

# ACADEMIC UNITS

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All courses in this Calendar will be offered in 1999-2000 unless a ● appears to the left of the course number. No description will appear after the title if the course is not given in the current year, descriptions can usually be found in preceding Calendars.

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

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

## 1 Agricultural and Biosystems Engineering

Department of Agricultural and Biosystems Engineering  
Macdonald Campus  
21,111 Lakeshore Road  
Sainte-Anne-de-Bellevue, QC  
Canada H9X 3V9  
Telephone: (514) 398-7774  
Fax: (514) 398-8387  
Email: [raghavan@agrenv.lan.mcgill.ca](mailto:raghavan@agrenv.lan.mcgill.ca)  
Website: <http://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

R. Kok; B.E.Sc., Ph.D.(W.Ont.)  
C.A. Madramootoo; B.Sc.(Agr. Eng.), M.Sc., Ph.D.(McG.)  
E. McKyes; B.Eng., M.Eng., Ph.D.(McG.)  
S.O. Prasher; B.Tech, M.Tech.(Punj.), Ph.D.(Br.Col.)  
G.S.V. Raghavan; B.Eng.(B'lore), M.Sc.(Guelph), Ph.D.(Colo.St.)

#### Associate Professors

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

#### Assistant Professors

S. Babarutsi; B.Sc.(Agr.Eng.), M.Eng., Ph.D.(McG.) (Special Category)  
J.A. Landry; B.Sc.(Agr.Eng.), Ph.D.(McG.)  
M.O. Ngadi; B.Eng.(Agr.Eng.), M.A.Sc., Ph.D.(Dal.Tech.)

#### Brace Research Institute Assistant Professor

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

#### Auxiliary Professors

N.B. McLaughlin, J. Millette, B. Paterson, A. Shady, G. Sunahara, C. Vigneault;

#### Research Associates

P. Enright, Y. Garipey, V. Orsat

### 1.2 Programs Offered

The Department offers facilities for research in the areas of biosystems 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, postharvest 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 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 making application for admission. An equivalent cumulative grade point average of 3.0/4.0 is required at the Bachelor's level. Experience after the undergraduate degree is an additional asset.

### 1.4 Application Procedures

Applications for Admission and all supporting documents must be sent directly to:

Student Affairs Office (Graduate Studies)  
Macdonald Campus of McGill University  
21,111 Lakeshore  
Ste-Anne-de-Bellevue, Québec  
H9X 3V9 CANADA  
Telephone: (514) 398-7708  
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.

**Deadlines** – For **international students**, complete applications with supporting documents must reach the Student Affairs Office (Graduate Studies) at Macdonald Campus at least **eight months** prior to the intended start of program. May 1 for January (winter); September 1 for May (summer); January 1 for September (fall). For **domestic students**, complete applications with supporting documents must reach the office no later than **three months** in advance of intended start of program.

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

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

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

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

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

**Letters of Recommendation** – Two letters of recommendation on letterhead 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 IELTS (minimum 6.5). The MCHE is not considered equivalent. Results must be submitted as part of the application. The Univer-

sity code is 0935 (McGill University, Montreal); department code is 31 (graduate schools), Biological Sciences - Agriculture.

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

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

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

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

## 1.5 Program Requirements

### M.Sc.

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 conditions 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 faculty of graduate studies and research. This work is represented by courses M.Sc. Thesis I through VIII, described below and equivalent to four credits each, for a total of 32 credits allotted to thesis work (336-691 to 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., 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 (336-671 and 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. 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 65% (or B-) 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 336-701A,B,C, 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.

## 1.6 Courses

- Denotes not offered in 1999-2000.

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

- **336-500B Adv. APPLICATIONS OF MICRO. IN AGR.** (3) (3 hour lecture, 2 hour lab)

- **336-504B INSTRUMENTATION AND CONTROL.** (3) (3 hours lectures and 2 hours lab)

**336-512B SOIL CUTTING, TILLAGE AND TRENCHING.** (3) (2 hours lectures and 2 hours lab) Soil mechanics applied to cutting and tillage tools; soil cutting forces for two and three-dimensional

implements, soil loosening, sorting, inversion and manipulation; selection of traction machines to match soil cutting and tillage requirements, traction; depth and grade control systems; analysis of drainage machines, wheel trenchers, Chain trenchers and trenchless plows. **Professor McKyes**

**336-514B DRAIN PIPE AND ENVELOPE MATERIALS.** (3) Plastic, concrete, ceramic and geotextile drainage materials. Production, processing and management sciences. Quality control, testing, inventory management, handling, uses. Granular media for drainage. **Professor Bonnell**

**336-515A COMPUTER MODELS IN DRAINAGE ENGINEERING.** (3) A review of computer simulation models of designing subsurface drainage systems. Use of CAD systems in design and drafting drainage plans. In depth discussion and applications of DRAINMOD and SWATRE, two microcomputer based models for designing and evaluating drainage water management systems for soils with high water tables, analysis of climatic and parametric uncertainties in the design. **Professor Prasher**

● **336-516A PREPARATION AND APPRAISAL OF DRAINAGE PROJECTS.** (3)

● **336-517A DRAINAGE PROJECT CONTRACTS, INSTALLATION AND MANAGEMENT.** (3)

● **336-518A POLLUTION CONTROL FOR AGRICULTURE.** (3) (3 hours lectures)

**336-525B VENTILATION OF AGRICULTURAL STRUCTURES.** (3) The analyses of heat and water vapour transfer through the structure of buildings are used to design heating, ventilation and refrigeration systems. Heat conduction, convection and radiation are included in the analysis of heat transfer. Ventilation systems are designed for livestock shelters, produce storages and greenhouses. **Professor Barrington**

● **336-530B ADVANCED FOOD AND FERMENTATION ENGINEERING.** (3) (3 lectures and one 3-hour lab) (Prerequisite 336-325 or equivalent)

**336-605A FUNCTIONAL ANALYSIS OF AGRICULTURAL MACHINES.** (3) (3 hours lectures) Theoretical analysis of unit operations performed by field machines. Physical and biological properties of the materials affected by the machines. **Professor Norris**

● **336-606A,B,C LAND DRAINAGE ENGINEERING.** (3) (Three weeks intensive course.)

● **336-607B ENGINEERING ASPECTS OF PLANT ENVIRONMENT.** (3) (3 hours lectures)

**336-608A,B,C SPECIAL PROBLEMS IN AGRICULTURAL ENGINEERING.** (3) (2 conferences, either term) Laboratory, field and library studies and reports on special problems related to agricultural and biosystems engineering that are not covered in regular course work. **The Chair and Staff**

● **336-609A,B HYDROLOGIC SYSTEMS AND MODELLING.** (3) (3 hours lectures)

● **336-611A,B ADVANCES IN IRRIGATION ENGINEERING.** (3) (3 hours lectures)

● **336-612A SIMULATION AND MODELLING.** (3) (3 hours lectures)

**336-614B ENGINEERING DECISION ANALYSIS.** (3) (3 hours lectures) Analysis of various kinds of uncertainties, use of expected values of random parameters in decision analysis, decision trees, utility theorem, updating probabilities with Baye's theorem, first and second order methods of analyzing uncertainty. **Professor Prasher**

● **336-616B ADVANCED SOIL AND WATER ENGINEERING.** (3) (3 hours lectures)

● **336-617B SPECIAL DRAINAGE APPLICATIONS.** (3)

**336-619B,C DRAINAGE AND RECLAMATION OF IRRIGATED LANDS.** (3) Design of drainage systems for control of salinity and water-logging in irrigated arid and semi-arid lands. Field investigations of soil and water salinity components, movement of water and salts. Canal leakage control, interceptor drains and field

drains. Groundwater geology considerations. Disposal or reuse of drainage water. **Professors Paterson and Bonnell**

**336-621A,B 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. **Professor Raghavan**

● **336-622A,B ADVANCES IN POST-HARVEST TECHNOLOGY – STORAGE.** (3) (3 hours lectures)

**336-623A,B,C PROPOSAL PREPARATION.** (3) (3 hours conferences) Critiques of proposals prepared by others. Preparation and defense of draft proposals for funding agencies. **Professor Raghavan and Staff**

**336-651A,B,C DEPARTMENTAL SEMINAR M.Sc. I.** (1) To give seminars and participate in discussions. **Professor Landry**

**336-652A,B,C DEPARTMENTAL SEMINAR M.Sc. II.** (1) To give seminars and participate in discussions. **Professor Landry**

**336-653A,B,C DEPARTMENTAL SEMINAR M.Sc. III.** (1) To give seminars and participate in discussions **Professor Landry**

**336-671A,B,C PROJECT I.** (6) Prepare project outline, execute and report. This project relates to the M.Sc. (Applied) degree. **Professor Raghavan and Staff**

**336-672A,B,C PROJECT II.** (6) Prepare project outline, execute and report. This project relates to the M.Sc. (Applied) degree. **Professor Raghavan and Staff**

**336-691 through 336-698 must be taken in sequence.**

**336-691A,B,C M.Sc. THESIS I.** (4) Problem definition and literature Review. **The Chair and Staff**

**336-692A,B,C M.Sc. THESIS II.** (4) Project proposal and presentation. **The Chair and Staff**

**336-693A,B,C M.Sc. THESIS III.** (4) Methodology development. **The Chair and Staff**

**336-694A,B,C M.Sc. THESIS IV.** (4) Experimentation I. **The Chair and Staff**

**336-695A,B,C M.Sc. THESIS V.** (4) Experimentation II. **The Chair and Staff**

**336-696A,B,C M.Sc. THESIS VI.** (4) Data analysis. **The Chair and Staff**

**336-697A,B,C M.Sc. THESIS VII.** (4) Draft thesis preparation. **The Chair and Staff**

**336-698A,B,C M.Sc. THESIS VIII.** (4) Thesis completion and acceptance. **The Chair and Staff**

**336-699A,B,C 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. **Professor Raghavan and Staff**

**336-701A,B,C PH.D. COMPREHENSIVE EXAMINATION.** **The Chair and Staff**

**336-702A,B SPECIAL PROBLEMS IN AGRICULTURAL ENGINEERING II.** (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. **Professor McKyes and Staff**

**336-751A,B,C DEPARTMENTAL SEMINAR PH.D. I.** To give seminars and participate in discussions. **Professor Landry**

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

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



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

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

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

## 2 Agricultural Economics

Department of Agricultural Economics  
Macdonald Campus  
21,111 Lakeshore Road  
Sainte-Anne-de-Bellevue, QC Canada H9X 3V9  
Telephone: (514) 398-7820  
Fax: (514) 398-8130  
Email: [atkinson@agradm.lan.mcgill.ca](mailto:atkinson@agradm.lan.mcgill.ca)  
Website: <http://www.agrenv.mcgill.ca/agrecon>

Chair — P.J. Thomassin

### 2.1 Staff

#### Associate Professors

H. G. Coffin; B.Sc.(McG.), M.Sc., Ph.D.(Conn.) (*Part-time*)  
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); Chair

#### Assistant Professors

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

#### Associate Member

C. Green (Department of Economics)

#### 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 in Agricultural Economics on an *ad hoc* basis, or through the Ph.D. program of 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 fulfil 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

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## 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 elective courses (9 credits)
4. Seminar (334-690) (1 credit)
5. M.Sc. Thesis I, II, III, IV, V (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 (334-690) (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

- Denotes not offered in 1999-2000.

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

**334-611B PRICE ANALYSIS.** (3) Topics in advanced microeconomic theory with applications in agricultural economics.

**Professor Henning**

- **334-620A STRATEGIC MANAGEMENT AND THE ENVIRONMENT.** (3)

- **334-630B FOOD AND AGRICULTURAL POLICY.** (3)

### 334-633A 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.

**Professor Thomassin**

- **334-640A AGRICULTURE AND FOOD MARKETING.** (3)

**334-642B 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.

**Professor Gunjal**

- **334-679A FINANCING: ALTERNATIVE STRATEGIES.** (3)

### 334-685A,B,C 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)

**Staff**

**334-690 A,B,C 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.

**334-691A,B,C M.Sc. THESIS I.** (6)

**334-692A,B,C M.Sc. THESIS II.** (3)

**334-693A,B,C M.Sc. THESIS III.** (6)

**334-694A,B,C M.Sc. THESIS IV.** (6)

**334-695A,B,C M.Sc. THESIS IV.** (6)

## 3 Anatomy and Cell Biology

Department of Anatomy and Cell Biology  
Strathcona Anatomy and Dentistry Building  
3640 University Street  
Montreal, QC  
Canada H3A 2B2  
Telephone: (514) 398-6335  
Fax: (514) 398-5047

*Chair* — J.J.M. Bergeron

### 3.1 Staff

#### *Emeritus Professor*

Y. Clermont; B.Sc.(Montr.), M.Sc., Ph.D.(McG.)

#### *Professors*

A. Beaudet\*; 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. Brawer; 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.)  
D. Lawrence\*; B.Sc.(Bishop's), M.D., C.M.(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.)  
R. Murphy\*; M.S.(Northeastern), Ph.D.(Rutgers)  
D.G. Osmond; B.Sc., M.B., Ch.B., D.Sc.(Brist.), F.R.S.C.  
B. Posner\*; M.D.(Man.), Ph.D.(Iowa)  
C.E. Smith\*; D.D.S., Ph.D.(McG.)  
E. Wang\*; M.A.(N. Mich.), Ph.D.(C.W.R., Clev.)  
H. Warshawsky; B.Sc.(Sir G.Wms), M.Sc., Ph.D.(McG.)

#### *Associate Professors*

O.W. Blaschuk\*; B.Sc.(Winn.), M.Sc.(Man.), Ph.D.(Tor.)  
E. Daniels; M.Sc., Ph.D.(Man.)

S. David\*; Ph.D.(Man.)  
 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)  
 M. Miller\*; B.Sc.(Marquette), M.Sc., Ph.D.(Loyola)  
 C.R. Morales; D.V.M.(Argentina), Ph.D.(McG.)  
 H. Vali\*; B.Sc., M.Sc., Ph.D.(Munich)

#### Assistant Professors

C. Autexier\*; B.Sc.(C'dia) Ph.D.(McG.)  
 D. Baranes; B.Sc., M.Sc., Ph.D.(Jerusalem)  
 P. Barker\*; B.Sc.(S.Fraser), Ph.D.(Alta.)  
 M. Greenwood\*; B.Sc., M.Sc.(C'dia), Ph.D.(McG)  
 T. Kennedy\*; B.Sc.(McM.), M.Phil., Ph.D.(Col.)  
 A. Koromilas\*; B.Sc., Ph.D.(Aristotelian U., Greece)  
 N. Lamarche-Vane; B.Sc., Ph.D.(U.Mtl.)  
 P. McPherson\*; M.Sc.(Man.), Ph.D.(Iowa)  
 A. Ribeiro-da-Silva\*; M.D., Ph.D.(Oporto)  
 W. Sossin\*; S.B.(M.I.T.), Ph.D.(Stan.)  
 J. Snipes\*; Ph.D., M.D.(Vanderbilt)  
 S. Stifani\*; Ph.D.(Rome), Ph.D.(Alta.)  
 D. Walker\*; B.Sc.(Geneva), Ph.D.(Salk), Ph.D.(Geneva)  
 G. Wild\*; B.Sc., Ph.D., M.D., C.M.(McG.)

#### Adjunct Professor

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)  
 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 hema-

tology, 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, recombinant 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.

#### 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 Graduate Studies of the Faculty of Graduate Studies and Research, 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 is permitted.)

### 3.4 Application Procedures

Application for admission to the Faculty of Graduate Studies and Research 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) which he/she has 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.

### 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 (504-698 and 504-699).

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

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

**504-663D HISTOLOGY.** (9) The study of the cytology and structure of tissues and organs.

**504-690D CELL BIOLOGY.** (6) 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.

**504-698D M.Sc. THESIS RESEARCH.** (24)

**504-699D M.Sc. THESIS SEMINAR.** (9)

**504-701D Ph.D. COMPREHENSIVE EXAMINATION.**

## 4 Animal Science

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

E. Block; B.S.(C'nell), M.S., Ph.D.(Penn. St.)  
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.)  
P.C. Laguë; B.A.(Montr.), B.S.A.(Laval), M.S., Ph.D.(C'nell)  
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)

#### Assistant Professors

R. Lacroix; B.Sc., M.Sc.(Que.), Ph.D.(McG.) (PT)  
K.M. Wade; B.Sc.(Agr.), M.Sc.(Agr.)(Dublin), Ph.D.(C'nell)

#### Associate Members

Faculty in the School of Dietetics and Human Nutrition

#### Adjunct Professors

M. Britten, C. Karatzas, C. Keefer, P. Lacasse,  
A. Lazaris-Karatzas, B. Murphy, D. Petitclerc, D. Silversides,  
M. Simpson, J.D. 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 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

Applications for Admission and all supporting documents must be sent directly to:

Student Affairs Office (Graduate Studies)  
Macdonald Campus of McGill University  
21,111 Lakeshore  
Ste-Anne-de-Bellevue, Québec  
H9X 3V9 CANADA  
Telephone: (514) 398-7708  
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.

**Deadlines** – For **international students**, complete applications with supporting documents must reach the Student Affairs Office (Graduate Studies) at Macdonald Campus at least **eight months** prior to the intended start of program. May 1 for January (winter); September 1 for May (summer); January 1 for September (fall). For **domestic students**, complete applications with supporting documents must reach the office no later than **three months** in advance of intended start of program.

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

1. Certified personal cheque in Cdn.\$ drawn on a Canadian bank;
2. Certified personal cheque in U.S.\$ drawn on a U.S. bank;
3. Canadian Money order in Cdn.\$;



4. U.S. Money Order in U.S.\$;
5. Bank draft in Cdn.\$ drawn on a Canadian bank;
6. Bank draft in U.S.\$ drawn on a U.S. bank;
7. Credit card (by completing the appropriate section of the application form).

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

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

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

**Letters of Recommendation** – Two letters of recommendation on letterhead 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 IELTS (minimum 6.5). The MCHE is not considered equivalent. Results must be submitted as part of the application. The University code is 0935 (McGill University, Montreal); department code is 31 (graduate schools), Biological Sciences - Agriculture.

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

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

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

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

## 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 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 (342-680, 681, 682, and 683). Exceptional M.Sc. students may be considered for Ph.D. status after one full year in the Department.

### M.Sc. (Applied) in Animal Science (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)

342-501B (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)

342-643 (3) Project I  
 342-644 (3) Project II  
 342-645 (3) Project III  
 342-646 (3) Project IV  
 342-647 (3) Project V

### 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 342-701D.

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

## 4.6 Courses

- Denotes not offered in 1999-2000.
- Denotes limited enrolment.

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

In addition to the courses listed below, students may be required to take one or more courses offered by other departments or faculties.

- **342-501B ADVANCED ANIMAL PRODUCTION SYSTEMS.** (3) (3 lectures)

**342-504A POPULATION GENETICS.** (3) (3 lectures) A consideration of the problems involved in the improvement of animals and the application of genetics in their solution. **Professor Monardes**

**342-551B CARBOHYDRATE AND LIPID METABOLISM.** (3) (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. **Professor Ng-Kwai-Hang**

**342-552A PROTEIN METABOLISM AND NUTRITION.** (3) (3 lectures) Comparative aspects of nutrition and metabolism of amino acids and proteins from the cellular level on through the multisystem operation of the whole organism. Main topics include cellular metabolism and functions of amino acids and proteins, digestion,

absorption and utilization of dietary protein. Comparison between farm animals and humans. **Professors Zhao and Phillip**

● **342-603B PHYSIOLOGICAL GENETICS OF DOMESTIC ANIMALS.** (3) (3 lectures)

**342-605B ESTIMATION OF 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. **Professor Hayes**

**342-606B SELECTION INDEX AND ANIMAL IMPROVEMENT.** (3) (3 lectures) Selection index principles and their application to livestock improvement are considered, with emphasis on the estimation of genetic breeding values for single and multi-trait selection. **Staff**

**342-607A 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. **Professor Cue**

● **342-611B ADVANCE REPRODUCTIVE PHYSIOLOGY.** (3) (2 lectures, 1 seminar) (Given in alternate years.)

● **342-620A,B VERTEBRATE CELL CULTURE METHODS.** (3) (3 labs and 1 seminar)

● **342-621B EXPERIMENTAL TECHNIQUES IN PROTEIN CHEMISTRY.** (3) (1 lecture and 3 labs)

**342-622B SELECTED TOPICS IN MOLECULAR BIOLOGY.** (3) (1 lecture and 2 seminars) (Prerequisite: 362-500B 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. **Professor Kuhnlein**

**342-623B TECHNIQUES IN MOLECULAR GENETICS: DNA SEQUENCING.** (3) Growth of bacterial cells and isolation of plasmids containing DNA; dideoxysequencing of double-strand DNA; separation using urea-polyacrylamide gels; autoradiography and sequence analysis including use of DNAsis and genbank/EMBL databases. **Professor Zadworny**

□ **342-624B TECHNIQUES IN MOLECULAR GENETICS: DNA FINGERPRINTING.** (3) (Requires previous laboratory experience.) Isolation of DNA from blood, tissue samples or plant material (students can choose their preferred source of DNA and problem). Digestion of the DNA with restriction enzymes. Agarose gel electrophoresis; Southern blotting; hybridisation with a DNA fingerprinting probe; autoradiography; interpretation (i.e. genetic variability, genetic relationship or paternity). **Professor Kuhnlein**

**342-625B TECHNIQUES IN MOLECULAR GENETICS: POLYMERASE CHAIN REACTION.** (3) Isolation of genomic DNA; amplification of target sequences using the polymerase chain reaction; analysis of the product using restriction enzymes and electrophoresis (polyacrylamide or agarose gel electrophoresis). **Professor Zadworny**

● **342-630A EXPERIMENTAL TECHNIQUES IN ANIMAL SCIENCE: NUTRITION.** (3) (1 lecture, 1 lab)

**342-635B VITAMIN AND MINERAL NUTRITION.** (3) (3 lectures) Modularised course dealing with advanced topics in Nutrition. The core of the course will focus on vitamins and minerals. **Professor Block**

**342-636B TECHNIQUES IN ANALYSIS OF 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. **Professor Cue**

**342-643A,B PROJECT I.** (3) Review of the literature and design of the project. This project relates to the M.Sc. Applied (non-thesis) degree. **Staff**

**342-644A,B PROJECT II.** (3) Continuation of the review of the literature and design of project. This project relates to the M.Sc. Applied (non-thesis) degree. **Staff**

**342-645A,B PROJECT III.** (3) Execution and write-up of project. This project relates to the M.Sc. Applied (non-thesis) degree. **Staff**

**342-646A,B PROJECT IV.** (3) Continuation of write-up and submission of project. This project relates to the M.Sc. Applied (non-thesis) degree. **Staff**

**342-647A,B PROJECT V.** (3) Seminar and project presentations. This oral presentation of the project relates to the M.Sc. Applied (non-thesis) degree. **Staff**

**342-680A,B ANIMAL SCIENCE M.Sc. THESIS I.** (7) Independent research under the direction of a supervisor toward completion of M.Sc. thesis. **Staff**

**342-681A,B ANIMAL SCIENCE M.Sc. THESIS II.** (7) Independent research under the direction of a supervisor toward completion of M.Sc. thesis. **Staff**

**342-682A,B ANIMAL SCIENCE M.Sc. THESIS III.** (7) Independent research under the direction of a supervisor toward completion of M.Sc. thesis. **Staff**

**342-683A,B ANIMAL SCIENCE M.Sc. THESIS IV.** (10) Final submission and approval of M.Sc. thesis. **Staff**

**342-691D,N SPECIAL TOPICS IN ANIMAL SCIENCE.** (3) 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. **Staff**

**342-692D,N SPECIAL TOPICS IN ANIMAL SCIENCE.** (3) 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. **Staff**

**342-693D,N SPECIAL TOPICS IN ANIMAL SCIENCE.** (3) 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. **Staff**

**342-695A,B ANIMAL SCIENCE SEMINAR I.** (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. **Professor Cue**

**342-696A,B ANIMAL SCIENCE SEMINAR II.** (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. **Professor Cue**

**342-797A,B ANIMAL SCIENCE SEMINAR III.** (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. **Professor Cue**

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

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

● **342-730D COLLOQUIUM IN NUTRITION.** (1 lecture)

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

Professor Cue

## 5 Anthropology

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Stephen Leacock Building  
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Chair — Donald W. Attwood

### 5.1 Staff

#### Professors

Donald W. Attwood; A.B.(Calif.), Ph.D.(McG.)  
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*)  
Jérôme 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.  
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.)  
Laurel Bossen; B.A.(Barnard), M.A., Ph.D.(SUNY, Albany)  
(*on leave 1999-2000*)  
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.)  
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

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

### 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 are as follows: those applying for admission and McGill Fellowships – January 1; those applying only for admission – February 15.

Applications will be considered upon receipt of:

1. Graduate Faculty Application Form;
2. application fee, 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 is required by Graduate Faculty.)

The Department admissions committee announces its selections by April 1.

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 Faculty of Graduate Studies and Research Calendar.

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

### 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), 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 (522-605, 151-615), 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 (522-605, 151-615) as well as the following courses in anthropology: Theory I, 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 (522-605, 151-615) and at least five additional graduate courses in anthropology (Theory I 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 Faculty, 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 Graduate Faculty.

### **5.6 Courses for Higher Degrees**

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

N.B. Most of these are 3-credit courses that take the form either of seminars or tutorials, some of which may be spread over two terms, according to need. Please contact Department for a current course list.

- 151-547A,B,D EARLY PREHISTORY OF THE NEW WORLD. (3)**
- 151-552A,B,D PROBLEMS IN THE PREHISTORY OF EASTERN NORTH AMERICA. (3)**
- 151-602A,B,D THEORY I. (3)**
- 151-603A,B,D THEORY II. (3)**
- 151-605A,B,D CULTURE AREA. (3)**
- 151-607D PROSEMINAR IN ARCHAEOLOGY. (6)**
- 151-609D PROSEMINAR IN ANTHROPOLOGY. (6)**
- 151-610A,B,D SOCIAL ORGANIZATION. (3)**
- 151-611A,B,D RESEARCH DESIGN. (3)**
- 151-612A,B,D KINSHIP. (3)**
- 151-614A,B,D ECONOMIC ANTHROPOLOGY. (3)**
- 151-615A,B,D SEMINAR IN MEDICAL ANTHROPOLOGY. (3)**
- 151-616A,B,D POLITICAL ANTHROPOLOGY. (3)**
- 151-618A,B,D STRATIFICATION. (3)**
- 151-620A,B,D ETHNICITY. (3)**
- 151-625A,B,D CULTURAL ECOLOGY. (3)**
- 151-630A,B,D SOCIAL CHANGE. (3)**
- 151-631A,B,D SYMBOLIC ANTHROPOLOGY. (3)**



- 151-633A,B,D WOMEN AND DEVELOPMENT. (3)  
 151-634A,B,D ANTHROPOLOGY OF DEVELOPMENT I. (3)  
 151-635A,B,D ANTHROPOLOGY OF DEVELOPMENT II. (3)  
 151-636A,B,D URBANIZATION. (3)  
 151-638A,B,D COMPLEX SOCIETIES. (3)  
 151-640A,B,D PSYCHOLOGICAL ANTHROPOLOGY. (3)  
 151-642A,B,D ANTHROPOLOGY OF EDUCATION. (3)  
 151-646A,B,D COGNITIVE ANTHROPOLOGY. (3)  
 151-647A,B,D PEOPLING OF THE AMERICAS. (3)  
 151-648A,B,D STRUCTURAL ANTHROPOLOGY. (3)  
 151-650A,B,D ANTHROPOLOGY OF RELIGION. (3)  
 151-651A,B,D ANTHROPOLOGY AND HISTORY. (3)  
 151-652A,B,D ANTHROPOLOGY AND GENDER. (3)  
 151-653A,B,D ANTHROPOLOGY, LANGUAGE AND COGNITION. (3)  
 151-654A,B,D ANTHROPOLOGY OF CHINA. (3)  
 151-656A,B,D ANTHROPOLOGY OF ART. (3)  
 151-660A,B,D RESEARCH METHODS. (3)  
 151-665A,B,D QUANTITATIVE METHODS IN ANTHROPOLOGY. (3)  
 151-670A,B,D ARCHAEOLOGICAL THEORY I. (3)  
 151-671A,B,D ARCHAEOLOGICAL THEORY II. (3)  
 151-673A,B,D ARCHAEOLOGICAL FIELD METHODS. (3)  
 151-674A,B,D ARCHAEOLOGICAL LABORATORY METHODS. (3)  
 151-676A,B,D ARCHAEOLOGICAL AREA. (3)  
 151-678A,B,D ETHNOHISTORY. (3)  
 151-680A,B,D M.A. TUTORIAL READING. (3)  
 151-681A,B,D M.A. TUTORIAL READING. (3)  
 151-682A,B,D M.A. TUTORIAL READING. (3)  
 151-683A,B,D M.A. TUTORIAL READING. (3)  
 151-684A,B,D M.A. TUTORIAL READING. (3)  
 151-685A,B,D RESEARCH TUTORIAL 1. (3)  
 151-686A,B,D RESEARCH TUTORIAL 2. (3)  
 151-687A,B,D RESEARCH TUTORIAL 3. (3)  
 151-688A,B,D RESEARCH TUTORIAL 4. (3)  
 151-690A RESEARCH PAPER I. (6)  
 151-691B RESEARCH PAPER II. (6)  
 151-692B RESEARCH PAPER III. (6)  
 151-693B RESEARCH PAPER IV. (6)  
 151-694A,B M.A. THESIS TUTORIAL I. (6)  
 151-695A,B M.A. THESIS TUTORIAL II. (6)  
 151-696A,B,D M.A. RESEARCH PAPER. (15)  
 151-699A,B,D M.A. THESIS. (24)  
 151-700D PH.D. PRELIMINARY EXAMINATION.  
 151-702A,B,D ADVANCED ANTHROPOLOGICAL THEORY. (3)  
 151-760A,B,D ADVANCED ANTHROPOLOGICAL METHODS. (3)  
 151-770A,B,D ADVANCED ARCHAEOLOGICAL THEORY. (3)  
 151-773A,B,D ADVANCED ARCHAEOLOGICAL METHODS. (3)  
 151-780A,B,D READING AND RESEARCH. (3)  
 151-781A,B,D READING AND RESEARCH. (3)  
 151-790 A,B,D PH.D. TUTORIAL 1. (3)  
 151-791 A,B,D PH.D. TUTORIAL 2. (3)  
 151-792 A,B,D PH.D. TUTORIAL 3. (3)

## 6 Architecture

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

Director — David Covo  
 Chair, Graduate Program — Vikram Bhatt

### 6.1 Staff

#### Emeritus Professors

John Bland; B.Arch.(McG.), A.A. Dipl., D.Sc.(Carl.), R.C.A.,  
 F.R.A.I.C., O.A.Q.  
 Norbert Schoenauer; B.Arch.(Bud.), M.Arch.(McG.), R.C.A.,  
 F.R.A.I.C., O.A.Q., C.U.Q., M.C.I.P. (*William C. Macdonald  
 Emeritus Professor of Architecture*)  
 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 Perez-Gomez; Dipl.Eng.Arch.(Inst.Poly.Nac.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

Anmarie Adams; B.A.(McG.), M.Arch., Ph.D.(Calif.), M.R.A.I.C.  
 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.), M.R.A.I.C., O.A.Q.  
 Avi Friedman; B.Arch.(Technion), M.Arch.(McG.), Ph.D.(Montr.),  
 O.A.Q., I.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.)  
 Gentile Tondino; R.C.A.

#### Adjunct Professors

M. Asselin, C. Baird, J. Baker, J. Bourke, R. Cohen, A. Cormier,  
 N. David, H. Davies, G. Edwards, F. Ermond, J. Gersovitz,  
 D. Hanganu, A. Jain, P. Lambert, S. Levine, L. Mastropasqua,  
 H. Mayerovitch, D. Pearl, J. Rousseau, D. Rohan, N. Schoenauer,  
 J. Zorko

### 6.2 Programs Offered

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

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

Information concerning the duration of programs, documents required of applicants, etc. may be obtained from the Secretary of the School of Architecture.

### 6.3 Admission Requirements

#### M.Arch.

Students holding the McGill B.Arch degree or equivalent professional qualification with a cumulative grade point average of at least 3.0 are eligible to apply for admission. In special cases, candidates with a degree in a related field may be considered.

A minimum TOEFL score of 550 is required by Graduate Faculty.

**Ph.D.**

Candidates 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 (M.Arch.) 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**

Applications will be considered upon receipt of:

1. application form;
2. transcripts;
3. letters of reference;
4. \$60 application fee;
5. test results (GRE, TOEFL).

The application deadline is February 1.

**6.5 Program Requirements****Master of Architecture Program**

The residence requirement for the M.Arch. program is three academic semesters, and students are expected to complete their studies within the prescribed time. The M.Arch. degree is awarded upon fulfillment of the required program of study and the successful completion of a written thesis based on research which the student has undertaken throughout the course of studies. The thesis is considered the core activity of the program.

Students are required to complete 45 credits of course work, including a series of four thesis research courses which form the basis of the thesis. The thesis must be approved by the Director of the School and by the Faculty.

**Ph.D.**

Candidates 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 (M.Arch.) in the proposed area of research will be admitted to Ph.D.II. If the thesis proposal is approved by an Advisory Committee, the candidate may then proceed with research. Upon completion of course 301-701 (Progress Report I), a comprehensive research proposal is required. Candidates will submit two further reports in formal meetings with the Committee, who will review the work in progress, (courses 301-702 and 301-703). The last meeting takes place after a review of the full draft of the dissertation by the Advisory Committee. If approved, the dissertation will then be submitted to the Thesis Office. Acceptance of the thesis by the examiners is followed by an oral defense.

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

**Graduate Diploma in Housing**

The Graduate Diploma program is a post-professional program which consists of two academic semesters (about seven months). Students in the Diploma program are required to complete a minimum of 27 credits, to include required courses and electives approved by the Program Director.

**6.6 Courses**

**301-521B STRUCTURE OF CITIES.** 3(2-0-7) Nature, pattern and life of modern cities. Urban networks, special areas, problems and prospects. **Professor Anderson**

**301-525A SEMINAR ON ANALYSIS AND THEORY.** 3(2-0-7) Analysis and evaluation of significant architectural projects with reference to contemporary architectural theories. **Professor Zuk**

**301-527B CIVIC DESIGN.** 3(2-0-7) The elements of form in buildings and their siting design in the urban setting. **Professor Drummond**

**301-528A HISTORY OF HOUSING.** 3(2-0-7) Indigenous housing both transient and permanent, from the standpoint of individual

structure and pattern of settlements. Principal historic examples of habitat including housing in the age of industrial revolution, and contemporary housing. **Professor Schoenauer**

**301-529B HOUSING THEORY.** 3(2-0-7) (Prerequisite: 301-528A) A review of environmental alternatives in housing; contemporary housing and the physical and sociological determinants that shape it; Canadian housing. **Professor Schoenauer**

**301-531A ARCH. INTENTIONS FROM VITRUVIUS TO THE RENAISSANCE.** 3(2-0-7) (Prerequisite: 301-251B) Architectural intentions embodied in buildings and writings of architects from Antiquity to the Renaissance. Special emphasis is placed on the cultural connections of architecture to science and philosophy. **Professor Perez-Gomez**

**301-532B ORIGINS OF MODERN ARCHITECTURE.** 3(2-0-7) (Prerequisite: 301-251B) Examination of architectural intentions (theory and practice) in the European context (especially France, Italy and England), during the crucial period that marks the beginning of the modern era. **Professor Perez-Gomez**

**301-630A, 301-631B HOUSING SEMINAR I, II.** 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. **Professors Adams, Bhatt and Friedman**

**301-634B 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. **Professor Bhatt**

**301-635A,B SELECTED TOPICS IN HOUSING I.** 3(3-0-6) Special topics related to housing. **Professors Adams, Bhatt and Friedman**

**301-636A,B SELECTED TOPICS IN HOUSING II.** 3(3-0-6) Special topics related to housing. **Professors Adams, Bhatt and Friedman**

**301-644C SHELTER FIELD OPERATIONS.** 6(0-0-18) Fieldwork related to housing research. **Professors Adams, Bhatt and Friedman**

**301-645A, 301-646B HOUSING PROJECT I, II.** 6(2-10-6) Innovative housing designs; lectures and studio work leading to a design project. **Professors Bhatt and Friedman**

**301-650A ARCHITECTURAL HISTORY SEMINAR I.** 5(3-3-9) Western Architectural history from Antiquity to the Renaissance. **Professor Perez-Gomez**

**301-651B ARCHITECTURAL HISTORY SEMINAR II.** 5(3-3-9) Early Modern European theory of architecture, 17th to 19th centuries. **Professor Perez-Gomez**

**301-652A ARCHITECTURAL THEORY SEMINAR I.** 4(4-0-8) Phenomenology and hermeneutics. **Professor Perez-Gomez**

**301-653B ARCHITECTURAL THEORY SEMINAR II.** 4(4-0-8) The experience of modernity in cultural criticism, philosophy, literature and art. **Professor Perez-Gomez**

**301-690A,B,C THESIS RESEARCH I.** 3(0-2-7) Ongoing research pertaining to thesis. **Staff**

**301-691A,B,C THESIS RESEARCH II.** 6(0-2-16) Ongoing research pertaining to thesis. **Staff**

**301-692A,B,C THESIS RESEARCH III.** 6(0-2-16) Ongoing research pertaining to thesis. **Staff**

**301-693A,B,C THESIS RESEARCH IV.** 12(0-2-34) Ongoing research pertaining to thesis. **Staff**

**301-700 PRELIMINARY PH.D. EXAMINATION.**

**301-701 PROGRESS REPORT I.**

**301-702 PROGRESS REPORT II.**

**301-703 PROGRESS REPORT III.**