT.** (3)
- **ARTH 716 RESEARCH: MODERN ARCHITECTURE - 1750 TO PRESENT.** (3)
- **ARTH 717 SEMINAR IN URBAN PLANNING AND TOPOGRAPHY.** (3)
- **ARTH 718 SEMINAR IN URBAN PLANNING AND TOPOGRAPHY.** (3)
- **ARTH 719 SEMINAR IN URBAN PLANNING AND TOPOGRAPHY.** (3)
- **ARTH 720 STUDIES OF DRAWINGS.** (3)
- **ARTH 721 STUDIES OF DRAWINGS.** (3)
- **ARTH 722 STUDIES OF DRAWINGS.** (3)
- **ARTH 723 ART CRITICISM 1.** (3)
- **ARTH 724 ART CRITICISM 2.** (3)
- **ARTH 725 METHODS IN ART HISTORY.** (3)
- **ARTH 731 CURRENT PROBLEMS: ARCHITECTURAL HISTORY 2.** (3)

## 8 Atmospheric and Oceanic Sciences

Department of Atmospheric and Oceanic Sciences  
Burnside Hall  
805 Sherbrooke Street West, Room 945  
Montreal, QC H3A 2K6  
Canada

Telephone: (514) 398-3764

Fax: (514) 398-6115

Email: [graduateinfo.aos@mcgill.ca](mailto:graduateinfo.aos@mcgill.ca)

Website: <http://zephyr.meteo.mcgill.ca>

Chair — C.A. Lin

### 8.1 Staff

#### *Emeritus Professors*

R.R. Rogers; B.S.(Texas), S.M.(M.I.T.), Ph.D.(N.Y.)

E.J. Stansbury; M.A., Ph.D.(Tor.)

#### *Professors*

J.F. Derome; B.Sc., M.Sc.(McG.), Ph.D.(Mich.)

H.G. Leighton; B.Sc., M.Sc.(McG.), Ph.D.(Alta.)

C.A. Lin; B.Sc.(Br.Col.), Ph.D.(M.I.T.)

L.A. Mysak; B.Sc.(Alta.), M.Sc.(Adel.), A.M. Ph.D.(Harv.),  
F.R.S.C.

I.I. Zawadzki; B.Sc.(Buenos Aires), M.Sc., Ph.D.(McG.)

#### *Associate Professors*

P. Bartello; B.Sc., M.Sc., Ph.D.(McG.)(*joint app. with  
Mathematics*)

J.R. Gyakum; B.Sc.(Penn.St.), M.Sc., Ph.D.(M.I.T.)

D. Straub; B.S., M.S.(SW Louisiana), Ph.D.(Wash.)

M.K. Yau; S.B., S.M., Sc.D.(M.I.T.)

#### *Assistant Professors*

P. Ariya; B.Sc., Ph.D.(York) (*William Dawson Scholar*) (*joint appt.  
with Chemistry*)

F. Fabry; B.Sc., M.Sc., Ph.D.(McG.) (*joint appointment with McGill  
School of Environment*)

#### *Lecturer*

A.P. Schwartz

#### *Adjunct Professors*

G. Brunet, R.G. Ingram, R. Laprise, S. Laroche

### 8.2 Programs Offered

The Department of Atmospheric and Oceanic Sciences offers courses and research opportunities in atmospheric, physical oceanographic, and climate fields leading to the M.Sc. and Ph.D. degrees. Research programs include the main areas of atmospheric science, such as cloud and precipitation physics, dynamic meteorology, numerical weather prediction, atmospheric chemistry, radar and satellite meteorology, and mesoscale meteorology. Research projects in physical oceanography include the modelling of ocean circulations as well as studies of sea ice and paleoclimates. Some faculty members are associated with the Centre for Climate and Global Change Research, which brings together researchers from several departments to work on problems affecting the evolution of our planet, with emphasis on climate-related questions. Topics of research of this nature in the Department 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 Graduate and Postdoctoral Studies Office 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.

Commencing with applications for entry in January 2003, McGill's on-line application form will be available to all graduate program candidates at <http://www.mcgill.ca/applying/graduate>.

### 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 ATOC 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 ATOC 691, ATOC 692, ATOC 693, ATOC 694, ATOC 695, ATOC 696 and ATOC 699. All students must take seminar course ATOC 694 and complete ATOC 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 Graduate and Postdoctoral Studies Office. 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 standard Graduate and Postdoctoral Studies Office requirements concerning a thesis must be satisfied.

### 8.5 Courses for Higher Degrees

**Please note: courses may have been rescheduled or new courses added after this Calendar went to press. Students preparing to register are advised to consult the 2002-2003 Class Schedule on the Web at <http://www.mcgill.ca/minerva-students> for the most up-to-date information.**

**The Class Schedule includes the term(s), days, and times when courses will be offered, as well as class locations and names of instructors.**

**The schedule of courses to be offered in Summer 2003 will be available on the website in January 2003.**

The course credit weight is given in parentheses after the title. Term(s) offered (Fall, Winter, Summer) may appear after the credit weight to indicate when a course would normally be taught. Please check the Class Schedule to confirm this information.

ATOC has replaced 195 as the prefix for Atmospheric and Oceanic Sciences courses.

- Denotes courses not offered in 2002-03

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

**ATOC 512 ATMOSPHERIC AND OCEANIC DYNAMICS.** (3) (Fall) (3 hours lectures) 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.

**ATOC 513 WAVES AND STABILITY.** (3) (Winter) (3 hours lectures) 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.

**ATOC 515 TURBULENCE IN ATMOSPHERE AND OCEANS.** (3) (3 hours lectures) Application of statistical and semi-empirical methods to the study of geophysical turbulence. Reynolds' equations, dimensional analysis, and similarity. The surface and planetary boundary layers. Oceanic mixed layer. Theories of isotropic two- and three- dimensional turbulence: energy and enstrophy inertial ranges. Beta turbulence.

**ATOC 530 CLIMATE DYNAMICS 1.** (3) (Fall) (3 hours lectures) Introduction to the components of the climate system. Review of paleoclimates. Physical processes and models of climate and climate change.

**ATOC 531 CLIMATE DYNAMICS 2.** (3) (Winter) (3 hours lectures) 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.

**ATOC 540 SYNOPTIC METEOROLOGY 1.** (3) (Fall) (2 hours lectures; 2 hours laboratory) 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.

- **ATOC 541 SYNOPTIC METEOROLOGY 2.** (3) (Winter) (2 hours lectures; 2 hours laboratory)

**ATOC 546 CURRENT WEATHER DISCUSSION.** (1) (Winter) (2 hours) Half-hour briefing 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 techniques.

**ATOC 550 SPECIAL TOPICS METEOROLOGY AND OCEANOGRAPHY.** (1) (Fall) (1 hour lecture) 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.

- **ATOC 551 SPECIAL TOPICS METEOROLOGY AND OCEANOGRAPHY.** (1) (Winter) (1 hour lecture)

- **ATOC 558 NUMERICAL METHODS AND LABORATORY.** (3) (Winter) (1 hour lecture; 4 hours laboratory)

- **ATOC 568 OCEAN PHYSICS.** (3) (Winter) (3 hours lectures)

- **ATOC 616 TOPICS - GEOPHYSICAL FLUID DYNAMICS.** (3) (3 hours)

- **ATOC 619 ATMOSPHERIC CHEMISTRY.** (4) (3 hours) (Restriction: Offered in odd years. Students should register in CHEM 619 in

even years. Not open to students who have taken or are taking ATOC 419, CHEM 419, or CHEM 619)

**ATOC 620 PHYSICAL METEOROLOGY 1.** (3) (2 hours) Thermodynamics of the atmosphere. Instability and convection. Solar and terrestrial radiation. Radiative transfer. Radiation budgets.

**ATOC 621 PHYSICAL METEOROLOGY 2.** (3) (2 hours) Atmospheric aerosols, nucleation of water and ice. Formation and growth of cloud droplets and ice crystals. Initiation of precipitation. Severe storms and hail. Weather modification. Numerical cloud models.

- **ATOC 626 ATMOSPHERIC/OCEANIC REMOTE SENSING.** (3) (3 hours)

- **ATOC 646 MESOSCALE METEOROLOGY.** (3) (3 hours)

**ATOC 666 TOPICS IN OCEAN CIRCULATION.** (3) (3 hours) Recent observations of mesoscale and large-scale ocean circulation. Inverse methods and their application to tracer distributions and deep ocean circulation. Review of modern theoretical developments such as geostrophic turbulence, homogenization of potential vorticity, ventilated thermoclines, wind and buoyancy driven ocean circulation models, and coupled ice-ocean circulation models.

**ATOC 670 READING COURSE: METEOROLOGY 1.** (3) Assigned reading of a specialized topic in meteorology with formal evaluation.

**ATOC 671 READING COURSE: METEOROLOGY 2.** (3) Assigned reading of a specialized topic in meteorology with formal evaluation.

**ATOC 672 READING COURSE: OCEANOGRAPHY 1.** (3) Assigned reading of a specialized topic in oceanography with formal evaluation.

**ATOC 673 READING COURSE: OCEANOGRAPHY 2.** (3) Assigned reading of a specialized topic in oceanography with formal evaluation.

**ATOC 691 MASTER'S THESIS LITERATURE REVIEW.** (3) Review of relevant literature in preparation for the M.Sc. research.

**ATOC 692 MASTER'S THESIS RESEARCH 1.** (6) Independent research under the supervision of the student's M.Sc. supervisor. **May also be available as: ATOC 692N1, ATOC 692N2.**

**ATOC 693 MASTER'S THESIS RESEARCH 2.** (6) Independent research under the supervision of the student's M.Sc. supervisor. **May also be available as: ATOC 693N1, ATOC 693N2.**

**ATOC 694 MASTER'S THESIS PROGRESS REPORT AND SEMINAR.** (3) Written report on the M.Sc. research progress and oral presentation of the report in seminar form to staff and students.

**ATOC 695 MASTER'S THESIS RESEARCH 3.** (6) Independent research under the supervision of the student's M.Sc. supervisor.

**ATOC 696 MASTER'S THESIS RESEARCH 4.** (6) Independent research under the supervision of the student's M.Sc. supervisor.

**ATOC 699 MASTER'S THESIS.** (12) Independent research under the supervision of the student's M.Sc. supervisor leading to the M.Sc. thesis.

**May also be available as: ATOC 699N1, ATOC 699N2.**

**ATOC 700 PH.D. PROPOSAL SEMINAR.** (1)

**ATOC 701 PH.D. COMPREHENSIVE (GENERAL).** (0)

**May also be available as: ATOC 701D1, ATOC 701D2.**

**ATOC 751D1 SEMINAR: PHYSICAL METEOROLOGY.** (3) (Students must also register for ATOC 751D2) (No credit will be given for this course unless both ATOC 751D1 and ATOC 751D2 are successfully completed in consecutive terms) Seminars on topics in physical meteorology. Students are required to present one or more seminars during the year on their thesis research and to participate actively in the seminars given by others.

**ATOC 751D2 SEMINAR: PHYSICAL METEOROLOGY.** (3) (Prerequisite: ATOC 751D1) (No credit will be given for this course unless both ATOC 751D1 and ATOC 751D2 are successfully completed in consecutive terms) See ATOC 751D1 for course description.

**ATOC 752D1 ATMOSPHERIC, OCEANIC AND CLIMATE DYNAMICS.** (0.5) (Students must also register for ATOC 752D2) (No credit will be given for this course unless both ATOC 752D1 and ATOC 752D2 are successfully completed in consecutive terms) Seminars on topics in atmospheric, oceanic and climate dynamics. Students are required to present one or more seminars during the year on their thesis research and to participate actively in the seminars given by others.

**ATOC 752D2 ATMOSPHERIC, OCEANIC AND CLIMATE DYNAMICS.** (0.5) (Prerequisite: ATOC 752D1) (No credit will be given for this course unless both ATOC 752D1 and ATOC 752D2 are successfully completed in consecutive terms) See ATOC 752D1 for course description.

## 9 Biochemistry

Department of Biochemistry  
McIntyre Medical Sciences Building  
3655 Promenade Sir-William-Osler  
Montreal, QC H3G 1Y6  
Canada

Telephone: (514) 398-7266

Fax: (514) 398-7384

Email: [admissions.biochemistry@mcgill.ca](mailto:admissions.biochemistry@mcgill.ca)

Website: <http://www.medicine.mcgill.ca/biochem/>

Chair — David Y. Thomas.

### 9.1 Staff

#### Emeritus Professors

Angus F. Graham; M.Sc., Ph.D., D.Sc.(Edin.), F.R.S.C.

Rose M. Johnstone; B.Sc., Ph.D.(McG.), F.R.S.C.

Samuel Solomon; M.Sc., Ph.D.(McG.), F.R.S.C.

Theodore L. Sourkes; M.Sc.(McG.), Ph.D.(C'nell), F.R.S.C.

#### Professors

Rhoda Blostein; B.Sc., M.Sc., Ph.D.(McG.)

Nicole Beauchemin; B.Sc., M.Sc., Ph.D.(Montr.) (*joint appt. with Oncology*)

Philip E. Branton; B.Sc., M.Sc., Ph.D.(Tor.) (*Gilman Cheney Professor of Biochemistry*)

Peter E. Braun; B.Sc., M.Sc.(Br.Col.), Ph.D.(Berk.)

Vincent Giguère; B.Sc., Ph.D.(Laval) (*joint appt. with Oncology*)

Philippe Gros; B.Sc., M.Sc.(Montr.), Ph.D.(McG.)

Annette A. Herscovics; B.Sc. M.Sc. Ph.D.(McG.), F.R.S.C. (*joint appt. with Oncology*)

Robert E. MacKenzie; B.Sc.(Agr.) (McG.), M.N.S., Ph.D.(C'nell)

Edward A. Meighen; B.Sc.(Alta.), Ph.D.(Berk.)

Walter E. Mushynski; B.Sc., Ph.D.(McG.)

Morag Park; B.Sc., Ph.D. (Glas.) (*William Dawson Scholar*)

Gordon C. Shore; B.Sc.(Guelph), Ph.D.(McG.)

Joseph Shuster; B.Sc.(McG.), Ph.D.(Calif.), M.D.(Alta.)

John R. Silvius; B.Sc., Ph.D.(Alta.)

Nahum Sonenberg; M.Sc., Ph.D.(Weizmann Inst.) F.R.S.C. (*James McGill Professor*)

Clifford P. Stanners; B.Sc.(McM.), M.A., Ph.D.(Tor.) (*joint appt. with Oncology*)

David Y. Thomas; B.Sc.(Bristol), M.Sc., Ph.D.(Univ. College, Lond.), F.R.S.C.

Michel L. Tremblay; B.Sc., M.Sc.(Sher.), Ph.D.(McM.)

Maria Zannis-Hadjopoulos; B.Sc., M.Sc., Ph.D.(McG.) (*joint appt. with Oncology*)

#### Associate Professors

Albert Berghuis; B.Sc., M.Sc. (Rijks Univ. Groningen, The Netherlands), Ph.D.(UBC)

Kalle Gehring; M.Sc. (Mich.), Ph.D.(Berk.)

Alain Nepveu; B.Sc., M.Sc.(Montr.), Ph.D.(Sher.) (*joint appt. with Oncology*)

Jerry Pelletier; B.Sc., Ph.D.(McG.)

#### Assistant Professor

Imed Gallouzi; Maîtrise, DEA, Ph.D. (Montpellier, France)

#### Associate Members

John J. Bergeron (*Anatomy & Cell Biology*); Katherine Cianflone (*Exp. Medicine, RVH*); L. Ferdinand Congote (*Exp. Medicine, RVH*); Robert Dunn (*Exp. Medicine, MGH*); Mark S. Featherstone (*Oncology*); William C. Galley (*Chemistry*); Michael Hallett (*Computer Science*); Peter J. Roughley (*Shriners' Hosp.*); Erwin Schurr (*Exp. Medicine, RVH*); Charles Scriver (*Pediatrics, MCH*); Bernard Turcotte (*Exp. Medicine, RVH*); Simon Wing (*Medicine*); Xiang-Jiao Yang (*Mol. Oncol., RVH*)

#### Adjunct Professors

Prabhat Arya (*NRC, Steacie Inst. for Mol Sciences*); Michael Cordingley (*Boehringer-Ingelheim*); Mirek Cygler (*NRC/BRI*); Jacques Drouin (*Clin. Res. Inst.*); Feng Ni (*NRC/BRI*); Donald Nicholson (*Merck Frosst*); Maureen D. O'Connor-McCourt (*NRC/BRI*); Arnim Pause (*Boehringer Ingelheim*); Enrico Purisima (*NRC/BRI*); Sophie Roy; (*Merck Frosst*); Andrew C. Storer (*NRC/BRI*); Marc Therrien (*Clin.Res.Inst.*); André Veillette (*Clin. Res. Inst.*); Alice Vrielink (*Univ. of Cal., Santa Cruz*)

### 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 and regulation of proteins; membrane structure, function and assembly; intracellular protein targeting; embryonic development; bioinformatics; chemical biology and cellular neurobiology. A summary of the research interest of faculty members is available on the Department homepage at <http://www.medicine.mcgill.ca/biochem/>

#### Funding

Prospective students are urged to make every effort to secure their own funding. All students accepted to the program must be financially supported either by their supervisor or through studentships or fellowships. Applications may be made for a variety of fellowships administered by the University or by various private, provincial or federal agencies. Deadlines for completion of most fellowship applications vary from October to February for studies beginning the following September. For more information on fellowships and awards, see the Graduate and Postdoctoral Studies Office website <http://www.mcgill.ca/fgsr>.

### 9.3 Admission Requirements

Admission is based on the candidate's academic record, letters of recommendation, curriculum vitae and personal statement. A minimum grade point average of 3.2 (out of 4) B+ is required. Files that do not meet the minimum requirement will not be considered.

#### Master's Program

Candidates for the M.Sc. degree must hold a B.Sc. degree or its equivalent in Biochemistry or in related disciplines (eg. biology, chemistry, physics, physiology, microbiology, etc.).

#### Doctoral Program

Candidates who have completed their M.Sc. degree may be admitted directly to the Ph.D. program. Candidates who are admitted to the M.Sc. program and who are interested in the Ph.D. may transfer directly to the Ph.D. program after successfully completing the transfer seminar (BIOC 701) and all course requirements. The M.Sc. thesis requirement is then waived.

#### International Applicants

International students whose language of instruction is not English must submit the following documents in order to be considered for admission :

**TOEFL:** Minimum score of 600 (250 on computer-based test).

**GRE:** Subject Test in Biochemistry, Cell and Molecular Biology with a minimum score of 550.

## 9.4 Application Procedures

Applications will be considered upon receipt of:

1. application form;
2. curriculum vitae;
3. application fee (\$60);
4. two letters of recommendation from professors;
5. two official transcripts;
6. test results (TOEFL/GRE) if applicable.

All information is to be submitted to the Admissions Officer, Department of Biochemistry. All applicants are encouraged to approach staff members during or before the application process since no students are accepted without a supervisor.

Commencing with applications for entry in January 2003, McGill's on-line application form will be available to all graduate program candidates at <http://www.mcgill.ca/applying/graduate>.

### Deadlines

Applications should be submitted as early as possible in order to meet the following deadlines:

Canadian applicants:    March 1 for September admission  
                                       July 1 for January admission

International applicants: November 1 for September admission  
                                       April 1 for January admission

## 9.5 Program Requirements

### Coursework

All students are required to complete a minimum of 6 course credits as part of their M.Sc. or Ph.D. program. The following course is highly recommended for students admitted to the Doctoral program or for those wishing to proceed to the Doctoral program: BIOC 603 (3 credits). The Graduate Admissions Committee may stipulate additional course work depending on the background of the candidate. Unless stipulated on the decision form, students, after consultation with their research director and with the approval of the Chair of the Graduate Admissions Committee, may choose their courses from those offered by Biochemistry, Experimental Medicine, Biology, Chemistry, Physiology as well as other graduate and advanced undergraduate courses in the medical and allied sciences. The following courses are required for those who have not completed an equivalent: BIOC 450 Protein Structure & Function, and BIOC 454 Nucleic Acids.

**Departmental Seminars:** Members of the staff and visiting scientists present their work to the Department at weekly and bi-weekly intervals respectively throughout the academic year. Graduate students are required to attend all the above seminars and other informal seminars, and are encouraged to attend meetings of scientific communities.

### Master's Program

The M.Sc. program is comprised of 45 credits:

BIOC 696	(3)	Research Seminar
BIOC 697	(9)	Thesis 1
BIOC 698	(12)	Thesis 2
BIOC 699	(15)	Thesis 3

and a minimum 6 credits of course credits, as specified above.

Additional courses may be required, depending on the student's background.

The M.Sc. program usually requires a minimum of two years of study. Students in the M.Sc. program are required to complete all course requirements and submit a thesis.

### Doctoral Program

The requirements for the doctorate are: successful completion of the minimum of 6 course credits specified above, **plus** any additional course work stipulated by the Graduate Admissions Committee; the comprehensive oral exams; submission of a thesis, and its oral defence.

### Transfer to the Ph.D.

After 21 months students may transfer to the Ph.D. program only if all transfer requirements have been fulfilled. This includes com-

pletion of BIOC 701 **and** the minimum of 6 course credits specified above, including BIOC 603, **plus** any additional course work stipulated by the Graduate Admissions Committee. The M.Sc. thesis requirement is then waived.

### Comprehensive Oral Exams

All students who plan to proceed to the Ph.D. degree, as well as students entering at the Ph.D. level, must present and pass the following comprehensive oral exams, listed as courses:

- BIOC 701 Research Seminar 1
- BIOC 702 Ph.D. Thesis Proposal
- BIOC 703 Research Seminar 2.

## 9.6 Graduate Courses

**Please note: courses may have been rescheduled or new courses added after this Calendar went to press. Students preparing to register are advised to consult the 2002-2003 Class Schedule on the Web at <http://www.mcgill.ca/minerva-students> for the most up-to-date information.**

**The Class Schedule includes the term(s), days, and times when courses will be offered, as well as class locations and names of instructors.**

**The schedule of courses to be offered in Summer 2003 will be available on the website in January 2003.**

The course credit weight is given in parentheses after the title. Term(s) offered (Fall, Winter, Summer) may appear after the credit weight to indicate when a course would normally be taught. Please check the Class Schedule to confirm this information.

BIOC has replaced 507 as the prefix for Biochemistry courses.

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

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

- Denotes courses not offered in 2002-03

**BIOC 503 IMMUNOCHEMISTRY.** (3) (Winter) (Prerequisites: BIOC 311, BIOC 312) This course, presented in lecture format, emphasizes the molecular, genetic and structure function events that occur in the humoral immune response. Interleukins and other mediators of inflammation, a field in which rapid changes are occurring, are discussed. The clinical significance of fundamental biochemical findings is described.

**BIOC 603 RECENT ADVANCES IN MOLECULAR GENETICS.** (3) (Prerequisites: BIOC 454 and permission of instructor.) Recent 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.

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

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

**BIOC 697 THESIS RESEARCH 1.** (9)

**BIOC 698 THESIS RESEARCH 2.** (12)

**BIOC 699 THESIS RESEARCH 3.** (15)

**BIOC 701 RESEARCH SEMINAR 1.** (0) (Biochemistry graduate students) Presentation on original current laboratory research carried out by student.

**BIOC 702 PH.D. THESIS PROPOSAL.** (0) (Biochemistry graduate students) Dissertation presented to Committee.

**BIOC 703 RESEARCH SEMINAR 2.** (0) (Ph.D. students in Biochemistry) Presentation of the planned thesis including central findings and original contribution to knowledge in the field of research.

**EXMD 615 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**

**BIOC 311 METABOLIC BIOCHEMISTRY.** (3) (Fall) (Prerequisites: BIOL 200, BIOL 201 or BIOC 212, CHEM 222) 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.

**BIOC 312 BIOCHEMISTRY OF MACROMOLECULES.** (3) (Winter) (Prerequisites: BIOC 311, BIOL 200, BIOL 201 or BIOC 212) 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 turnover; programmed cell death (apoptosis).

**BIOC 404 BIOPHYSICAL CHEMISTRY.** (3) (Winter) (Prerequisites: CHEM 204, CHEM 214 or equivalent) (Not open to students who have taken 180-404) Hydrodynamic and electrophoretic methods for separation and characterization of macromolecules. Optical and magnetic resonance spectroscopy of biopolymers, and applications to biological systems.

**BIOC 450 PROTEIN STRUCTURE AND FUNCTION.** (3) (Fall) (Prerequisites: BIOC 311, BIOC 312 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.

**BIOC 454 NUCLEIC ACIDS.** (3) (Fall) (Prerequisites: BIOC 311, BIOC 312 or permission of 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.

**BIOC 455 NEUROCHEMISTRY.** (3) (Winter) (Prerequisites: BIOC 311, BIOC 312 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.

**BIOC 458 MEMBRANES AND CELLULAR SIGNALING.** (3) (Winter) (Prerequisites: BIOC 212, ANAT 262; one of PHGY 201, PHGY 209 or BIOL 205; one of BIOC 312 or ANAT 365; and BIOC 311 or permission of instructors) (This course is also listed as ANAT 458. Not open to students who have taken or are taking ANAT 458 or BIOC 456) 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  
3647 Peel Street  
Montreal, QC H3A 1X1  
Canada  
Telephone: (514) 398-6980  
Fax: (514) 398-8349  
Email: [bioethics@falaw.lan.mcgill.ca](mailto:bioethics@falaw.lan.mcgill.ca)  
Website: <http://www.biomedicaethicsunit.mcgill.ca>

**10.1 Staff**

E. Bereza; B.A., M.D., C.M.(McG.), C.C.F.P.(C)  
C. Ellis; R.R.T(VGH), M.A., Ph.D.(Tenn.)  
K.C. Glass; A.M.(Chic.), LL.B., B.C.L., D.C.L.(McG.)  
N. Gilmore; B.A.(College of the Holy Cross), Ph.D.(Lond.), M.D.(Vt.)  
D. Jones; B.A.(Yale), Ph.D.(Harv.)  
L. Turner; B.A.(Winn.), M.A.(Manit.), M.A., Ph.D.(S.Calif.)

**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;  
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 by the appropriate Faculty, the Bioethics Graduate Studies Advisory Committee, and the Graduate and Postdoctoral Studies Office.

Commencing with applications for entry in January 2003, McGill's on-line application form will be available to all graduate program candidates at <http://www.mcgill.ca/applying/graduate>.

**10.5 Program Requirements**

The curriculum is composed of required courses (for 6 credits) offered in the Biomedical Ethics Unit, bioethics courses (3 credits minimum) offered by the base faculty or department and any graduate courses required or accepted by a base faculty for the granting of a Master's degree, for a total of 18 to 21 credits. A minimum of 45 credits is required including the thesis.

Registration Requirements: Depending upon the requirements of the base discipline, a minimum of three terms is required for completion of the program, including course work and thesis.

Thesis Supervision: Thesis supervision for students in the specialization is provided by a participating faculty member in the program. Thesis examination will be conducted according to the base discipline and the Graduate and Postdoctoral Studies Office norms.

**Required Courses – Biomedical Ethics Unit (6 credits)**

BIOE 680 (3) Bioethical Theory  
BIOE 681 (3) Bioethics Practicum

**Required Course – base faculty (3 credits)**

one of the following:

BIOE 682 (3) Medical Basis of Bioethics  
CMPL 642 (3) Law and Health Care  
PHIL 543 (3) Seminar: Medical Ethics  
RELG 571 (3) Religion and Medicine

**Complementary Courses (12 credits)**

the remaining credits are to be taken in any graduate courses required or accepted by the base faculty for the granting of a Master's degree

**Thesis Component – Required (24 credits)**

BIOE 690 (3) Thesis Literature Survey  
BIOE 691 (3) Thesis Research Proposal



BIOE 692 (6) Thesis Research Progress Report  
 BIOE 693 (12) Thesis

## 10.6 Courses

For the term (Fall and/or Winter), days, and times when courses will be offered, please refer to the 2002-2003 Class Schedule on the Web, <http://www.mcgill.ca/minerva-students/class/>. Class locations and names of instructors are also provided.

Students preparing to register are advised to consult the Class Schedule website for the most up-to-date list of courses available. New courses may have been added or courses rescheduled after this Calendar went to press.

The schedule of courses to be offered in Summer 2003, will be available on the website in January 2003.

BIOE has replaced 508 as the prefix for Bioethics courses. The course credit weight is given in parentheses after the title.

### Biomedical Ethics Unit Courses

**BIOE 680 BIOETHICAL THEORY.** (3) (Limited enrolment) A survey of some of the main problem areas and common argument forms used in current bioethics. Problem areas include consent, decisions to withhold or withdraw treatment, allocation of scarce resources, research with human subjects and confidentiality. Argument forms include those drawn from diverse ethical theories and traditions.

**BIOE 681 BIOETHICS PRACTICUM.** (3) (Limited enrolment) Four hours per week supervised placement within health care settings (e.g., intensive care, family practice, clinical ethics committees). In addition, students shall be assigned for the last month of the term to a single intensive placement. Participation in rounds, care discussions, and a weekly seminar.

**BIOE 690 M.Sc. THESIS LITERATURE SURVEY.** (3)

**BIOE 691 M.Sc. THESIS RESEARCH PROPOSAL.** (3)

**BIOE 692 M.Sc. THESIS RESEARCH PROGRESS REPORT.** (6)  
 May also be available as: **BIOE 692D1**, **BIOE 692D2**.

**BIOE 693 M.Sc. THESIS.** (12)

May also be available as: **BIOE 693D1**, **BIOE 693D2**.

**BIOE 694 INDEPENDENT STUDIES 3.** (3)

### Base Faculty Courses

**BIOE 682 MEDICAL BASIS OF BIOETHICS.** (3) (Limited enrolment.) The seminar examines the medical basis of timely ethical dilemmas in health care. Content includes: clinical concepts of pathogenesis, disease, screening, diagnosis, therapeutic interventions and prognosis; decision-making in clinical care and institutional policy development; organization of health care systems including socialized medicine, public health and institutions providing health care; medical research.

**CMPL 642 LAW AND HEALTH CARE.** (3) (Limited enrolment.) Topics in this seminar will include philosophical and ethical foundations of law as applied in medicine, legal structures and their impact on health care, law and ethics of the health care professions, administrative and legal control of health care systems and other selected issues.

**PHIL 543 SEMINAR: MEDICAL ETHICS.** (3) (Prerequisite: PHIL 343 or written permission of the instructor) (Seminars are open only to graduate students and final year Philosophy Majors, Honours and Joint Honours students, except by written permission of the Department) An advanced course devoted to a particular philosophical problem as it arises in the context of medical practice or the application of medical technology.

**RELG 571 RELIGION AND MEDICINE.** (3) A study of the resources of major world religions (Judaism, Christianity, Islam, Hinduism, Buddhism, Taoism and Shinto) for thinking about ethical issues related to modern medicine, e.g., health, illness, suffering; new reproductive technologies; genetic engineering; euthanasia; palliative care; animal research; transplants.

## 11 Biology

Department of Biology  
 Stewart Biology Building  
 1205 Avenue Docteur Penfield  
 Montreal, QC H3A 1B1  
 Canada

Telephone: (514) 398-6400

Fax: (514) 398-5069

Email: [gradinfo.biology@mcgill.ca](mailto:gradinfo.biology@mcgill.ca)

Website: <http://www.mcgill.ca/Biology/biology1.htm>

Chair — Paul F. Lasko

Chair of Graduate Program — Robert Levine

### 11.1 Staff

#### Emeritus Professors

F. Clarke Fraser; O.C., B.Sc.(Acad.), M.Sc., Ph.D., M.D., C.M.(McG.), D.Sc.(Acad.), F.R.S.C., F.R.C.P.S.(C) (*Molson Emeritus Professor of Genetics*) (joint appt. with Human Genetics)

Sarah P. Gibbs; A.B., M.S.(C'neil), Ph.D.(Harv.), F.R.S.C. (*Macdonald Emeritus Professor of Botany*)

John B. Lewis; B.Sc., M.Sc., Ph.D.(McG.)

Gordon A. Maclachlan; B.Sc., M.A.(Sask.), Ph.D.(Man.), F.R.S.C. (*Macdonald Emeritus Professor of Botany*)

Barid B. Mukherjee; B.Sc.(Calc.), M.S.(Brig.Young), Ph.D.(Utah) (*joint appt. with Human Genetics*)

Rolf O. Sattler; B.Sc.(Tübingen), Ph.D.(Munich), F.R.S.C.

#### Professors

Graham A.C. Bell; B.A., D.Phil.(Oxon.), F.R.S.C. (*James McGill Professor*)

Gregory G. Brown; B.Sc.(Notre Dame), Ph.D.(N.Y.)

A. Howard Bussey; B.Sc., Ph.D.(Brist.), F.R.S.C.

Robert L. Carroll; B.Sc.(Mich.), M.A., Ph.D.(Harv.), F.R.S.C. (*Strathcona Professor of Zoology*)

Ronald Chase; A.B.(Stan.), Ph.D.(M.I.T.)

Rajinder S. Dhindsa; B.Sc., M.Sc.(Punj.), Ph.D.(Wash.)

Donald L. Kramer; B.Sc.(Boston Coll.), Ph.D.(U.B.C.)

Paul F. Lasko; A.B. (Harv.), Ph.D.(M.I.T.) (*Molson Professor of Genetics*) (joint appt. with Anatomy & Cell Biology)

Martin J. Lechowicz; B.A.(Mich. St.), M.S., Ph.D.(Wis.)

Ronald J. Poole; B.Sc., Ph.D.(Birm.)

Rima Rozen; B.Sc., Ph.D.(McG.) (*James McGill Professor*)

Daniel J. Schoen; B.Sc., M.Sc.(Mich.), Ph.D.(Calif.) (*Macdonald Professor of Botany*)

#### Associate Professors

Thomas E. Bureau; B.Sc.(Calif), Ph.D.(Texas) (*William Dawson Scholar*) (on leave)

Siegfried Hekimi; M.Sc., Ph.D.(Geneva)

Louis Lefebvre; B.Sc., M.A., Ph.D.(Montr.)

Robert L. Levine; B.Sc.(Brooklyn), M.Sc., Ph.D.(Yale)

Yutaka Nishioka; B.A., M.A.(Tokyo), Ph.D.(Col.)

Gerald S. Pollack; M.A., Ph.D.(Prin.)

Catherine Potvin; B.Sc., M.Sc.(Montr.), Ph.D.(Duke)

Neil M. Price; B.Sc.(U.N.B.), Ph.D.(U.B.C.)

Joseph Rasmussen; B.Sc., M.Sc.(Alta.), Ph.D.(Cal.)

Beat Suter; Dip., Ph.D.(Zur)

Candace S. Waddell; B.A.(Va.), Ph.D.(U.C.S.F.) (on leave)

#### Assistant Professors

Joseph Dent; B.Sc.(Mich), Ph.D.(Colo.)

Christian Hardtke; M.Sc., Ph.D. (Munich)

Andrew Hendry; B.Sc.(Vic.,B.C.) M.Sc., Ph.D. (Wash)

Kevin McCann; B.A.(Dart), M.Sc., Ph.D.(Guelph)

Laura Nilson; B.A.(Colgate), Ph.D.(Yale) (*Canada Research Chair in Developmental Genetics*)

Richard Roy; B.Sc.(Bishop's), Ph.D.(Laval)

Monique Zetka; B.Sc., Ph.D. (Br. Col.)

**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**

Eldredge Bermingham (STRI); Wing Y. Cheung (DNA Landmarks); Wayne Hunte (U. West Indies); Benoit S. Landry (DNA Landmarks); William F. Laurance (STRI); Malcolm S. Whiteway, B.Sc.(Dal.), Ph.D.(Alta.) (Bio Tech Inst.)

**11.2 Programs Offered**

The Department offers graduate training in many areas of biology with particular strengths in Molecular Genetics and Development, Evolutionary and Behavioural Ecology, Human Genetics, Limnology, Marine Biology, Neurobiology, and Experimental Plant Biology.

Graduate programs leading to the M.Sc. and Ph.D. degrees are offered. The emphasis in both programs is on development of the intellectual and technical skills necessary for independent research. The main component of both degrees is a thesis embodying the results of original research. Formal course requirements are few and are largely intended to fill gaps in the student's background.

The Stewart Biology Building is well equipped for graduate training and research in a wide variety of areas of biology. Its resources are greatly extended by affiliation with other organizations such as the Redpath Museum; the Groupe Interuniversitaire de Recherches Océanographiques du Québec (GIROQ); the Biotechnology Research Institute of the National Research Council of Canada; Macdonald Campus; the Montreal Neurological Institute; the Jewish General Hospital; the Montreal General, Montreal Children's and Royal Victoria Hospitals. Field research facilities include the Mont St. Hilaire Field Station (Québec); the Huntsman Marine Science Centre (New Brunswick); the Subarctic Research Laboratory (Québec); the Bellairs Research Institute (Barbados); and the Memphremagog Field Station (Québec).

The Department specifies a minimum level of support for all graduate students. This amount is \$12,500 per annum plus tuition fees. The required minimum duration of support is 2 years for the M.Sc. program, 5 years for a Ph.D. student entering as Ph.D.1 (from a Bachelor's) and 4 years for a Ph.D. student entering as Ph.D.2.

**11.3 Admission Requirements**

Applicants must have a B.Sc. in a discipline relevant to the proposed field of study with an overall Cumulative Grade Point Average (CGPA) of 3.0/4.0 or a CGPA of 3.2/4 for the last 2 full-time academic years. Graduate Record Examination (GRE) scores are not required, but may be submitted. The Test of English as a Foreign Language (TOEFL) is required of students who have graduated from a non-English language university outside of Canada. A score of 550 on the paper-based TOEFL (213 on the computer-based test) or 6.5 on IELTS, is the minimum standard for admission.

Admission is based on an evaluation by the Graduate Training Committee and on acceptance by a research director who can provide adequate funding for personal and research expenses. Prospective graduate students are encouraged to contact staff members with whom they wish to study before applying for admission.

**11.4 Application Procedures**

Application packages must be obtained directly from the Department. The application package contains specific information on the application process, program information, a summary of the research areas of the staff and contact information. Application forms to be printed and returned to the Department are available on the Biology Website, and included in our application package.

Deadlines for applications and all supporting documents are March 1 for September admission (January 15 for international applicants) and October 15 for January admission (August 15 for international applicants). If application materials are received after these dates, it may be necessary to delay review of the applicant's file until the following admittance period. All inquiries pertaining to admission procedures should be directed to the Graduate Admissions Secretary.

Commencing with applications for entry in January 2003, McGill's on-line application form will be available to all graduate program candidates at <http://www.mcgill.ca/applying/graduate>.

**11.5 Program Requirements**

The graduate program of each student is established and regularly evaluated by a three-member supervisory committee appointed by the Graduate Training Committee and chaired by the student's thesis supervisor.

All graduate students are required to participate regularly in the various seminar series and journal clubs offered by the Department.

**M.Sc. REQUIREMENTS**

**Length of Program** – Three full-time terms of resident study at McGill University is the minimum time requirement to complete the Master's degree. The normal and expected duration is 2 years.

**Course Requirements** – Forty-five credits are required for the M.Sc. degree. Students must complete the courses BIOL 697, BIOL 698 and BIOL 699 (Master's Thesis Research 1, 2, 3). The research courses each carry a credit weight of 13 credits. In addition, six course credits are required and may be taken in Biology or in other departments and must be numbered -500 or higher. Additional course work may be required if the student's background is insufficient. A graduate pass (B- or better) is mandatory for all courses required for the M.Sc. degree.

**Thesis** – In Biology, the M.Sc. degree is considered to be a research degree and the candidate must present a thesis which should contain original contributions to knowledge.

**M.Sc. – NEOTROPICAL ENVIRONMENT REQUIREMENTS**

**Length of Program** – Three full-time terms of resident study at McGill University is the minimum time requirement to complete the Master's degree. The normal and expected duration is 2 years.

**Course Requirements** – Forty-eight credits are required for this M.Sc. degree. Students must complete the courses BIOL 697, BIOL 698 and BIOL 699 (Master's Thesis Research 1, 2, 3). The research courses each carry a credit weight of 13 credits. In addition, six course credits are required from ENVR 610 and BIOL 640. Three credits must be chosen from POLI 644, SOCI 565, ENVR 611, ENVR 612, ENVR 680, BIOL 553, BIOL 641, GEOG 498, AGRI 550. Additional course work may be required if the student's background is insufficient. A graduate pass (B- or better) is mandatory for all courses required for the M.Sc. degree.

Participation in the MSE-Panama Symposium presentation in Montreal is also required.

**Thesis** – In Biology, the M.Sc. degree is considered to be a research degree and the candidate must present a thesis which should contain original contributions to knowledge.

**Transfer from M.Sc to Ph.D. Program** – The student's Supervisory Committee may recommend to the Graduate Training Committee that the student be permitted to transfer to the Ph.D. program. This is normally done at the end of the first year of the Master's program. Students who transfer into the Ph.D. program

are required to take their Ph.D. Qualifying Examination within eight months of the transfer.

#### Ph.D. REQUIREMENTS

**Length of Program** – Candidates entering Ph.D.1 must complete at least three years of full-time resident study (6 terms). The normal and expected duration of the Ph.D. program is 4-5 years. A student who has obtained a Master's degree at McGill, or at an approved institution elsewhere, and is proceeding in the same subject towards a Ph.D. degree may, upon the recommendation of the Graduate Training Committee, enter at the Ph.D.2 level.

**Course Requirements** – Students are required to take 6 course credits. These courses may be taken in Biology or in other departments and must be numbered -500 or higher. Additional courses may be required if the student's background is insufficient. A graduate pass (B- or better) is mandatory for all courses required for the Ph.D. degree.

**Ph.D. Qualifying Examination** – The Qualifying exam is a formal evaluation of the student's ability to proceed to the attainment of the Ph.D. Students must pass the Qualifying Examination (BIOL 700) no later than 15 months from the date of registration in the program. Students who transfer from the Master's program must take the exam within 8 months. Students who enter the Ph.D. program after completing an M.Sc. in Biology at McGill must take the exam within 12 months.

**Ph.D. Seminar** – All Ph.D. students must deliver a research seminar (BIOL 702) at some time during the academic session (September-April) towards the end of their studies and preferably at least 3 months prior to the thesis submission.

**Thesis** – The Ph.D. is a research degree. The candidate must present a thesis which represents high scholastic attainment in a specialized field, demonstrated by independent and original research. After the thesis has been submitted and approved, the candidate is required to orally defend their thesis in an open forum.

#### Ph.D. REQUIREMENTS – NEOTROPICAL ENVIRONMENT

**Length of Program** – Candidates entering Ph.D.1 must complete at least three years of full-time resident study (6 terms). The normal and expected duration of the Ph.D. program is 4-5 years. A student who has obtained a Master's degree at McGill, or at an approved institution elsewhere, and is proceeding in the same subject towards a Ph.D. degree may, upon the recommendation of the Graduate Training Committee, enter at the Ph.D.2 level.

**Course Requirements** – Students are required to take 6 course credits: ENVR 610 and BIOL 640. Three more credits must be chosen from POLI 644; SOCI 565, ENVR 611, ENVR 612, ENVR 680, BIOL 553, BIOL 641, GEOG 498, AGRI 550. Additional courses may be required if the student's background is insufficient. A graduate pass (B- or better) is mandatory for all courses required for the Ph.D. degree.

Participation in the MSE-Panama Symposium presentation in Montreal is also required.

**Ph.D. Qualifying Examination** – The Qualifying exam is a formal evaluation of the student's ability to proceed to the attainment of the Ph.D. Students must pass the Qualifying Examination (BIOL 700) no later than 15 months from the date of registration in the program. Students who transfer from the Master's program must take the exam within 8 months. Students who enter the Ph.D. program after completing an M.Sc. in Biology at McGill must take the exam within 12 months.

**Ph.D. Seminar** – All Ph.D. students must deliver a research seminar (BIOL 702) at some time during the academic session (September -April) towards the end of their studies and preferably at least 3 months prior to the thesis submission.

**Thesis** – The Ph.D. is a research degree. The candidate must present a thesis which represents high scholastic attainment in a specialized field, demonstrated by independent and original research. After the thesis has been submitted and approved, the candidate is required to orally defend their thesis in an open forum.

#### 11.6 Courses

**Please note: courses may have been rescheduled or new courses added after this Calendar went to press. Students preparing to register are advised to consult the 2002-2003 Class Schedule on the Web at <http://www.mcgill.ca/minerva-students> for the most up-to-date information.**

**The Class Schedule includes the term(s), days, and times when courses will be offered, as well as class locations and names of instructors.**

**The schedule of courses to be offered in Summer 2003 will be available on the website in January 2003.**

The course credit weight is given in parentheses after the title. Term(s) offered (Fall, Winter, Summer) may appear after the credit weight to indicate when a course would normally be taught. Please check the Class Schedule to confirm this information.

BIOL has replaced 177 as the prefix for Biology courses.

● Denotes courses not offered in 2002-03

#### GENERAL COURSES

**BIOL 650 RECENT ADVANCES IN BIOLOGY 1.** (3) Directed reading, seminar and discussion courses in subjects of current interest in biological research. Intended for students working individually or in classes on selected areas under the supervision of one or more staff members. Content and form are flexible to allow the Department to meet specific student demands or needs. Such courses are arranged by consultation with individual staff.

**BIOL 651 RECENT ADVANCES IN BIOLOGY 2.** (3) Directed reading, seminar and discussion courses in subjects of current interest in biological research. Intended for students working individually or in classes on selected areas under the supervision of one or more staff members. Content and form are flexible to allow the Department to meet specific student demands or needs. Such courses are arranged by consultation with individual staff.

**BIOL 652 RECENT ADVANCES IN BIOLOGY 3.** (3) Directed reading, seminar and discussion courses in subjects of current interest in biological research. Intended for students working individually or in classes on selected areas under the supervision of one or more staff members. Content and form are flexible to allow the Department to meet specific student demands or needs. Such courses are arranged by consultation with individual staff.

**BIOL 655 LABORATORY PROJECTS AND TECHNIQUES 1.** (3) Directed training in selected methods used in areas of current interest in biological research. Intended for individuals or classes working in selected areas under the supervision of one or more staff members. Form and content are flexible to allow the Department to meet specific student demands and needs. Each course is arranged by consultation with individual staff.

**BIOL 656 LABORATORY PROJECTS AND TECHNIQUES 2.** (3) Directed training in selected methods used in areas of current interest in biological research. Intended for individuals or classes working in selected areas under the supervision of one or more staff members. Form and content are flexible to allow the Department to meet specific student demands and needs. Each course is arranged by consultation with individual staff.

**BIOL 697 MASTER'S THESIS RESEARCH 1.** (13) Independent research work under the direction of the Thesis Supervisor and the Supervisory Committee.

**BIOL 698 MASTER'S THESIS RESEARCH 2.** (13) Independent research work under the direction of the Thesis Supervisor and the Supervisory Committee.

**BIOL 699 MASTER'S THESIS RESEARCH 3.** (13) Independent research work under the direction of the Thesis Supervisor and the Supervisory Committee.

**BIOL 700 DOCTORAL QUALIFYING EXAMINATION.** (0) The oral Qualifying Examination is a formal evaluation of the candidate's ability to proceed to the attainment of the Ph.D. Candidates must submit a thesis proposal in advance of the exam.

**BIOL 702 PH.D. SEMINAR.** (6) Doctoral candidates are required to give a public oral presentation of their major results before submitting a thesis.

#### SPECIFIC COURSES

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

● Denotes courses not offered in 2002-03

★ Denotes courses offered in alternate years.

● ★ **BIOL 505 DIVERSITY AND SYSTEMATICS SEMINAR.** (3) (Winter) (3 hours seminar) (Prerequisites: BIOL 304/204, BIOL 305, or permission)

**BIOL 516 GENETICS OF DEVELOPMENT.** (3) (Winter) (3 hours lecture) (Prerequisites: BIOL 202, BIOL 300, BIOL 303; permission) (Not open to students who have taken 177-416) This course aims to examine problems, theories, and experimental evidence on several concepts of mammalian developmental processes at molecular to organogenesis levels. Most topics are in the mouse model system, where various techniques for genetic manipulation are available.

**BIOL 518 EUKARYOTIC CELL GENETICS.** (3) (Winter) (2 hours seminar) (Prerequisite: BIOL 300 and permission) This course is designed for advanced undergraduate and graduate students. Readings from recent journal articles and reviews. Variable topics, including: cell differentiation, function of oncogenes and anti-oncogenes, growth regulation and cell cycle, gene transfer, recombination, mobile genetic elements, regulation of gene expression, cellular and viral replication, signal transduction.

**BIOL 520 GENE ACTIVITY IN DEVELOPMENT.** (3) (Winter) (3 hours lecture and discussion) (Prerequisites: BIOL 300 and BIOL 303 or permission) (Not open to students who have taken 177-420) An analysis of the role and regulation of gene expression in several models of eukaryotic development. The emphasis will be on critical evaluation of recent literature concerned with molecular or genetic approaches to the problems of cellular differentiation and determination. Recent research reports will be discussed in conferences and analyzed in written critiques.

★ **BIOL 522 PLANT MOLECULAR BIOLOGY SEMINAR.** (3) (Winter) (2 hours seminar, 1 hour tutorial per week) (Prerequisite: BIOL 300 or permission) This course deals with current topics in plant development, with particular emphasis on genetic and molecular approaches. This advanced course will include readings from the primary literature, as well as oral presentations and a written NSERC-styled grant proposal.

**BIOL 524 TOPICS IN MOLECULAR BIOLOGY.** (3) (Fall) (Prerequisite: BIOL 300, BIOL 303 or permission) Recent literature in the fields of molecular genetics and molecular biology. Topics include: signal transduction, cell function, genetic diseases in eukaryotes.

★ **BIOL 530 NEURAL BASIS OF BEHAVIOUR.** (3) (Winter) (1 hour lecture, 2 hours seminar) (Prerequisite: BIOL 306 or PHGY 311 or PSYC 308) (Not open to students who have taken 177-430) This course examines neural mechanisms underlying behaviour. Topics will be introduced by a lecture, supplemented by a review article. This will be followed by student seminars and/or discussions. Topics will vary according to current literature, but will likely include communication, visual behaviour, escape, orientation, neurogenetics and locomotion.

**BIOL 531 NEUROBIOLOGY LEARNING MEMORY.** (3) (Fall) (3 hours lecture and discussion) (Prerequisite: BIOL 306 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.

**BIOL 532 DEVELOPMENTAL NEUROBIOLOGY SEMINAR.** (3) (Winter) (1 hour lecture, 2 hours seminar) (Prerequisites: BIOL 303 and BIOL 306 or permission) Discussions of all aspects of nervous system development including pattern formation, cell lineage, pathfinding and targetting by growing axons, and neuronal

regeneration. The basis for these discussions will be recent research papers and other assigned readings.

● **BIOL 535 POLITICAL ECOLOGY.** (3) (Winter) (3 hour seminar) (Prerequisite: BIOL 208/308 or permission of instructor) .

● ★ **BIOL 544 GENETIC BASIS OF LIFE SPAN.** (3) (Fall) (1 hour lecture, 2 hours seminar) (Prerequisites: BIOL 202, BIOL 300; BIOL 303 recommended or permission) (Not open to students who have taken 177-444)

**BIOL 551 MOLECULAR BIOLOGY: CELL CYCLE.** (3) (Fall) (3 hours lecture) (Prerequisites: BIOL 200, BIOL 201, BIOL 300) (Not open to students who have taken 177-451) Cytological studies, biochemical and genetical information are integrated to explain molecular form and function in the eukaryotic cell. The mitotic cell cycle and its coordination with cell growth and division; maintenance of cellular architecture, protein targeting, self-assembly of macromolecular complexes, organelle biogenesis, and DNA replication and segregation are examined.

**BIOL 553 NEOTROPICAL ENVIRONMENTS.** (3) (Winter) (24 hours lecture and 36 hours field work over a 4-week period) (Prerequisites: HISP 218, MATH 203, and BIOL 208/308, or equivalents, and permission of Program Coordinator. Corequisites: ENVR 451, GEOG 498 and ABEN 450) (Not open to students who have taken 177-453) (Restriction: location in Panama. Students must register for a full semester of studies in Panama) Ecology revisited in view of tropical conditions. Exploring species richness. Sampling and measuring biodiversity. Conservation status of ecosystems, communities and species. Indigenous knowledge.

**BIOL 555 FUNCTIONAL ECOLOGY OF TREES.** (3) (Summer) (Lectures and laboratory taught in residence at the Gault Nature Reserve) (Prerequisites: BIOL 205, BIOL 304/204, BIOL 357) Functional organization in trees: physiology, architecture, and life history. Emphasis on trees in natural habitats.

● **BIOL 560 AQUATIC CONSERVATION.** (3) (Fall) (2 lecture hours, 1 conference) (Prerequisites: BIOL 208/308 and BIOL 465/365 or permission) (Not open to students who have taken 177-460)

**BIOL 570 ADVANCED SEMINAR IN EVOLUTION.** (3) (Winter) (3 hours seminar) (Open to undergraduates by permission) Detailed analysis of a topic in evolutionary biology, involving substantial original research.

● ★ **BIOL 572 MOLECULAR EVOLUTION.** (3) (Fall) (4 hours lecture/seminar) (Prerequisite: BIOL 300) (Not open to students who have taken 177-472)

★ **BIOL 588 MOLECULAR/CELLULAR NEUROBIOLOGY.** (3) (Fall) (1 1/2 hours lecture, 1 1/2 hours seminar) (Prerequisite: BIOL 300 and BIOL 306 or permission) Discussion of fundamental molecular mechanisms underlying the general features of cellular neurobiology. An advanced course based on lectures and on a critical review of primary research papers.

**BIOL 632 LIMNOLOGY.** (3) (2 hours lecture; 3 hours laboratory) (Prerequisites: BIOL 206 and/or permission) A study of the physical, chemical and biological properties of inland waters, with emphasis on their functioning as systems.

**BIOL 640 TROPICAL BIOLOGY AND CONSERVATION.** (3) (Restricted to students enrolled in Neotropical Environment Option (NEO) or permission of the instructor) Long-term research at the Smithsonian Tropical Research Institute will be organized and synthesized to examine historical assembly and ecological maintenance of tropical communities. This synthesis will draw on phylogenetic concepts for historical insight and will examine the probable resilience of these communities to global change, pollution and biodiversity loss.

**BIOL 641 ISSUES IN TROPICAL BIOLOGY.** (3) (Course will only be offered if enrolment is five students or more. Enrolment in the Neotropical Environment Option (NEO) or permission of the instructor) Advanced interdisciplinary topics relevant to environmental work in Latin America including tropical marine environmental physiology encompassing issues of pollution and toxicity, global climate change from an ecosystem and economical perspective, evolutionary ecology of tropical communities as related to the maintenance of species diversity.