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1 The Faculty

1.1 Location

McGill University, Macdonald Campus
 21,111 Lakeshore Road
 Sainte-Anne de Bellevue, QC H9X 3V9
 Canada

Telephone: (514) 398-7928

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

The Faculty of Agricultural and Environmental Sciences, and the School of Dietetics and Human Nutrition are located on the Macdonald Campus of McGill at Sainte-Anne de Bellevue at the western end of Montreal Island. It is served by public transport (M.U.C.T.C. bus and train) and is easily reached from the McGill Downtown Campus and from Dorval International airport.

1.2 Administrative Officers

DEBORAH J.I. BUSZARD, B.Sc.(Bath), Ph.D.(Lond.) **Dean,
 Faculty of Agricultural and Environmental Sciences,
 and Associate Vice-Principal (Macdonald Campus)**

WILLIAM H. HENDERSHOT, B.Sc.(Tor.), M.Sc.(McG.),
 Ph.D.(U.B.C.) **Associate Dean (Academic)**

ERIC R. NORRIS, B.S.A.(Tor.), M.Sc.(Guelph),
 Ph.D.(Mich. St.) **Associate Dean (Student Affairs)**

MARCEL J. COUTURE, B.Sc.(Agr.)(McG.), M.Sc.(Guelph)
Associate Dean (Community Relations)

DIANE E. MATHER, B.Sc.(Agr.)(McG.), M.Sc.,
 Ph.D.(Guelph) **Associate Dean (Research)**

GARY O'CONNELL, B.Comm.(C'dia) **Director of
 Administrative Services**

WILLIAM R. ELLYETT, B.A.(Sir G. Wms.),
 B.Ed.(Phys.Ed.)(McG.) **Director of Athletics**

TBA **Director of Macdonald Farm**

GINETTE LEGAULT **Manager, Campus Housing**

SUZANNE HIGGINS, B.A.(McG.) **Manager,
 Student Affairs Office**

PETER D.L. KNOX, B.Sc.(Agr.)(McG.) **Supervisor,
 Property Maintenance**

1.3 Programs and Academic Units

The Faculty of Agricultural and Environmental Sciences and the School of Dietetics and Human Nutrition offer B.Sc., M.Sc. and Ph.D. programs in the areas of study of: Agricultural Sciences, Environmental Sciences, Biological Sciences, Food Science, Engineering and Nutritional Sciences. The Faculty of Agricultural and Environmental Sciences is also one of the three faculties in partnership with the McGill School of Environment.

The Faculty is comprised of eight academic units: the School of Dietetics and Human Nutrition; the departments of Agricultural and Biosystems Engineering, Agricultural Economics, Animal Science, Food Science and Agricultural Chemistry, Natural Resource Sciences, and Plant Science; and the Institute of Parasitology.

The School offers programs in dietetics and nutrition, the former leading to membership in various professional associations. Professional Practice experiences to complete the dietetics practicum are provided in the McGill teaching hospitals and in a wide variety of health, education, business, government and community agencies.

The Institute offers graduate programs leading to M.Sc. and Ph.D. degrees as well as a Graduate Certificate in Biotechnology. Major areas of research include the molecular biology, immunology, and population biology of parasites and their hosts and the biochemical pharmacology of antiparasite drugs. The underlying orientation of all research is to apply relevant modern biological techniques to reduce parasite

transmission and to improve methods of diagnosis and control. The research background and activities of the staff encompass many disciplines applied to the study of host-parasite interactions, ranging from research involving viruses and cancer cells to studies on protozoa and helminth parasites of humans, livestock, and other animals. The Institute has been designated by the Quebec Government as a Centre d'excellence for research on parasites.

1.3.1 Co-op Experience

Most undergraduate programs offered in the Faculty include the opportunity for a Co-op work experience.

Students are able to profit from a Co-op experience of approximately 12 weeks duration where they will be exposed to the main areas of operation of their employer. Each student registered in a Co-op work experience will benefit from a program developed by both the employer and the instructor exclusively for that individual student.

Students who register for a Co-op experience benefit from practical learning arising from work-term employment in a meaningful job situation. Students also benefit from the non-tangible learning experience arising from the increased responsibilities required to obtain and successfully complete the work term.

1.4 Macdonald Campus Facilities

The Macdonald Campus, established in 1907, consists of approximately 800 hectares on the shore of beautiful Lac Saint-Louis. It includes the Morgan Arboretum which has over 245 hectares of managed and natural woodlands and tree plantations used for environmental research and teaching in a wide range of courses. Groups of all the Canadian native trees and many useful and important exotics are also present. The Arboretum features three self-guided interpretation trails, a bird sanctuary, 20 kilometres of wooded trails, a variety of forest ecosystems, soil and water conservation projects, forest operations such as reforestation, plantation management, timber harvesting and maple syrup production, and related forestry-wildlife ecological activities. A volunteer-run nature interpretation program is offered.

Laboratory and lecture rooms are well supplied with modern and efficient teaching facilities, while the reference section of the Library and the research laboratories associated with the various science departments are well equipped to permit the vigorous investigation of problems at the post-graduate level.

Macdonald Campus Library

The Library is located in the Barton Building. The collection includes materials in the agricultural, biological, environmental, food and nutritional sciences. The Library is a depository for many print and electronic government publications. The print collection numbers approximately 97,000 volumes of books and journals, 17,000 volumes of government publications, and 700 current print journal subscriptions. The online catalogue includes the holdings of all McGill Libraries. Remote access to the catalogue, circulation, reference, electronic resources, and interlibrary loan service is available. An extensive collection of electronic information is available from the McGill Libraries homepage (<http://www.library.mcgill.ca>) which provides access to an excellent range of electronic indexing and abstracting services, and full-text journals and documents via local area networks and licensed websites. Reference service is available to assist users in obtaining necessary print or electronic resources, and a comprehensive library instruction service is provided throughout the year.

Lyman Entomological Museum and Research Laboratory

Originally established in 1914 and formerly housed in the Redpath Museum, the Lyman Entomological Museum was moved to the Macdonald Campus in 1961. It houses the largest university collection of insects in Canada, second only in size to the National Collection. The Museum also has an active graduate research program in association with the Department of Natural Resource Sciences. Study facilities are available, on request from the Curator, to all bona fide students of entomology. Visits by other interested parties can also be arranged by calling (514) 398-7914.

Brace Centre for Water Resources Management

The Brace Centre for Water Resources Management is located on the Macdonald Campus. It is a multidisciplinary and advanced research and training centre of McGill University, dedicated to solving problems of water management related to food production, the environment, and rural development. It brings together staff from several McGill faculties to undertake research, teaching, specialized training, and policy and strategic studies, both in Canada and internationally. The Centre draws on the wide range of facilities available within the University.

2 Summary of Academic Programs

2.1 Outline of Academic Programs

Programs leading to five degrees are offered on the Macdonald Campus, with Majors associated with each degree. A Certificate in Ecological Agriculture is also offered. Detailed information about each Major and the Minors can be found in the section on the administering department that is indicated (in brackets) beside each program.

2.1.1 Major Programs

Bachelor of Science in Agriculture - B.Sc.(Agr.)

This is a three-year (90 credit) program following the Diploma of Collegial Studies and leading to professional qualification in Agricultural Science or in one of its related specialized branches in Biological Science, Environmental Science or Renewable Resources. (Graduates of programs marked with an asterisk * are eligible for membership in l'Ordre des agronomes du Québec.)

Agricultural Economics* (Agricultural Economics, [page 442](#))

Agribusiness Option

Agricultural Systems Option

Natural Resource Economics Option

Agricultural Sciences* (Interdisciplinary Studies, [page 448](#))

Animal Biology (Animal Science, [page 444](#))

Animal Science* (Animal Science, [page 444](#))

Applied Zoology (Natural Resource Sciences, [page 449](#))

Botanical Science (Plant Science, [page 452](#))

Ecology Option

Molecular Option

Environmental Biology (Natural Resource Sciences, [page 449](#))

Microbiology (Natural Resource Sciences, [page 450](#))

Plant Science* (Plant Science, [page 453](#))

Resource Conservation (Natural Resource Sciences, [page 450](#))

Soil Science* (Natural Resource Sciences, [page 451](#))

Soils and Crops Option

Soil Conservation Option

Wildlife Biology (Natural Resource Sciences, [page 451](#))

Bachelor of Science in Agricultural Engineering - B.Sc.(Agr.Eng.)

This is normally a three and one-half year (109 credit) program following the Diploma of Collegial Studies in Pure and Applied Sciences and leading to professional qualification in both Agricultural Engineering and Agrology. (Program credit increase from 106 credits awaiting University approval.)

Agricultural Engineering (Agricultural and Biosystems Engineering, [page 440](#))

Bachelor of Science in Food Science - B.Sc.(F.Sc.)

This is a three-year (90 credit) program following the Diploma of Collegial Studies leading to professional qualification in Food Science.

Food Science (Food Science and Agricultural Chemistry, [page 447](#))

Bachelor of Science in Nutritional Sciences - B.Sc.(Nutr.Sc.)

Two programs are offered by the School of Dietetics and Human Nutrition, a three-year (90 credit) program for Nutrition and a three and one-half year (115 credit) program for Dietetics, following the Diploma of Collegial Studies.

- Dietetics (School of Dietetics and Human Nutrition, [page 445](#))
- Nutrition (School of Dietetics and Human Nutrition, [page 446](#))
 - Nutritional Biochemistry Option
 - Nutrition and Populations Option
 - Nutrition of Food Option

Bachelor of Science - B.Sc.

This is a three-year (90 credit) program following the Diploma of Collegial Studies.

- Environment (McGill School of Environment, [page 476](#))

2.1.2 Minor Programs

- Agricultural Economics (Agricultural Economics, [page 443](#))
- Agricultural Engineering (Agricultural and Biosystems Engineering, [page 441](#))
- Agricultural Production (Plant Science, [page 453](#))
- Ecological Agriculture (Interdisciplinary Studies, [page 447](#))
- Entrepreneurship (Agricultural Economics, [page 443](#))
- Environment (McGill School of Environment, [page 472](#))
- Environmental Engineering (Agricultural and Biosystems Engineering, [page 441](#))
- Human Nutrition (School of Dietetics and Human Nutrition, [page 446](#))

2.1.3 Certificate Program

- Ecological Agriculture (Ecological Agriculture Program, [page 447](#))

2.1.4 Diploma Programs

- Farm Management and Technology Program, [page 467](#)
- Environment (McGill School of Environment, [page 484](#))

2.2 Environmental Sciences Programs

McGill School of Environment (MSE)

The McGill School of Environment (MSE), a joint initiative of the Faculty of Agricultural and Environmental Sciences, the Faculty of Arts, and the Faculty of Science, offers a B.Sc. Major in Environment, a B.A. Faculty Program in Environment, a Minor in Environment and a Diploma in Environment. Many of the MSE programs allow students to choose to study exclusively on the Macdonald or downtown campuses, or to take advantage of both. For further information on these programs, please refer to the McGill School of Environment, [page 435](#).

Other Environmental Programs at Macdonald Campus

A number of other integrated environmental science programs are also offered on the Macdonald Campus. The objective of these interdepartmental programs is to provide the student with a well-rounded training in a specific interdisciplinary subject as well as the basis for managing the natural resource. The programs include:

- Agricultural Economics Major, Natural Resource Economics Option, [page 443](#)
- Applied Zoology Major, [page 449](#)
- Botanical Science Major, [page 452](#)
- Environmental Biology Major, [page 449](#)
- Microbiology Major, [page 450](#)
- Resource Conservation Major, [page 450](#)
- Wildlife Biology Major, [page 451](#)

3 Application and Admission Requirements

The programs in the Faculty of Agricultural and Environmental Sciences, and the School of Dietetics and Human Nutrition, are normally of three years' duration following the completion of a two-year Quebec post-secondary Collegial program (CEGEP). Exceptions are the Agricultural Engineering program and the Dietetics program, both of which are normally three and one-half years.

Holders of the Diplôme d'études collégiales (DEC)/Diploma of Collegial Studies (DCS) are considered for admission to the first year of a program requiring the completion of a minimum of 90 credits – 109 credits for Agricultural Engineering (increase from 106 credits awaiting University approval) and 115 credits for Dietetics. Students who complete the “DEC en sciences, lettres et arts” may be considered for any university program. Students who have completed a technical or professional DEC will be considered on an individual basis.

Based upon entry with the appropriate DEC, the B.Sc.(Agr.) and the B.Sc.(F.Sc.) are both three-year programs. The B.Sc.(Agr.Eng.) is normally a three and one-half year program. Two B.Sc.(Nutr.Sc.) programs are offered, a three-year program for Nutrition, and a three and one-half year program for Dietetics.

Students from outside Quebec who are admitted on the basis of a high school diploma enter a program which is extended by one year to include the 30 credits which comprise the Freshman Year (see [section 5.1](#)). Advanced standing of up to 30 credits may be granted to students who obtain satisfactory results in International Baccalaureate, French Baccalaureate, or Advanced Placement Tests.

For information, or to obtain an application package, contact:

Student Affairs Office
 Macdonald Campus of McGill University
 21,111 Lakeshore Road
 Sainte-Anne de Bellevue, Quebec, H9X 3V9
 Telephone: (514) 398-7928
 Email: studentinfo@macdonald.mcgill.ca
 Website: <http://www.macdonald.mcgill.ca>

Please note that the same application form is used to request admission to the Faculties of Arts, Education, Engineering, Management, and Science. A second choice of program may be entered on the form.

Applications may also be submitted on-line via the Web at <http://www.aro.mcgill.ca>.

More specific information on application deadlines and admission requirements can be found in the Application Procedures and Admission Requirements section beginning on [page 11](#).

4 Student Information

4.1 Student Services

Students who study on Macdonald Campus may make full use of all Student Services available at McGill as listed in the General University Information chapter, [section 9.1](#). The Office of the Dean of Students, in cooperation with the Faculty of Agricultural and Environmental Sciences, offers students direct access to the services listed in [section 9.3](#).

Further information can be found via the Faculty Website <http://www.mcgill.ca/macdonald/campus/services/students/> and the Student Services Website <http://www.mcgill.ca/stuser>.

4.2 Macdonald Campus Residences

For more than 90 years, residence life has been an integral part of Macdonald Campus activities. Students may apply for residence in either of two distinctive facilities:

Laird Hall, with a capacity of more than 210 students, is arranged on a co-educational basis and provides accommodation for both undergraduate and graduate students.

The new EcoResidence, Canada's first ecologically-friendly student residence and recent winner of the prix d'excellence from l'Ordre des architectes du Québec, accommodates 100 students.

For further information, please refer to "[University Residences – Macdonald Campus](#)" on [pag e39](#) or the Faculty website, <http://www.macdonald.mcgill.ca>.

4.3 Extracurricular Activities

All undergraduate, postgraduate, and Farm Management and Technology students are members of the Macdonald Campus Students' Society. The MCSS, through the 19-member Students' Council, is involved in numerous campus activities such as social events, academic affairs, and the coordination of clubs and organizations. Student life is informal and friendly and student groups range from the Outdoor Adventure Club to the Photography Society. Major social events include Orientation, the Halloween Party, Winter Carnival and International Night. The Ceilidh, a student-run bar located in the Centennial Centre, is open every Thursday night.

The Centennial Centre is the students' building and the centre of student life, offering facilities for student activities, such as meeting rooms, a Yearbook room, a pool tables, great places to relax, listen to music and meet friends. Also located in the Centre are the Students' Council offices, an information desk, and the campus store, the Robber's Roost.

4.4 Student Conduct and Discipline

The Associate Vice-Principal (Macdonald Campus) and Dean of the Faculty of Agricultural and Environmental Sciences has jurisdiction over all offenses committed by students registered at Macdonald and over all offenses committed by students on or about the Macdonald Campus. Directors of residences have jurisdiction over all offenses committed in or about their respective residences.

Students found guilty of improper conduct, violation of rules or willful damage to persons or property, shall be liable to discipline as set forth in the Code of Student Conduct and Disciplinary Procedures as printed in the *Handbook of Student Rights and Responsibilities*. A copy of the Handbook can be found on the Web (<http://www.mcgill.ca/Secretariat/Students/>) or obtained from the Student Affairs Office or the Macdonald Campus Student Services Office. The Code specifies that discipline may include: imposition of fines or assessments for damage caused by individuals or groups; posting of security for good behaviour; reprimand; imposition of conduct probation; suspension or expulsion from classes or residence; expulsion from the University.

Any student who is unwilling to submit to the demands of university life, or whose work is definitely unsatisfactory, may be placed on probation, or may be required to withdraw from the University.

All students are obliged to inform themselves of the current rules and regulations. A few of these are listed below, but the main body of them will be found in other available documents.

Possession or consumption of alcohol by students is forbidden on the Campus, except in authorized places and with special permission.

Initiation or hazing in any form is forbidden.

Unauthorized entrance to buildings is forbidden. Violation of this rule is sufficient reason for expulsion.

Gambling is not permitted on Campus.

Tampering with fire fighting equipment is forbidden.

Students are not permitted to bring firearms into a Residence nor is the use of firearms allowed on University property.

4.5 Fees

The University reserves the right to make changes without notice in its published scale of tuition, residence and other fees.

All cheques, money orders, etc., should be drawn to the order of McGill University, and made payable in Canadian funds. Payment of student fees can also be made through any Chartered Bank in Canada.

The University shall have no obligation to issue any transcript of record, award any diploma or re-register a student in case of non-payment of tuition fees, library fines, residence fees, or loans on their due date.

Tuition Fees

General information on Tuition and other fees will be found under Fees, [page 23](#).

Other Expenses

In addition to tuition fees and the cost of accommodation and meals, students should be prepared to spend a minimum of \$1000 (dependent on program) on prescribed textbooks and classroom supplies. These may be purchased at the campus book store in Centennial Centre.

Uniforms are required for food laboratories. Students in the B.Sc.(Nutr.Sc.) program will be advised of the uniform requirements on acceptance or promotion.

4.6 Immunization for Dietetics Majors

Students in the Dietetics Major are encouraged to complete the Compulsory Immunization Program for Health Care students prior to registration. Participation in Professional Practices (Stages) in Dietetics will only be permitted for those students who have completed all immunization requirements.

4.7 Language Requirement for Professions

Quebec law requires that candidates seeking admission to provincially-recognized Quebec professional corporations or orders possess a working knowledge of the French language, i.e. be able to communicate verbally and in writing in that language. Agrologists, Chemists, Dietitians, and Engineers are among those within this group.

For additional information see the General University Information section, [page 36](#).

5 Faculty Information and Regulations

Each student in the Faculty of Agricultural and Environmental Sciences must be aware of the Faculty Regulations as stated in this Calendar. While departmental and faculty advisers and staff are always available to give advice and guidance, the ultimate responsibility for completeness and correctness of course selection and registration, for compliance with, and completion of program and degree requirements, and for the observance of regulations and deadlines *rests with the student*. It is the student's responsibility to seek guidance if in any doubt; misunderstanding or misapprehension will not be accepted as cause for dispensation from any regulation, deadline, program or degree requirement.

5.1 Freshman Entry Program

Given below is the Freshman Year program outline for recent high school graduates from Canada (except Quebec) and the United States. Individual course descriptions can be found at the end of this section of the Calendar.

		CREDITS	
Fall			
344-120A	General Biology	3	
333-230A	Organic Chemistry	4	
360-101A	Calculus I	3	
338-112A	Introductory Physics I	4	14
Winter			
333-110B	Inorganic Chemistry	4	
360-102B	Calculus II	3	
338-114B	Introductory Physics II	4	
	Electives*	5	16
Total Credits			30

* 344-202B Cellular Biology must be substituted for students in programs in the B.Sc.(Nutr.Sc.) degree and 336-103A,B Linear Algebra must be substituted for students in the B.Sc.(Agr.Eng) degree.

5.2 Academic Advisers

Before registration, all students entering the Faculty must select a Major program of study. They must consult with the Academic Adviser of their chosen program for the selection and timetabling of required, complementary, and elective courses. The Academic Adviser will continue to act in this capacity during the whole of the student's studies in the Faculty.

5.3 Minimum Credit Requirement

Each student's minimum credit requirement for the degree is determined at the time of acceptance and is specified in the letter of admission or its attached documentation.

Normally, Quebec students who have completed the Diplôme d'études collégiales (DEC) or equivalent diploma are admitted to the first year of a program requiring the completion of a minimum of 90 credits – 109 credits for Agricultural Engineering (increase from 106 credits awaiting University approval) and 115 credits for Dietetics.

Students from outside Quebec who are admitted on the basis of a high school diploma enter a program that is extended by one year to include the 30 credits which comprise the Freshman Year (see [section 5.1](#)). Advanced standing of up to 30 credits may be granted to students who obtain satisfactory results in International Baccalaureate, French Baccalaureate, or Advanced Placement Tests under certain conditions; refer to [section 3](#).

5.4 Categories of Students

Full-Time Students

Full-time students in satisfactory standing take a minimum of 12 credits per semester.

Full-time students in probationary standing are not normally permitted to take more than 12 credits per semester. In exceptional circumstances the Committee on Academic Standing may give permission to attempt more.

Part-time students

Part-time students carry fewer than 12 credits per semester. New students apply through the Student Affairs Office of the Faculty and the applicant must have the qualifications to enter a full-time program. Full-time students who wish to become part-time must consult the Office of the Associate Dean (Student Affairs). Certain programs must be completed within a specified number of years; such information is available from the Associate Dean.

5.5 Academic Standing

All students are required to give satisfactory evidence of mastery of the material of lectures and laboratories. Examinations are normally held at the end of each course but other methods of evaluation may also be used. The grade assigned for a course represents the standing of the student in all the work of the course.

5.6 Examinations

Students should refer to the General University Information [section 5](#) for information about final examinations and deferred examinations.

Every student has a right to write essays, examinations and theses in English or in French except in courses where knowledge of a language is one of the objects of the course.

Oral presentations made as part of course requirements shall be in English.

5.6.1 Reassessments and Rereads

In accordance with the Charter of Student Rights, and subject to the conditions stated therein, students have the right to consult any written submission for which they have received a mark as well as the right to discuss this submission with the examiner.

If, after discussion with the instructor, students request a formal final examination re-read, they must apply in writing to the Student Affairs Office. The following conditions apply:

- grades may be either raised or lowered as the result of a reread;
- rereads in courses outside the Faculty of Agricultural and Environmental Sciences are subject to the deadlines, rules and regulations of the relevant faculty.

Application for rereads must be made by March 31 for fall-term courses and by September 30 for winter-term and summer-term courses. Students are assessed a fee for formal rereads. Any request to have term work re-evaluated must be made directly to the instructor concerned. Students should consult the Student Affairs Office for further information.

5.7 Credit System

The credit assigned to a particular course reflects the amount of effort it demands of the student. As a guideline, one credit would represent approximately 45 hours total work per course. This is, in general, a combination of lecture hours and other contact hours such as laboratory periods, tutorials and problem periods as well as personal study hours.

Please refer to General University Information [section 4.6](#).

5.8 Academic Credit Transfer

Transfer of credits (maximum of 30) based on courses taken at other institutions before entrance to this Faculty is made by the Admissions Committee prior to entrance.

Transfer of credits may be made for work at other educational institutions during a student's attendance at McGill University. Permission to apply such credits to a McGill program must be secured by the student from the Academic Adviser of their program before the work is undertaken. Forms are available in the Student Affairs Office of the Faculty. Grades obtained in such courses do not enter into calculations of grade point averages (GPA) in this Faculty.

Exemption from a required or complementary course on the basis of work completed at another institution must be approved by both the Academic Adviser and the instructor of the appropriate McGill course.

Full-time students may, with the written permission of the Associate Dean (Student Affairs) of the Faculty, register for 3 credits, or exceptionally 6 credits, in each semester at any university in the province of Quebec. These courses successfully completed with a minimum grade of C (according to the standards of the university giving the course), will be recognized for the purpose of the degree but the grades obtained will not enter into calculations of GPA in this Faculty. Further details on the Quebec Inter-University Transfer Agreement are found in the General University Information [section 6.6](#).

5.9 Standing

The program for the degree will normally be completed in three academic years or six semesters; three and one half years for Agricultural and Biosystems Engineering, and Dietetics. For the purpose of student classification, the years will be termed U1, U2 and U3.

U1 to be used during the first 12 months following each admission to a degree program in which the student is required to complete 72 or more credits at the time of admission.

U2 to be used for all students who are not U1 or U3.

U3 to be used during the session in which it is expected the student will qualify to graduate.

Students' academic standing is based on the CGPA that is calculated on the courses taken while registered as a full-time or part-time undergraduate in a degree program. If the CGPA drops below 2.00, the student is in academic difficulty.

5.10 Students in Academic Difficulty

1. When a student's CGPA (or SGPA in the first semester of the program) drops below 2.00, withdrawal is advised. Students who choose to re-register are on probation until the CGPA is raised to 2.00.
2. Students on probation are normally permitted (see "[Categories of Students](#)" on page 439) to register for not more than 12 credits per semester. They are not permitted to be on probation for more than one semester unless they obtain a SGPA of 2.50 or higher.
3. Students who do not raise their CGPA to 2.00 (or obtain a SGPA of 2.50) while on probation are not permitted to register. They are required to withdraw from the Faculty for at least one semester. Application for readmission after this period must be made in writing to the Committee on Academic Standing, observing the published application deadlines.

5.11 Course Change Information

1. Courses: please refer to the General Information and Regulations [section 3.7 "Change of Course \(Drop/Add\)"](#) and the Calendar of Dates.
2. Course withdrawal (Transcript notation of "W"): please refer to the General Information and Regulations [section 3.8 "Regulations Concerning Withdrawal"](#) and the Calendar of Dates.
3. Other changes: Information about changes may be obtained from the Student Affairs Office of the Faculty. Application for changes must be made to the Committee on Academic Standing.

5.12 Graduate Courses Available to Undergraduates

Undergraduates wishing to take such courses must have a cumulative grade point average (CGPA) of at least 3.20.

5.13 Attendance and Conduct in Class

Matters of discipline connected with, or arising from, the general arrangement for teaching are under the jurisdiction of the Dean of the Faculty or Director of the School concerned.

Students may be admonished by a professor or instructor for dishonest or improper conduct or may be reported to the Dean or Director concerned for disciplinary action.

Punctual attendance at all classes, laboratory periods, tests, etc., is expected of all students. Absences are excused only on grounds of necessity or illness, of which proof may be required. Special attention is called to the fact that the completion of all laboratory work is obligatory and the opportunity to make up work missed will be provided only in the case of properly excused absences.

The Faculty has the power to refuse examination to those students who persist in absenting themselves from classes without permission.

Students are requested not to make application for additional leave either before or after holiday periods, as such leaves are granted only in case of illness or other exceptional circumstances.

5.14 Degree Requirements

To be eligible for a B.Sc.(Agr.), B.Sc.(Agr.Eng.), B.Sc.(F.Sc.), or B.Sc.(Nutr.Sc.) degree, students must have passed all required and complementary courses of the program. They must have a CGPA of at least 2.00.

They must have completed the minimum credit requirement for the degree as specified in their letter of admission or its attached documentation, see [section 5.3](#). At least 60 of these credits must have been taken at McGill.

In addition, students in the Dietetics program must have completed the stages of professional formation.

Students majoring in Agricultural Engineering are also required to have at least 650 hours experience in some phase of agricultural engineering work approved by the Agricultural and Biosystems Engineering Department.

6 Academic Programs

6.1 Department of Agricultural and Biosystems Engineering

Macdonald Stewart Building – Room MS1-027
Telephone: (514) 398-7773
Fax: (514) 398-8387
Email: Raghavan@macdonald.mcgill.ca
Website: <http://agrenv.mcgill.ca/agreng>

Chair — G.S. Vijaya Raghavan

Emeritus Professor — Robert S. Broughton

Professors — Suzelle Barrington, Robert Kok,
Chandra Madramootoo (*James McGill Professor*),
Edward McKyes, Shiv O. Prasher, G.S. Vijaya Raghavan

Associate Professors — Robert B. Bonnell (*Brace Centre for Water Resources Management*), Eric R. Norris, John D.J. Sheppard

Assistant Professors — Jacques-André Landry, Michael O. Ngadi
Assistant Professor (Special Category) — Sofia Babarutsi (PT)

Adjunct Professors — Darakhshan Ahmad, Geoffrey I. Sunahara,
Clement Vigneault

AGRICULTURAL ENGINEERING MAJOR

The Department of Agricultural and Biosystems Engineering collaborates with other departments and the Faculty of Engineering, in providing courses of instruction for a curriculum in Agricultural and Biosystems Engineering. Graduates qualify for registration as professional engineers in any province of Canada. The curriculum integrates engineering fundamentals and branch specialties with the agricultural, biological and environmental sciences. The program is oriented to the design, construction and management of the agro-ecosystem; various facets of any, or several of these areas may be emphasized by the student via the appropriate choice of elective course sets. Academic advisers can aid the student to structure her or his studies along any of the following main streams: Agro-Environmental; Irrigation and Drainage; Agricultural Machinery and Buildings; Food and Bio-Processing; and Information and Computing Technologies. For all streams, a typical engineering approach is followed; the relationship is stressed between decision-making/option-evaluation during the design stage and the resultant performance of the unit once implemented. This approach is applicable to practically any case, be it a simple cultivation tool, a harvesting machine, a post-harvest conditioning process or an entire ecosystem.

In order to learn some of the fundamentals of engineering design, and appreciate and understand other branches of engineering, students are required to spend the second semester of the penultimate year taking courses in the Faculty of Engineering. Furthermore, students in Agricultural Engineering may wish to increase their competence in specialized fields by pursuing one of the Minors offered by the Faculty of Engineering. **Minors** which would be of particular interest include: **Biotechnology, Computer Science, Construction Engineering and Management, and Environmental Engineering.** Details of these Minors can be found in the Faculty of Engineering **section 5.** In order to complete a Minor, students will need to spend at least one extra semester beyond the requirements of the B.Sc.(Agr.Eng.) program.

All required courses must be passed with a minimum grade of C.

Required Courses: 85 credits.

Complementary Courses: 24 credits.

NOTE: this program is under revision. Please contact the Academic Adviser for the most up-to-date information. (Program revisions, including increase of credit requirement from 106 to 109 credits, awaiting University approval)

	CREDITS
Required Courses:	85
306-221A,B Engineering Professional Practice	1
336-210A Mechanics I	4
336-211B Mechanics II	4
336-214A Surveying	3
336-216B Materials Science	3
336-217B Hydrology and Drainage	3
336-252A Structured Computer Programming	3
336-305A Fluid Mechanics	4
336-312B Circuit Analysis	3
336-314B Agricultural Structures	3
336-315A Design of Machines	4
336-319A Applied Mathematics	3
336-325A Food Engineering	3
336-341B Strength of Materials	4
336-412A Agricultural Machinery	3
336-418B Soil Mechanics and Foundations	3
336-490A,B Design 1	2
336-491D,N Seminar 1	1
336-492D,N Seminar 2	1
336-495A,B Design 2	3
305-346B Heat Transfer	3
305-362B Mechanical Laboratory I	2
306-310A,B Engineering Economy	3
342-250A Principles of Animal Science	3
367-211A Principles of Plant Science	3
372-210A Principles of Soil Science	3
360-202A Calculus	3
360-205B Differential Equations	4
360-310A,B Statistical Methods I	3
Complementary Courses:	24
One 3-credit course on the impact of technology on society from the following list:	3
302-230B (3) Environmental Aspects of Technology	
306-308A (3) Social and Economic Impacts of Technology	
170-203A,B (3) Knowledge, Ethics and Environment	
183-302B (3) Environmental Analysis and Management: Problems and Policy	
186-243 (3) Environmental Geology A,B,L	

Two 3-credit courses in the humanities and social sciences/administrative studies and law/language courses. (Any language course which is deemed by the academic advisor to have a sufficient cultural component or, in the case of the student who is not proficient in a specific language, program credit will be given for the second of two successfully completed, academically approved 3-credit language courses.)

15 additional credits selected in consultation with Academic Adviser

6 credits, two of the following courses:

336-212A (3) Graphics
or 305-291B (3) Graphics

336-301A (3) Biothermodynamics
or 305-240B (3) Thermodynamics I

Advanced Agricultural and Biosystems Engineering – 9 or more credits (with the permission of the instructor, graduate level courses may be taken) from :

- 330-435A (3) Soil and Water Quality Management
- 336-322A (3) Food Prod/Processing Waste Mgmt
- 336-323A (3) Physical Properties of Biological Materials
- 336-330B (3) GIS for Biosystems Management
- 336-411A (3) Off-Road Power Machinery
- 336-416A (3) Engineering for Land Development
- 336-419A (3) Structural Design
- 336-500B (3) Adv Applications of Micro in Agriculture
- 336-504B (3) Instrumentation and Control
- 336-506C (3) Advances in Drainage and Water Management
- 336-509A,B (3) Hydrologic Systems and Modelling
- 336-512B (3) Soil Cutting and Tillage
- 336-514B (3) Drain Pipe and Envelope Materials
- 336-515B (3) Computer Models in Drainage Engineering
- 336-516A (3) Preparation and Appraisal of Drainage Projects
- 336-517A (3) Drainage Project Contracts, Installation and Management
- 336-518A (3) Pollution Control for Agriculture
- 336-525B (3) Ventilation of Agr. Structures
- 336-530B (3) Advanced Food & Fermentation Engineering
- 336-605B (3) Functional Analysis of Agricultural Machines
- 336-607B (3) Engineering Aspects of Plant Environment
- 336-612A (3) Simulation and Modelling
- 336-616A,B (3) Advanced Soil & Water Engineering

ENVIRONMENTAL ENGINEERING MINOR

The Minor program consists of 27 credits in courses environment related. By a judicious choice of complementary and elective courses, Agricultural and Biosystems Engineering students may obtain this Minor with a minimum of 12 additional credits. The Environmental Engineering Minor Program is administered by the Department of Civil Engineering and Applied Mechanics, see **page 274** in the Faculty of Engineering section.

Courses available in the Faculty of Agricultural and Environmental Sciences: (partial listing)

- 362-331B Microbial Ecology
- 375-333A Physical and Biological Aspects of Pollution
- 336-322A Food Prod/Processing Waste Mgmt
- 336-416A Engineering for Land Development
- 336-518A Pollution Control in Agriculture

MINOR IN AGRICULTURAL ENGINEERING

Academic Adviser: Professor R.B. Bonnell

Engineering systems are now being emphasized in animal and crop production, management and utilization of waste products, production of value-added materials and by-products, protection of natural resources, conservation and management of ecosystems, soil and water decontamination, and the development of new food, fibre and pharmaceutical products. Computer-based systems play

a major role in the management of information, and process control in many of the above technologies. A non-professional Minor in Agricultural Engineering, consisting of 24 credits of Agricultural and Biosystems Engineering courses is available for students registered in the B.Sc.(Agr.) and B.Sc.(F.Sc.) programs. A total of 18 credits of required Agricultural and Biosystems Engineering courses will demonstrate basic engineering applications. Selection of 6 complementary credits from a wide range of Agricultural and Biosystems Engineering courses will allow more focused study in one of the 6 streams of Agricultural Engineering, viz. Agro-Environmental; Irrigation and Drainage; Agricultural Machinery and Buildings; Food and Bio-Processing; and Information and Computing Technologies.

Students are advised to consult their Major Program adviser and the Academic Adviser of the Minor in their first year. At the time of registration for their penultimate year, students must declare their intent to obtain a Minor in Agricultural Engineering. With the agreement of their Major Program adviser they must submit their program of courses already taken, and to be taken in their final year, to the Academic Adviser of the Agricultural Engineering Minor. The Academic Adviser of the Agricultural Engineering Minor will then certify which courses the student will apply toward the Minor and that the student's program conforms with the requirements of the Minor.

General Regulations

To obtain a Minor in Agricultural Engineering, students must:

- a) ensure that their academic record at the University includes a C grade or higher in the courses as specified in the course requirements given below.
- b) offer a minimum total of 24 credits from the courses as given below, of which not more than 6 credits may be counted for both the Major and the Minor programs. This restriction does not apply to elective courses in the Major program.

Required Courses: 18 credits.

Complementary Courses: 6 credits.

	CREDITS
Required Courses:	18
336-252A Structured Computer Programming	3
336-314B Agricultural Structures	3
336-324A Elements of Food Engineering	3
336-412A Agricultural Machinery	3
Complementary Courses:	6
6 credits chosen from the following list in consultation with the Academic Adviser for the Minor:	
336-411A (3) Off-Road Power Machinery	
336-413A (3) Materials Handling Systems	
336-416A (3) Engineering for Land Development	
336-418B (3) Soil Mechanics and Foundations	
336-500B (3) Adv Applications of Micro in Agriculture	
336-512B (3) Soil Cutting and Tillage	
336-514B (3) Drain Pipe and Envelope Materials	
336-515A (3) Computer Models in Drainage Engineering	
336-516A (3) Preparation and Appraisal of Drainage Projects	
336-517A (3) Drainage Project Contracts, Installation and Management	
336-518A (3) Pollution Control for Agriculture	
336-525B (3) Ventilation of Agricultural Structures	
336-530B (3) Advanced Food and Fermentation Engineering	

Notes:

- 1) Most courses listed at the 300 level and higher have prerequisites. Although instructors may waive prerequisite(s) in some cases, students are urged to prepare their program of study well before their final year.
- 2) Not all courses are available in any given year. Consult departmental listings for full course descriptions and offerings.

6.2 Department of Agricultural Economics

Raymond Building – Room R3-019
 Telephone: (514) 398-7820
 Website: <http://www.agrenv.mcgill.ca/agrecon/>

Chair — John C. Henning
Associate Professors — Laurence Baker, Kisan R. Gunjal, John C. Henning, Paul Thomassin
Assistant Professor — William Mark Brown (*joint appt. with Geography*)
Lecturer — Robert Oxley
Adjunct Professors — Joan Marshall, Peter Goldsmith

AGRICULTURAL ECONOMICS MAJOR

Increasingly complex economic problems facing the agriculture and food system and our natural environment have intensified the need for specialized knowledge and training in the field of agricultural economics. The curriculum is designed to provide students with the knowledge, analytical and decision-making skills required in a career in agribusiness, resource management, international development, and research. The selection of courses from the agribusiness, agricultural system or natural resource economics options permits a degree of specialization along those lines, in conjunction with the core courses listed below. Graduates are eligible to apply for membership in l'Ordre des agronomes du Québec (OAQ) if they fulfil the agronomic course requirements (consult the academic advisor).

Core Required Courses: 15 credits.
Core Complementary Courses: 22 credits.

	CREDITS
Required Courses:	15
334-200A Principles of Microeconomics	3
334-201B Principles of Macroeconomics	3
334-230B Economics of Marketing	3
334-320B Economics of Agriculture Production	3
334-425A Agricultural Econometrics	3
Complementary Courses:	12
A microcomputer applications course (approved by adviser)	3
A statistical methods course (approved by adviser)	3
plus 6 credits chosen from the following three courses	6
367-211A (3) Principles of Plant Science	
342-250A (3) Principles of Animal Science	
372-210A (3) Principles of Soil Science	

AGRIBUSINESS OPTION

Whether one has interests in agricultural supply, production, marketing, finance, food processing or retailing, professional management skills are the key to success. The agribusiness option prepares students for managerial responsibility by drawing on the resources of both the Faculty of Management and the Faculty of Agricultural and Environmental Sciences. This special partnership provides students with not only a first-class business training but also a specialization in the field of agriculture.

Core Required and Complementary Courses: 27 credits.
Option Required Courses: 33 credits.
Electives: to meet the minimum 90-credit requirement for the degree.

	CREDITS
Option Required Courses:	33
271-313 Managerial Accounting I	3
278-382 Introduction to International Business	3
280-211 Accounting I	3
280-341 Finance I	3
334-231B Economic Systems of Agriculture	3
334-242A Management Theories and Practices	3
334-331A Farm Business Management	3
334-450B Agribusiness Management	3

334-452B	Studies in Agribusiness	3
382-446A	Personnel Management	3
425-202	Effective Communication	3

AGRICULTURAL SYSTEMS OPTION

The smooth functioning of the agriculture and food system requires good market analysis and appropriate policy and program development and management in the public sector. Agricultural economists are called upon to perform these tasks, utilizing their knowledge of the economic forces that affect the industry and the methods of analysis to predict the outcome of the numerous changes that occur. The agricultural systems orientation is intended to provide students with a broad understanding of the many dimensions of agriculture and food systems, including economic development, international agriculture, and food and agricultural policy.

Core Required and Complementary Courses: 27 credits.

Option Required Courses: 21 credits.

Electives: to meet the minimum 90-credit requirement for the degree.

	CREDITS
Option Required Courses:	21
334-231B Economic Systems of Agriculture	3
334-333A Resource Economics	3
334-350B Agricultural Finance	3
334-430B Agriculture, Food, and Resource Policy	3
334-440A Advanced Agriculture & Food Marketing	3
334-442B Economics of International Agricultural Development	3
334-491A Research Seminar in Agricultural Economics	3

NATURAL RESOURCE ECONOMICS OPTION

This option integrates biological sciences and environmental decision making with the economics of natural resource use and development. The natural resource economics option is intended to prepare students for careers in the management of natural resources and the analysis of natural resource problems and policies.

Core Required and Complementary Courses: 27 credits.

Option Required Courses: 32 credits.

Electives: to meet the minimum 90-credit requirement for the degree.

	CREDITS
Option Required Courses:	32
154-405B Natural Resource Economics	3
334-333A Resource Economics	3
334-343B Accounting and Cost Control	3
334-491A Research Seminar in Agricultural Economics	3
344-205B Principles of Ecology	3
338-201A Introductory Meteorology	3
360-306A Mathematical Methods in Ecology	3
375-201B Renewable Resources	3
375-333A Physical and Biological Aspects of Pollution	3
375-415A Conservation Law	2
375-437B Assessing Environmental Impacts	3

MINOR IN AGRICULTURAL ECONOMICS

A Minor in Agricultural Economics will complement a student's education in four ways. First, as a social science, Economics will provide an alternative perspective for students in the Faculty. Second, the Minor will provide an excellent foundation of the workings of the economy at large. Third, it will aid students to understand the business environment surrounding the agri-food industry. Finally, it will challenge students to analyze the interaction between the agricultural economy and the natural resource base.

General Regulations:

To obtain a Minor in Agricultural Economics, students must:

- a) Ensure that their academic record at the University includes a C grade or higher in the courses specified in the course requirements below.
- b) Complete a minimum total of 24 credits from the courses given below, of which not more than 6 credits may be counted for both Major and Minor programs. This restriction does not apply to elective courses in the Major program.

Required Courses: 12 credits

Complementary Courses: 12 credits

	CREDITS
Required Courses	12
334-200A Principles of Microeconomics	3
334-201B Principles of Macroeconomics	3
334-230B Economics of Marketing	3
334-231B Economic Systems of Agriculture	3

Complementary Courses

12

Chosen in consultation with the academic adviser for the Minor from the offerings of the Department of Agricultural Economics.

334-242A (3)	Management Theories and Practices
334-320B (3)	Economics of Agriculture Production
334-331A (3)	Farm Business Management
334-333A (3)	Resource Economics
334-343B (3)	Accounting and Cost Control
334-350B (3)	Agricultural Finance
334-425A (3)	Agricultural Econometrics
334-430B (3)	Agriculture, Food, and Resource Policy
334-440A (3)	Advanced Agricultural and Food Marketing
334-442B (3)	Economics of International Development
334-450B (3)	Agribusiness Management
334-452B (3)	Studies in Agribusiness
334-491A (3)	Research Seminar in Agricultural Economics
334-492A,B (3)	Special Topics in Agricultural Economics

MINOR IN ENTREPRENEURSHIP

The Minor is concerned with the genesis and development of entrepreneurial activities. It deals with marketing, finance, organization, and policy in the development and expansion of small businesses in the agri-food and environment sectors. This 24-credit Minor will be of interest to students who wish to develop the skills and perspectives necessary to be successful in an entrepreneurial environment, whether it be self-employed in a start-up business or within an established corporation that employs entrepreneurial management strategies.

General Regulations:

To obtain a Minor in Entrepreneurship, students must:

- a) Ensure that their academic record at the University includes a C grade or higher in the courses as specified in the course requirements listed below.
- b) Complete a minimum total of 24 credits from the courses listed below, of which not more than 6 credits may be counted for both the Major and the Minor programs.

Required Courses (24 credits)

334-200 (3)	Principles of Microeconomics
334-230 (3)	Economics of Marketing
334-242 (3)	Management Theories and Practices
334-343 (3)	Accounting and Cost Control
334-344 (3)	Entrepreneurial Leadership
334-450 (3)	Agribusiness Management
334-453 (3)	Venture Capital Opportunities
382-446 (3)	Personnel Management

6.3 Department of Animal Science

Macdonald Stewart Building - Room MS1-084
 Telephone: (514) 398-7794
 Email: info@AnimSci.AgrEnv.McGill.CA
 Website: <http://animsci.agrenv.mcgill.ca>

Chair — Xin Zhao

Emeritus Professor — John E. Moxley

Professors — Roger B. Buckland, Eduardo R. Chavez, Bruce R. Downey, Kwet Fane Ng Kwai Hang, Flannan Hayes, Urs Kuhnlein

Associate Professors — Roger I. Cue, Paul C. Laguë, Humberto G. Monardes, Leroy E. Phillip, Kevin Wade, David Zadworny, Xin Zhao

Assistant Professors — Ri-Cheng Chian (PT), René Lacroix (PT), Arif F. Mustafa

Adjunct Professors — Carol Keefer, Pierre Lacasse, Bruce Murphy, Denis Petitclerc

The Department of Animal Science offers Majors in Animal Science and Animal Biology.

ANIMAL SCIENCE MAJOR

Academic Advisers: J.F. Hayes (U1), U. Kuhnlein (U2), R.I. Cue (U3)

The curriculum in Animal Science involves intensive training in both the basic and applied biological sciences as related to domestic animals and qualifies the graduate for membership in l'Ordre des agronomes du Québec and other professional organizations. Graduates generally enter agricultural industries, mainly sales and marketing, government service (Provincial or Federal), extension, teaching or post-graduate studies. Some students go on to study veterinary medicine. Students are strongly advised to obtain at least 3 months practical experience on a commercial live-stock farm before graduation.

Required Courses: 69 credits.

Complementary Courses: 6 credits.

Electives: selected in consultation with Academic Adviser, to meet the minimum 90-credit requirement for the degree.

	CREDITS	
Required Courses:	69	
330-430A Ecological Agriculture Systems	3	
333-211A Biochemistry I	3	
334-200A Principles of Microeconomics	3	
342-234B Biochemistry II	3	
336-322A Food Prod/Processing Waste Mgmt	3	
342-250A Principles of Animal Science	3	
342-301B Principles of Animal Breeding	3	
342-312B Animal Pathology	3	
342-323A Mammalian Physiology	4	
342-324A Animal Reproduction	3	
342-330A Fundamentals of Nutrition	3	
342-433B Animal Nutrition	3	
342-450A Dairy Cattle Production	3	
342-452B Beef Cattle and Sheep Production	3	
342-454B Swine Production	3	
342-456A Poultry Production	3	
342-495D Seminar	2	
344-202B Cellular Biology	3	
360-310A,B Statistical Methods I	3	
362-230B The Microbial World	3	
367-211A Principles of Plant Science	3	
372-210A Principles of Soil Science	3	
375-375B Issues in Environmental Sciences	3	

Complementary Courses:

One Ethics course: 3
 170-203A,B (3) Knowledge, Ethics and Environment

or 260-270A (3) Ethics and the Environment
 One additional Economics course 3

ANIMAL BIOLOGY MAJOR

Academic Adviser: P.C. Laguë

The Animal Biology Major is directed towards students who wish to further their studies in the basic biology of the larger mammals and birds. Successful completion of the program will enable students to qualify in applying to most professional schools in North America, to post-graduate schools in a variety of biological-oriented programs, and to work in most laboratory settings. The program is not intended for students wishing to become professional agrologists.

Required Courses: 34 credits

Complementary Courses: 24 credits, minimum

Electives: selected in consultation with Academic Adviser, to meet the minimum 90-credit requirement for the degree.

	CREDITS	
Required Courses:	34	
333-211A Biochemistry I	3	
342-234B Biochemistry II	3	
342-250A Principles of Animal Science	3	
342-251B Comparative Anatomy	3	
342-323A Mammalian Physiology	4	
342-330A Fundamentals of Nutrition	3	
342-495D,N Seminar	2	
344-202B Cellular Biology	3	
356-204A Genetics	4	
360-310A,B Statistical Methods I	3	
362-230B The Microbial World	3	

Complementary Courses:

A minimum of 24 credits selected from the following list in consultation with the Academic Adviser:

342-312B (3) Animal Pathology	
342-324A (3) Animal Reproduction	
342-424B (3) Metabolic Endocrinology	
342-433B (3) Animal Nutrition	
342-460B (3) Biology of Lactation	
349-307A (3) Natural History of the Vertebrates	
or 375-350B (3) Mammalogy	
349-311B (3) Ethology	
349-424B (3) Parasitology	
362-341A (3) Mechanism of Pathogenicity	
391-400B (3) Eukaryotic Cells and Viruses	
391-438A (3) Immunology	
373-550B (3) Veterinary & Medical Entomology	
375-410B (3) Wildlife Ecology	

The student may replace up to 12 credits of the complementary courses listed above by choosing, with the student advisor's approval, any course offerings (300 level or higher) in Anatomy and Cell Biology, Biochemistry, Biology, Microbiology and Immunology, Neurology and Neurosurgery, Pharmacology and Therapeutics, Physiology, and Psychology. Any prerequisites for these courses must be taken as electives.)

6.4 School of Dietetics and Human Nutrition

Macdonald Stewart Building – Room MS2-039
 Telephone: (514) 398-7842
 Email: dietstage@macdonald.mcgill.ca
 Website: <http://dietetics.mcgill.ca>

Director — Katherine Gray-Donald

Emeritus Professor — Helen R. Neilson

Professors — Peter J.H. Jones, Harriet V. Kuhnlein

Associate Professors — Laurie Chan, Katherine Gray-Donald, Timothy A. Johns, Kristine G. Koski, Stan Kubow, Louise Thibault

Assistant Professors — David Bissonnette, Linda Wykes

Lecturers — Lynda Fraser (PT), Linda Jacobs Starkey, Maureen Lucas, Joane Routhier Mayrand, Sandy Phillips, Hugues Plourde, Heidi Ritter, Donna Schafer, Richard Stojak (PT)

Adjunct Professors — Kevin A. Cockell, Jeffrey S. Cohn, Shi-Hsiang Shen

Cross-Appointed Staff —

Food Science and Agricultural Chemistry: Selim Kermasha
 Medicine: Louis Beaumier, Franco Carli, Katherine Cianflone, Réjeanne Gougeon, L. John Hoffer, Errol Marliss, Jean-François Yale

Parasitology: Marilyn E. Scott

Psychiatry: Simon Young

Health and well-being of individuals in relation to food choices and physiological status prevails as the unifying theme of the programs in the School of Dietetics and Human Nutrition. The availability of food, normal metabolism and clinical nutrition, community nutrition at the local and international level, the evaluation of nutritional products and their use in nutrition, and the communication of information about food and health form the core of academic programs.

DIETETICS MAJOR

Academic Advising Coordinator:

Linda Jacobs Starkey, Ph.D., RD, FDC

Graduates are qualified for challenging professional and leadership positions related to food and health, as dietitians, nutritionists and food administrators. The designations "Dietitian" and "Nutritionist" are reserved titles in the province of Quebec. As clinical nutritionists, dietitians may work in health and food service centres and hospitals, nutrition counselling centres, clinics and private practice. As community nutritionists, dietitians are involved in nutrition education programs through schools, sports centres and local and international health agencies. The dietitian in the food service sector participates in all aspects of management to assure quality food products. Postgraduate programs are available to qualified graduates. The duration of the program is three and one-half years. Successful graduates are qualified for membership in Dietitians of Canada and the Ordre professionnelle de diététistes du Québec. Forty weeks supervised professional experience in clinical and community nutrition and food service systems management are included.

Required Courses: 103 credits.

Note: The School firmly applies prerequisite requirements (with C grade as pass) for registration in all required courses in the Dietetics Major.

Complementary Courses: 6 credits.

Electives: 6 credits, selected in consultation with an Academic Adviser, to meet the minimum 115-credit requirement for the degree.

All required and complementary courses must be passed with a minimum grade of C.

	CREDITS
Term 1	17
333-211A Biochemistry I	3
333-212A Biochemistry Laboratory	2
336-251A Microcomputer Applications	3
382-214A Food Fundamentals	3
334-242A Management Theories and Practices	3
One Elective or Complementary	3
Term 2	19
342-234B Biochemistry II	3
362-230B The Microbial World	3
382-217B Application of Food Fundamentals	3
382-207A,B Nutrition and Health	3
382-208B* Professional Practice (Stage) in Dietetics Level Ia	1
382-209G* Professional Practice (Stage) in Dietetics Level Ib	3
One Elective or Complementary	3

Term 3		20
342-323A Mammalian Physiology	4	
342-330A Fundamentals of Nutrition	3	
360-310A Statistical Methods I	3	
382-345D Food Service Systems Management	5	
382-322A Instructional Communications	2	
One Elective or Complementary	3	

Term 4		18
342-424B Metabolic Endocrinology	3	
334-343B Accounting and Cost Control	3	
382-337B Nutrition Through Life	3	
382-310B* Professional Practice (Stage) in Dietetics Level II a	1	
382-311C* Professional Practice (Stage) in Dietetics Level II b	5	
382-344B Clinical Nutrition I	3	

Term 5		15
382-436A Nutritional Assessment	2	
382-445A Clinical Nutrition II	4	
382-446A Personnel Management	3	
382-450A Research Methods in Human Nutrition	3	
One Elective or Complementary	3	

Term 6		12
382-403B Community Nutrition	3	
382-409B* Professional Practice (Stage) in Dietetics Level III	8	
382-438B Interviewing and Counselling	1	

Term 7		14
382-410A* Professional Practice (Stage) in Dietetics Level IV	14	

Complementary Courses (6 credits)

3 credits of Human Behavioural Science courses chosen from:

382-301A (3) Psychology
 or equivalent course from another faculty.

3 credits from the social sciences**:

170-201A (3) Society and Environment
 170-203A,B (3) Knowledge, Ethics and Environment
 260-270A (3) Ethics and the Environment
 334-200A (3) Principles of Microeconomics
 334-230B (3) Economics of Marketing

** Revisions awaiting University approval

Electives (6 credits)

Elective courses should be chosen in consultation with the academic adviser. The following courses most often fit the timetable; elective choice is not limited to these courses.

333-200A (3) Introduction to Food Science
 348-330A (3) Academic and Scientific Writing
 382-406A (3) Ecology of Human Nutrition
 382-420A (3) Food Toxicants and Health Risks
 382-430A,B (3) Directed Studies in Dietetics/Nutrition I
 382-451A (3) Nutrition Research
 382-501A (3) Nutrition in Developing Countries
 382-511A (3) Nutrition and Behaviour
 382-512A,B (3) Herbs, Foods and Phytochemicals

* Successful completion of all component parts of each level of Professional Practice (Stage) in Dietetics courses is a prerequisite for the next level and must be passed with a minimum grade of C. All required and complementary courses must be passed with a grade of C or better. Undergraduate registration is restricted to students in the Dietetics Major, CGPA greater than or equal to 2.50. Visiting students must contact the Academic Advising Coordinator (Dietetics) regarding course registration eligibility.

A compulsory immunization program exists at McGill which is required by the teaching hospitals before they will permit Dietetics students to practice. Students should complete their immunization before arriving at Macdonald. Medical/health documentation must

be received prior to commencement of each level of Stage. There are no exceptions possible.

NUTRITION MAJOR

Academic Advising Coordinator: Kristine G. Koski

This Major covers the many aspects of human nutrition and food and gives first, an education in the scientific fundamentals of these disciplines and second, an opportunity to develop specialization in nutritional biochemistry, nutrition and populations or nutrition of food. Graduates normally will continue on to further studies preparing for careers in research, medicine or as specialists in nutrition. Research nutritionists, aside from working as university teachers and researchers, may be employed by government and health protection agencies, in world development programs, or by the food sector.

Required Courses: 52 credits.

Note: The School firmly applies prerequisite requirements (with C grade as pass) for registration in all required courses in the Nutrition Major.

Option Required and Complementary Courses: 12 credits.

Electives: selected in consultation with Academic Adviser, to meet the minimum 90 credit requirement for the degree.

All required courses must be passed with a minimum grade of C.

	CREDITS	
Term 1	11	
333-211A Biochemistry I	3	
333-212A Biochemistry Laboratory	2	
336-251A Microcomputer Applications	3	
382-214A Food Fundamentals	3	
Term 2	12	
342-234B Biochemistry II	3	
362-230B The Microbial World	3	
382-207A,B Nutrition and Health	3	
382-217B Application of Food Fundamentals	3	
Term 3	12	
342-323A Mammalian Physiology	4	
342-330A Fundamentals of Nutrition	3	
360-310A,B Statistical Methods I	3	
382-322A Instructional Communications	2	
Term 4	9	
342-424B Metabolic Endocrinology	3	
382-337B Nutrition Through Life	3	
382-344B Clinical Nutrition I	3	
Term 5	8	
382-436A Nutritional Assessment	2	
382-450A Research Methods in Human Nutrition	3	
382-451A Nutrition Research	3	

Additional required and complementary courses, 12 credits.

Students must select one of the following three options as part of their program.

	CREDITS
Nutritional Biochemistry Option:	12
Term 5 342-552A Protein Metabolism in Animals	3
Term 6 342-551B Carbohydrate and Lipid Metabolism	3
Term 3 or 5 338-303A Advances in Atomic and Nuclear Science	3
338-405B Elementary Tracer Techniques	3
Nutrition and Populations Option:	12
Term 5 382-406A Ecology of Human Nutrition	3
Term 6 382-403B Community Nutrition	3
Select 6 credits from those listed below or any other social science courses:	6
382-301A (3) Psychology	
170-203A,B (3) Knowledge, Ethics and the Environment	

Nutrition of Food Option:	12
Term 2 or 4 333-334B Analytical Chemistry II	3
Term 4 333-251B Food Chemistry I	3
Term 5 333-300A Food Analysis I	3
Term 6 333-315B Food Analysis II	3

Electives: Selected in consultation with the academic adviser to meet the minimum 90 credits for the degree.

MINOR IN HUMAN NUTRITION

Academic Adviser: Linda Wykes

The Minor in Human Nutrition is intended to complement a student's primary field of study by providing a focused introduction to the metabolic aspects of human nutrition. It is particularly accessible to students in Biochemistry, Biology, Physiology, Anatomy and Cell Biology, Microbiology and Immunology, Animal Science or Food Science programs. The completion of 24 credits is required, of which at least 18 must not overlap with the primary program. All courses must be taken in the appropriate sequence and passed with a minimum grade of C. Students may declare their intent to follow the Minor program at the beginning of their U2 year. They must then consult with the Academic Adviser for the Human Nutrition Minor in the School of Dietetics and Human Nutrition to obtain approval for their course selection. Since not all courses are offered every year and many have prerequisites, students are cautioned to plan their program in advance.

The Minor program does not carry professional recognition, therefore, it is not suitable for students wishing to become nutritionists or dietitians. However, successful completion may enable students to qualify for many post-graduate nutrition programs.

Required Courses: 6 credits.

Complementary Courses: 18 or 19 credits

	CREDITS
Required Courses:	6
382-337B Nutrition Through Life	3
382-450A Research Methods in Human Nutrition	3

Complementary Courses: 18 or 19

3 credits in biochemistry, one of:

- 507-311A (3) Metabolic Biochemistry
- 342-234B (3) Biochemistry II

3 or 4 credits in physiology, one of:

- 342-323A (4) Mammalian Physiology
- 552-210B (3) Mammalian Physiology II
- 552-202B (3) Human Physiology: Body Functions

3 credits in nutrition, one of:

- 382-307A (3) Human Nutrition
- 342-330A (3) Fundamentals of Nutrition

8 or 9 credits from the following list:

- 342-551B (3) Carbohydrate and Lipid Metabolism
- 342-552A (3) Protein Metabolism and Nutrition
- 382-451A (3) Analysis of Nutrition Data
- 382-436A (2) Nutritional Assessment
- 382-420A (3) Food Toxicants and Health Risks
- 382-512A,B (3) Herbs, Foods and Phytochemicals
- 382-501A (3) Nutrition in Developing Countries
- 382-406A (3) Ecology of Human Nutrition
- 382-430A,B (3) Directed Studies in Dietetics/Nutrition or 382-431D,N
- 528-314B (3) Immunology or 391-438A
- 526-300B (3) Human Disease

Notes:

- 1) Most courses listed at the 300 level and higher have prerequisites. Although instructors may waive prerequisite(s) in some cases, students are urged to prepare their program of study well before their final year.
- 2) Not all courses are available in any given year. Consult departmental listings for full course descriptions and offerings.

6.5 Department of Food Science and Agricultural Chemistry

Macdonald Stewart Building – Room MS1-034
 Telephone: (514) 398-7898
 Email: foodscience@macdonald.mcgill.ca
 Website: <http://agrenv.mcgill.ca/foodscience/>

Chair — Inteaz Alli

Professors — Inteaz Alli, William D. Marshall, James P. Smith, Frederik R. Van De Voort

Associate Professors — Ashraf A. Ismail, Selim Kermasha, Hosahalli Ramaswamy, Benjamin K. Simpson, Varoujan Yaylayan

Adjunct Professors — Byong H. Lee, Yasuo Konishi, Andre Morin, J.R. Jocelyn Pare

MAJOR IN FOOD SCIENCE

This program is intended for those students interested in the multi-disciplinary field of Food Science. The courses are integrated to acquaint the student with food processing, food chemistry, quality assurance, analytical procedures, food products, standards and regulations. The program prepares graduates for employment as scientists in industry or government, in regulatory, research, quality assurance, or product development capacities. Graduates have the academic qualifications for membership in the Canadian Institute of Food Science and Technology and the Institute of Food Technologists. Graduates can also qualify for admission to the Ordre des chimistes du Québec by careful selection of additional courses.

Required Courses: 66 credits.

Electives: selected in consultation with Academic Adviser, to meet the minimum 90-credit requirement for the degree. A portion of these credits should be in the humanities/social sciences.

Required Courses:	CREDITS
	66
333-200A Introduction to Food Science	3
333-211A,* Biochemistry I	3
333-213A Analytical Chemistry I	3
333-233B Physical Chemistry	3
333-251B Food Chemistry I	3
333-300A Food Analysis I	3
333-305A Food Chemistry II	3
333-310A Post Harvest Fruit & Vegetable Technology	3
333-315B Food Analysis II	3
333-319B Food Chemistry III	3
333-330B Food Processing	3
333-334B Analytical Chemistry II	3
333-400A Food Packaging	3
333-410B Flavour Chemistry	3
333-425B Principles of Quality Assurance	3
333-495D,N Food Science Seminar	3
336-251A,B Microcomputer Applications	3
336-324A Elements of Food Engineering	3
360-310A,B Statistical Methods I	3
362-230B The Microbial World	3
362-442A Food Microbiology and Sanitation	3
382-207A,B Nutrition and Health	3
* Students who have not taken CEGEP objective 00XV or equivalent (formerly Chemistry 202) must take Organic Chemistry (333-230A) as a prerequisite for 333-211A.	
The following courses must be taken by students who wish to meet the course requirements for admission to the Ordre des chimistes du Québec.	
333-212A (2) Biochemistry Laboratory	
333-230A (4) Organic Chemistry	
333-491D,N (4) Research Project	
333-510B (3) Food Hydrocolloid Chemistry	
333-520A (3) Biophysical Chemistry of Food	
336-301A (3) Biothermodynamics	

6.6 Interdisciplinary Studies

Ecological Agriculture Program
 Telephone: (514) 398-7928
 Website: <http://www.agrenv.mcgill.ca/agrecon/ecoagr>

MINOR IN ECOLOGICAL AGRICULTURE

Academic Adviser: Professor J. Henning

This Minor program is designed to focus on the principles underlying the practice of ecological agriculture and is suitable for students wishing to farm, do extension and government work, and those intending to pursue post graduate studies in this field. The Minor can be associated with existing Major programs in the Faculty, but in some instances it may require more than 90 credits to meet the requirements of both the Major and the Minor.

Students are advised to consult their Major Program adviser and the Academic Adviser of the Minor in their first year. At the time of registration for their penultimate year, students must declare their intent to obtain a Minor in Ecological Agriculture. With the agreement of their Major Program adviser they must submit their program of courses already taken, and to be taken in their final year, to the Academic Adviser of the Ecological Agriculture Minor. The Academic Adviser of the Ecological Agriculture Minor will then certify which courses the student will apply toward the Minor and that the student's program conforms with the requirements of the Minor.

General Regulations

To obtain a Minor in Ecological Agriculture, students must:

- ensure that their academic record at the University includes a C grade or higher in the courses as specified in the course requirements given below.
- offer a minimum total of 24 credits from the courses as given below, of which not more than 6 credits may be counted for both the Major and the Minor programs. This restriction does not apply to elective courses in the Major program.

Required Courses: 9 credits. These are the same as for the Certificate in Ecological Agriculture.

Complementary Courses: 15 credits. Courses are chosen from the same list as for the Certificate in Ecological Agriculture.

CERTIFICATE IN ECOLOGICAL AGRICULTURE

Academic Adviser: Professor J. Henning

This 30-credit Certificate Program is very similar to the Minor Program and is designed to focus on the principles underlying the practice of ecological agriculture. The Certificate may be of special interest to professional agrologists who wish further training, as well as formal recognition that they have completed a coherent program of courses beyond their B.Sc. studies.

Students holding a B.Sc. in agriculture or a related area are eligible to register for this program provided that they are otherwise acceptable for admission to the University. Students who have completed the Minor in Ecological Agriculture are not permitted to register for this program.

General Regulations

To obtain a Certificate in Ecological Agriculture, students must offer a minimum total of 30 credits from the courses as given below.

Required Courses: 9 credits.

Complementary Courses: 21 credits.

Required Courses:	CREDITS
	9
330-210B Agro-Ecological History	3
330-250B Principles of Ecological Agriculture	3
330-430A Ecological Agriculture Systems	3
Complementary Courses:	
21	
21 credits chosen from the following, in consultation with the Academic Adviser for Ecological Agriculture	

with at least 3 credits chosen from: 3-6
 373-521B (3) Soil Microbiology & Biochemistry
 372-490J (3) Plan global de fertilisation
 and the remaining credits to be chosen from: 15-18
 260-270A (3) Ethics and the Environment
 330-435A (3) Soil and Water Quality Management
 330-491G (3) Co-op Experience
 334-333A (3) Resource Economics
 344-205B (3) Principles of Ecology
 349-311B (3) Ethology
 350-452B (3) Biocontrol of Insect Pests
 367-300B (3) Cropping Systems
 367-361B (3) Pest Management & the Environment
 367-434B (3) Weed Biology and Control
 367-460A (3) Plant Ecology
 373-331B (3) Microbial Ecology
 374-410A (3) The Forest Ecosystem
 375-375B (3) Issues in Environmental Sciences
 382-512B (3) Herbs and Phytochemicals

Notes:

- 1) Most courses listed at the 30 0level and higher have prerequisites. Although instructors may waive prerequisite(s) in some cases, students are urged to prepare their program of study to ensure that they have met all conditions.
- 2) Not all courses are available in any given year. Consult departmental listings for full course descriptions and offerings.
- 3) Students using 330-491G towards the requirements of the Certificate/Minor are limited to an experience on farms or other enterprises that are either organic, biodynamic, or practicing permaculture. The placement must be approved by the academic adviser for the Certificate/Minor.
- 4) 373-521B is an alternate year course.

AGRICULTURAL SCIENCES MAJOR

Professor K.A. Stewart
 Raymond Building Room R2-022A
 Telephone: (514) 398-7851 ext. 7872

The Agricultural Sciences program is designed to provide a general scientific and applied background for modern agriculture without the requirements for a specialized program and to develop an appreciation of applied agriculture in its on-farm environment. Graduates may be employed in agri-business, agricultural extension and communications, sales and marketing, teaching or farm management. This program leads to accreditation from the Ordre des agronomes du Québec.

Required Courses: 36 credits.

Complementary Courses: 36 credits.

Electives: selected in consultation with Academic Adviser, to meet the minimum 90-credit requirement for the degree.

Required Courses:	CREDITS
330-495D,N Seminar and Assignment	2
333-211A Biochemistry I	3
334-200A Principles of Microeconomics	3
342-250A Principles of Animal Science	3
344-202B Cellular Biology	3
350-452B Biocontrol of Insect Pests	3
356-204A Genetics	4
360-310A,B Statistical Methods I	3
362-230B The Microbial World	3
367-211A Principles of Plant Science	3
372-210A Principles of Soil Science	3
375-375B Issues in Environmental Sciences	3

Complementary Courses: 36

at least one of:

- 342-323A (4) Mammalian Physiology
- 367-353B (4) Plant Structure and Function

a minimum of 3 credits, one Animal Production course from the following:

- 342-301A (3) Principles of Animal Breeding
- 342-312B (3) Animal Pathology
- 342-324A (3) Animal Reproduction
- 342-450A (3) Dairy Cattle Production
- 342-452B (3) Beef Cattle and Sheep Production
- 342-454B (3) Swine Production
- 342-456A (3) Poultry Production

a minimum of 3 credits from the following Plant Production courses:

- 367-300B (3) Cropping Systems
- 367-305A (3) Plant Pathology
- 367-310A (3) Plant Propagation
- 367-322B (3) Greenhouse Management
- 367-331A (3) Field Crops
- 367-341A,B (1) Horticulture – The Alliums
- 367-342A,B (1) Horticulture – Perennial Vegetable Crops
- 367-343A,B (1) Horticulture – Root Crops
- 367-344A,B (1) Horticulture – Salad Crops
- 367-345A,B (1) Horticulture – Solanaceous Crops
- 367-346A,B (1) Horticulture – Temperate Tree Fruits
- 367-347A,B (1) Horticulture – Small Fruits
- 367-421A (3) Landscape Plant Materials
- 367-434B (3) Weed Biology and Control
- 367-525A (3) Advanced Micropropagation

a minimum of 3 credits, one Soil Science course from the following:

- 372-315B (3) Soil Fertility and Fertilizers
- 372-326A (3) Soil Genesis and Classification
- 372-331B (3) Soil Physics
- 373-410B (3) Soil Chemistry
- 372-490B (3) Plan global de fertilisation intégrée (Continuing Education)
- 372-521B (3) Soil Microbiology and Biochemistry

a minimum of 3 credits, one Agricultural Engineering course from the following:

- 336-200B (3) Elements of Agricultural Engineering
- 336-217B (3) Hydrology and Drainage
- 336-314B (3) Agricultural Structures
- 336-322A (3) Food Prod/Processing Waste Mgmt
- 336-412A (3) Agricultural Machinery
- 336-518A (3) Pollution Control for Agriculture

a minimum of 3 credits, one Agricultural Economics course from the following:

- 334-231B (3) Economic Systems of Agriculture
- 334-320B (3) Economics of Agricultural Production
- 334-331A (3) Farm Business Management
- 334-350B (3) Agricultural Finance

a minimum of 3 credits, one Agricultural Sciences course from the following:

- 330-250B (3) Principles of Ecological Agriculture
- 330-411B (3) International Agriculture
- 330-430A (3) Ecological Agricultural Systems
- 330-435A,B (3) Soil and Water Quality Management

plus a minimum of 14 credits chosen in consultation with the Academic Adviser from the 330, 334, 336, 338, 342, 350, 367, 372 and 374 Teaching Units (see [section 7](#)).

6.7 Department of Natural Resource Sciences

Macdonald Stewart Building – Room MS3-040

Telephone: (514) 398-7890

Fax: (514) 398-7990

Email: info@nrs.mcgill.ca

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

Chair — William H. Hendershot

Emeritus Professors — A. Clark Blackwood, Roger Knowles, Angus F. Mackenzie, Robert A. MacLeod, Peter H. Schuepp, Robin K. Stewart

Professors — David M. Bird, Peter Brown (*joint appt. with Geography and McGill School of Environment*), William H. Hendershot, Edmund S. Idziak

Associate Professors — Benoit Côté, Mark A. Curtis, Gary B. Dunphy, James W. Fyles, David J. Lewis, Guy R. Mehuys, Donald F. Niven, Manfred E. Rau, Rodger D. Titman

Assistant Professors — Dominique Berteaux, Brian T. Driscoll, Chantal Hamel, Joann Whalen, Terry A. Wheeler

Associate Members — Laurie Chan (*School of Dietetics and Human Nutrition*), William D. Marshall (*Dept. of Food Science and Agricultural Chemistry*), Greg T. Matlashewski (*Dept. of Microbiology and Immunology*), Donald L. Smith (*Dept. of Plant Science*)

Adjunct Professors — Robert Anderson, Frederick S. Archibald, Gilles Boiteau, Guy Boivin, Trevor C. Charles, Helene Chiasson, Jeffrey Cumming, Charles W. Greer, Pierre Mineau, Marc St-Arnaud, Jean-Pierre Savard, Anton Scheuhammer, David Sergeant, Norman R. Seymour, Regis Simard, Thomas G. Smith, Ian Thompson, Charles Vincent, Frederick G. Whoriskey

APPLIED ZOOLOGY MAJOR

Academic Adviser: Professor T. A. Wheeler

The great diversity of animals form the focus of this Major, from the invertebrates, with their many beneficial and pest insects, to vertebrates, including fish and wildlife. The interaction of animals with each other and with human populations is stressed. By careful course selection students may emphasize life in soils or water, entomology, physiology, parasitology or vertebrate biology and ecology. Career opportunities exist in both the public and private sectors in research, program development and implementation, pest control, wildlife management, etc.

Required Courses: 24 credits.

Complementary Courses: 28 or 29 credits.

Electives: to meet the minimum requirement of 90 credits; chosen in consultation with the Academic Adviser.

Required Courses:		CREDITS
333-211A	Biochemistry I	3
333-212A	Biochemistry Laboratory	2
344-200A	Biology of Organisms	3
344-202B	Cellular Biology	3
344-205B	Principles of Ecology	3
356-204A	Genetics	4
360-310A,B	Statistical Methods I	3
367-201B	Comparative Plant Biology	3

Complementary Courses:		28 or 29
An appropriate Seminar Course		2 or 3
plus a minimum of 26 credits from the following:		26

342-323A	(4) Mammalian Physiology	
349-307A	(3) Natural History of the Vertebrates	
349-311B	(3) Ethology	
349-312A	(3) Zoological Systematics and Evolution	
349-313B	(3) Zoogeography	

349-424B	(3) Parasitology	
350-335A	(3) Soil Ecology and Management	
373-330A	(3) Insect Biology	
373-496D,N	(3) Project I	
or 373-497D,N	(5) Project II	
375-401A	(3) Fisheries and Wildlife Management	
375-410B	(3) Wildlife Ecology	
375-420A	(3) Topics in Ornithology	
375-475B	(3) Desert Ecology	

The following Zoology courses from the Downtown Campus may be substituted for those in the above list of Macdonald Campus Complementary Courses with the prior permission of the Academic Adviser and the Macdonald Committee on Academic Standing. When selecting electives, students are encouraged to consult with their Academic Adviser.

Department of Biology (Downtown Campus) Courses:

177-307B	(3) Behavioural Ecology and Sociobiology
177-327A	(3) Herpetology
177-331A	(3) Ecology and Behaviour Field Course
177-334E	(3) Field Course, Applied Tropical Ecology
177-335T	(3) Marine Mammals
177-336C	(3) Marine Aquaculture
177-337C	(3) Ecology and Behaviour of Fishes
177-351B	(3) The Biology of Invertebrates
177-352B	(3) Vertebrate Evolution
177-437A	(3) Advanced Invertebrate Zoology
177-542B	(3) Marine Biology

MACDONALD SUMMER FIELD SEMESTER: HUMAN IMPACTS ON THE ENVIRONMENT

Three courses are available during Summer Session that provide students the opportunity to participate in supervised field research concerning flora and fauna not easily studied at other times of the year, and to apply knowledge from the classroom to environmental issues in the field.

Common thematic elements include: the linkages between physical, biological and human systems, field research, and human impacts on the environment. Students learn and apply research techniques and analytical skills within a multi-disciplinary, holistic approach.

Summer Session Courses: (May 25 - July 31)

373-382L	(3) Ecological Monitoring & Analysis
373-383L	(3) Land Use: Redesign & Planning
373-384L	(3) Field Research Project

For more information, please consult the McGill Summer Studies Calendar, the Summer Studies Website (<http://www.mcgill.ca/Summer/>), or the Faculty Website (<http://www.agrenv.mcgill.ca/envschool>).

ENVIRONMENTAL BIOLOGY MAJOR

Academic Advisers: Professors D.J. Lewis (U1), J. Fyles (U2), M.E. Rau (U3)

This program provides scientists with basic knowledge in Biology and strong emphasis in Ecology. As ecologists they will be equipped to investigate the scientific aspects of the relationships between organisms and their environment.

Required Courses: 29 credits.

Complementary Courses: 30 credits.

Electives: To meet the minimum requirements of 90 credits for the degree.

Required Courses:		CREDITS
333-211A	Biochemistry I	3
333-212A	Biochemistry Laboratory	2
344-200A	Biology of Organisms	3
344-202B	Cellular Biology	3
344-205B	Principles of Ecology	3
344-495D,N	Environmental Biology Seminar	2
356-204A	Genetics	4

360-310A,B	Statistical Methods I	3
367-201B	Comparative Plant Biology	3
375-375B	Issues in Environmental Sciences	3

Complementary Courses: 30

a minimum of 30 credits selected from the following list in consultation with the Academic Adviser

338-201A	(3) Introductory Meteorology	
349-307A	(3) Natural History of the Vertebrates	
349-311B	(3) Ethology	
349-313B	(3) Zoogeography	
349-315A	(3) Science of Inland Waters	
360-306A	(3) Mathematical Methods in Ecology	
362-230B	(3) The Microbial World	
367-358A	(3) Flowering Plant Diversity	
367-460A	(3) Plant Ecology	
372-200B	(3) Introduction to Earth Science	
372-210A	(3) Principles of Soil Science	
373-331B	(3) Microbial Ecology	
373-496D,N	(3) Project	
374-410A	(3) The Forest Ecosystem	
374-420B	(3) Environmental Issues in Forestry	
375-333A	(3) Physical and Biological Aspects of Pollution	
375-401A	(4) Fisheries and Wildlife Management	
375-410B	(3) Wildlife Ecology	
375-437B	(3) Assessing Environmental Impact	
375-475B	(3) Desert Ecology	

With the permission of the Academic Adviser, ecological or environmental courses offered on the Downtown Campus may be substituted for those appearing in the above list of Complementary Courses.

MICROBIOLOGY MAJOR

Academic Advisers: Professors D. Niven (U1), B.T. Driscoll (U2), E. Idzia k(U3)

Students receive training in fundamental principles and applied aspects of Microbiology. Successful graduates are competent to work in university, government and industrial research laboratories and in the pharmaceutical, fermentation and food industries.

Required Courses: 60 credits.

Electives: to meet the minimum requirement of 90 credits for the degree; chosen in consultation with the Academic Adviser.

	CREDITS
Required Courses:	60
333-211A	Biochemistry I 3
333-212A	Biochemistry Laboratory 2
344-200A	Biology of Organisms 3
344-202B	Cellular Biology 3
344-205B	Principles of Ecology 3
349-424B	Parasitology 3
356-204A	Genetics 4
360-310A,B	Statistical Methods I 3
362-200A	Laboratory Methods in Microbiology 3
362-230B	The Microbial World 3
362-337D,N	Frontiers in Microbiology 1
362-341A	Mechanisms of Pathogenicity 3
362-492D,N	Project 5
362-495D,N	Seminar 3
367-201B	Comparative Plant Biology 3
373-331B	Microbial Ecology 3
373-338A	Bacterial Molecular Genetics 3
373-442A	Food Microbiology and Sanitation 3
391-400B	Eukaryotic Cells and Viruses 3
391-438A	Immunology 3

RESOURCE CONSERVATION MAJOR

Academic Adviser: Professor B. Côté

The Major prepares students to deal with problems in integrated resource management and environmental protection with the objective of making optimal use of natural resources under any given set of economic, social and ecological conditions. Students follow a series of required courses and select complementary courses on physical, biological, soil and aquatic resources from approved lists on each of these themes.

Required Courses: 25 credits

Complementary Courses: 33 credits.

Electives: to meet the minimum 90-credit requirement for the degree.

	CREDITS
Required Courses:	25
333-211A	Biochemistry I 3
334-200A	Principles of Microeconomics 3
334-333A	Resource Economics 3
344-205B	Principles of Ecology 3
349-315A	Science of Inland Waters 3
372-200B	Introduction to Earth Science 3
372-210A	Principles of Soil Science 3
375-437B	Assessing Environmental Impact 2
375-491D,N	Seminar 2

Complementary Courses:

367-201B	(3) Comparative Plant Biology	3
or 367-211A	(3) Principles of Plant Science	
360-310A,B	(3) Statistical Methods I	3
or 189-203A ¹	(3) Principles of Statistics I	
At least two of the following:		6
336-214A	(3) Surveying	
336-217B	(3) Hydrology and Drainage	
or 183-322A ¹	(3) Hydrology	
336-416A	(3) Engineering for Land Development	
338-201A	(3) Introductory Meteorology	
375-333A	(3) Physical and Biological Aspects of Pollution	

At least three of the following: 9 or 10

177-465A ¹	(3) Conservation Biology	
350-335A	(3) Soil Ecology and Management	
360-306A	(3) Mathematical Methods in Ecology	
367-358A	(3) Flowering Plant Diversity	
373-331B	(3) Microbial Ecology	
374-410A	(3) The Forest Ecosystem	
375-401A	(4) Fisheries and Wildlife Management	

At least three of the following: 9

330-435A	(3) Soil and Water Quality Management	
372-315B	(3) Soil Fertility and Fertilizers	
372-326A	(3) Soil Genesis and Classification	
372-331B	(3) Soil Physics	
372-410B	(3) Soil Chemistry	
373-521B	(3) Soil Microbiology and Biochemistry	

At least one of the following: 3

183-201B ¹	(3) Geographical Information Systems 1	
336-350B	(3) GIS & Biosystems	
375-310B	(3) Air Photo and Imagery Interpretation	

¹ Downtown Campus

Note: Other courses on the Downtown Campus may be equivalent to some required courses; consult the Academic Adviser.

SOIL SCIENCE MAJOR

Academic Adviser: Professor Mehuys

Students majoring in Soil Science gain an understanding of the nature of soils, in terms of their physical, biological, biochemical, and chemical properties, and of survey and management techniques which promote their sustained fertility, productivity, and conservation. Students may choose to take a specialized orientation related to either soils and crops, or soil and water conservation. The first option is more biologically oriented, while the second is concerned more with resource management and environmental protection. The Soil Science Major qualifies the graduate for membership in l'Ordre des agronomes du Québec and professional agrologist organizations in the other provinces.

Required Courses, 41 credits.

Complementary Courses: 21 - 23 credits, selected from an approved list in consultation with the Academic Adviser.

Soils and Crops Option: 21- 23 credits

Soil Conservation Option: 21 credits

Electives: to meet the minimum requirement of 90 credits for the degree.

	CREDITS
Required Courses:	41
334-200A Principles of Microeconomics	3
334-231B Economic Systems of Agriculture	3
338-201A Introductory Meteorology	3
342-250A Principles of Animal Science	3
360-310A,B Statistical Methods I	3
362-230B The Microbial World	3
367-211A Principles of Plant Science	3
372-200B Introduction to Earth Science	3
372-210A Principles of Soil Science	3
372-315B Soil Fertility and Fertilizers	3
372-326A Soil Genesis and Classification	3
372-331B Soil Physics	3
372-410B Soil Chemistry	3
375-491D,N Seminar	2

**Soils and Crops Option –
Complementary Courses**
21-23

Nine credits from the following courses:

330-430A (3) Ecological Agriculture Systems	
367-300B (3) Cropping Systems	
367-322B (3) Greenhouse Management	
367-331A (3) Field Crops	
367-341A,B (1) Horticulture - The Alliums	
367-342A,B (1) Horticulture - Perennial Vegetable Crops	
367-343A,B (1) Horticulture - Root Crops	
367-344A,B (1) Horticulture - Salad Crops	
367-345A,B (1) Horticulture - Solanaceous Crops	
367-346A,B (1) Horticulture - Temperate Tree Fruits	
367-347A,B (1) Horticulture - Small Fruits	
367-434B (3) Weed Biology and Control	

Four of the following courses:

260-270A (3) Ethics and the Environment	
330-435A (3) Soil and Water Quality Management	
333-211A (3) Biochemistry I	
336-251A,B (3) Microcomputer Applications	
344-202B (3) Cellular Biology	
350-452B (3) Biocontrol of Insect Pests	
356-204A (4) Genetics	
367-305A (3) Plant Pathology	
367-353B (4) Plant Structure and Function	
367-358A (3) Flowering Plant Diversity	
367-460A (3) Plant Ecology	
373-331B (3) Microbial Ecology	
373-521B (3) Soil Microbiology and Biochemistry	
374-441B (3) Integrated Forest Management	

**Soil Conservation Option –
Complementary Courses**
21

Three of the following courses:

330-250B (3) Principles of Ecological Agriculture	
330-430A (3) Ecological Agriculture Systems	
330-435A (3) Soil and Water Quality Management	
336-217B (3) Hydrology and Drainage	
336-416A (3) Engineering for Land Development	
373-521B (3) Soil Microbiology and Biochemistry	

Four of the following courses:

260-270A (3) Ethics and the Environment	
336-214A (3) Surveying	
336-251A,B (3) Microcomputer Applications	
336-330B (3) GIS for Biosystems Management	
344-205B (3) Principles of Ecology	
373-331B (3) Microbial Ecology	
374-410A (3) The Forest Ecosystem	
374-441B (3) Integrated Forest Management	
375-333A (3) Physical & Biological Aspects of Pollution	
375-415A (3) Conservation Law	
375-437B (3) Assessing Environmental Impact	

WILDLIFE BIOLOGY MAJOR

 Academic Advisers: Professors R. Titman (Sept. - Dec., 2001),
M. Curtis (Jan. - Aug., 2002 (U1);
D. Berteaux (U2); D. Bird (U3)

This program emphasizes understanding the ecology of vertebrate animals, their biological and physical environment and the interactions that are important in the management of ecological communities and wildlife species. Employment opportunities exist in resource planning, nature interpretation, wildlife management and environmental impact assessment. By careful course selection students may meet requirements for certification by the Wildlife Society.

Required Courses: 34 credits.

Complementary Courses: 26 credits.

Electives: to meet the requirement of 90 credits for the degree.

	CREDITS
Required Courses:	34
333-211A Biochemistry I	3
344-200A Biology of Organisms	3
344-205B Principles of Ecology	3
349-307A Natural History of the Vertebrates	3
356-204A Genetics	4
360-310A,B Statistical Methods I	3
367-201B Comparative Plant Biology	3
367-358A Flowering Plant Diversity	3
(Prereq: 344-201B)	
375-401A Fisheries and Wildlife Management	4
(Prereq: 367-358A)	
375-410B Wildlife Ecology	3
375-491D,N Seminar or appropriate substitute	2

Complementary Courses:
26

a minimum of 26 credits, 20 of which should be at the 300 level or above, selected from the following list in consultation with the Academic Adviser

170-200A (3) The Global Environment	
170-201A (3) Society and Environment	
170-202B (3) The Evolving Earth	
177-203A (3) Knowledge, Ethics and Environment	
334-333A (3) Resource Economics	
338-201A (3) Introductory Meteorology	
342-323A (4) Mammalian Physiology	
349-311B (3) Ethology	
349-315A (3) Science of Inland Waters	
349-424B (3) Parasitology	
352-300B (3) Communication - Extension Methods	

- 360-306A (3) Mathematical Methods in Ecology
- 367-460A (3) Plant Ecology
- 373-421B (3) Topics in Wildlife Conservation
- 373-496D,N (3) Project I
- or 373-497D,N (5) Project II
- 374-420B (3) Environmental Issues in Forestry
- 374-441B (3) Integrated Forest Management
- 375-375B (3) Issues in Environmental Science
- 375-382A (3) Fish and Wildlife Propagation
- 375-415A (2) Conservation Law
- 375-420A (3) Topics in Ornithology
- 375-437B (3) Assessing Environmental Impact
- 375-475B (3) Desert Ecology
- 382-361B (3) Environmental Toxicology

Department of Biology (Downtown Campus) Courses:

- 177-305B (3) Biodiversity of Life
- 177-307B (3) Behavioural Ecology/Sociobiology
- 177-327A (3) Herpetology
- 177-331A (3) Ecology/Behaviour Field Course
- 177-334E (3) Field Course, Applied Tropical Ecology
- 177-335T (3) Marine Mammals
- 177-336C (3) Marine Aquaculture
- 177-337C (3) Ecology and Behaviour of Fishes
- 177-352B (3) Vertebrate Evolution
- 177-354B (3) Biology of Birds
- 177-465A (3) Conservation Biology
- 177-542B (3) Marine Biology
- 177-470B (3) Lake Management

6.8 Department of Plant Science

Raymond Building – Room R2-019
 Telephone: (514) 398-7851
 Email: infoplsci@macdonald.mcgill.ca
 Website: <http://www.agrenv.mcgill.ca/plant>

Chair — Marc Fortin

Emeritus Professors — Ralph H. Estey, William F. Grant, W.E. Sackston, Howard A. Steppeler

Professors — Deborah J. Buszard, Donald L. Smith, Alan K. Watson

Associate Professors — Danielle J. Donnelly, Pierre Dutilleul, Marc Fortin (*William Dawson Scholar*), Suha J.-Hare, Ajjamada C. Kushalappa, Diane E. Mather, Timothy C. Paulitz, Salvatore A. Sparace, Katrine A. Stewart, Marcia J. Waterway

Assistant Professor — Philippe Seguin

Lecturers — Serge Lussier, Patrick Nantel, David D. Wees

Associate Member — Timothy A. Johns (*School of Dietetics and Human Nutrition*)

Adjunct Professors — Miles R. Bullen, Todd Capson, Odile Carisse, Daniel Cloutier, Warren K. Coleman, Bruce E. Coulman, Sylvie Jenni, Shahrokh Khanizadeh, Jean-François Laliberté, Cindy Morris, Louise O'Donoghue, Thérèse Ouellet

The Department of Plant Science administers Majors in Botanical Science and Plant Science. (Full descriptions of these Majors are available at <http://www.agrenv.mcgill.ca/plant/undergrad.htm>. A minimum of 90 credits is needed to complete each Major. It is recommended that students take organic chemistry prior to entering these Majors.

BOTANICAL SCIENCE MAJOR

Academic Adviser: Professor D.J. Donnelly

The Botanical Science Major offers two options for those interested in working with plants, one emphasizing the ecology of plants and their environment and the other emphasizing the physiology and molecular biology of plants. The Ecology Option emphasizes ecology, conservation, and environmental sciences.

The Molecular Option emphasizes molecular genetics, plant improvement, and biotechnology. These two options form botanists prepared for exciting careers in the knowledge economy. Graduates are finding employment within private industries, government services, consulting, teaching, and many have gone on to do postgraduate research. These programs can be completed entirely on the Macdonald Campus or one semester can be spent taking courses on the Downtown Campus during the final year.

Required Courses: 42 credits.

Complementary Courses: 18 credits, selected from an approved list in consultation with the Academic Adviser; taken in either the Ecology or the Molecular Option.

Electives: to meet the minimum requirement of 90 credits for the degree.

Note: courses marked with an asterisk (*) are offered on the Downtown Campus.

Required Courses:	CREDITS
	42
333-211A Biochemistry I	3
344-200A Biology of Organisms	3
344-202B Cellular Biology	3
344-205B Principles of Ecology	3
356-204A Genetics	4
360-310B Statistical Methods I	3
367-201B Comparative Plant Biology	3
367-220A Introduction to Vascular Plants	1
367-221A Introduction to Fungi	1
367-353B Plant Structure and Function	4
367-358A Flowering Plant Diversity	3
367-458A Flowering Plant Systematics	3
367-460A Plant Ecology	3
367-490D,N Project	3
367-495D,N Seminar	2

Complementary Courses **18**
 Either the Ecology Option or the Molecular Option

Ecology Option: **18**

at least 12 credits must be chosen from the following:

330-250B (3) Principles of Ecological Agriculture	
349-315A (3) Science of Inland Waters	
360-306A (3) Mathematical Methods in Ecology	
373-331B (3) Microbial Ecology	
374-410A (3) The Forest Ecosystem	
374-420B (3) Environmental Issues in Forestry	
375-415A (2) Conservation Law	
375-437B (3) Assessing Environmental Impact	
*177-324A (3) Ecological Genetics	
*177-331A (3) Ecology and Behaviour Field Course	
*177-334E (3) Field course in Applied Tropical Ecology	
*177-465A (3) Conservation Biology	
*177-483B (3) Stat. Approaches in Ecology and Evolution	
*183-350A (3) Ecological Biogeography	

the remaining credits, if any, to be chosen from Molecular Option Complementary Course list or from the General Complementary Course list given below.

Molecular Option: **18**

at least 12 credits must be chosen from the following:

333-212A (2) Biochemistry Laboratory	
344-306B (3) Biological Instrumentation	
356-500A,B (3) Plant Molecular Genetics	
356-501B (3) Plant Molecular Biology and Genetics	
362-200A (3) Laboratory Methods in Microbiology	
362-230B (3) Microbial World	
367-525B (3) Advanced Micropropagation	
367-535B (3) Plant Breeding	
373-338A (3) Bacterial Molecular Genetics	
391-400B (3) Eukaryotic Cells and Viruses	
391-501A,B (3) Bioinformatics	

- *177-301A,B(3) Laboratory in Molecular and Cellular Biology
 *177-303B (3) Developmental Biology
 *177-333B (3) Plant Biotechnology

the remaining credits, if any, to be chosen from Ecology Option Complementary Course list or from the General Complementary Course list given below.

**BOTANICAL SCIENCE MAJOR,
 GENERAL COMPLEMENTARY COURSES:**

- 367-215A (1) Orientation in Plant Science
 367-304B (3) Biology of Fungi
 367-305A (3) Plant Pathology
 367-310A (3) Plant Propagation
 367-434B (3) Weed Biology and Control
 367-450A,B (2) Special Topics Plant Science
 367-451A,B (3) Special Topics Plant Science
 372-210A (3) Principles of Soil Science
 382-512A (3) Herbs, Food, and Phytochemicals
 *177-555L (3) Functional Ecology of Trees

PLANT SCIENCE MAJOR

Academic Adviser: Professor K.A.Stewart

The Plant Science Major offers intensive training in agricultural plant science. Comprehensive studies are offered in all aspects of biology and production practices related to important crop plant species. Studies include laboratory, greenhouse, and field exposure relating to agronomic, horticultural, or field crop development, production and management. Graduates are eligible to apply for membership in l'Ordre des agronomes du Québec (OAQ) and the Agricultural Institute of Canada (AIC). Graduates rapidly find employment in agricultural industries, government services, extension, consulting, teaching, or go on to do postgraduate research.

Required Courses: 49 credits

Complementary Courses: 18 credits.

Electives: Chosen in consultation with the Academic Adviser, to meet the minimum 90 credit requirement for the degree.

	CREDITS
Required Courses:	49
333-211A Biochemistry I	3
334-200A Microeconomics	3
342-250A Principles of Animal Science	3
356-204A Genetics	4
360-310A Statistical Methods I	3
362-230B Microbial World	3
367-211A Principles of Plant Science	3
367-300B Cropping Systems	3
367-305A Plant Pathology	3
367-310A Plant Propagation	3
367-353B Plant Structure and Function	4
367-358A Flowering Plant Diversity	3
367-434B Weed Biology and Control	3
367-495D,N Seminar	2
372-210A Principles of Soil Science	3
372-315B Soil Fertility and Fertilizers	3

Complementary Courses:

at least one of:

- 336-200B (3) Elements of Agricultural Engineering
 350-452B (3) Biocontrol of Insect Pests

A minimum of 3 credits selected from the following list:

- 334-231B (3) Economic Systems of Agriculture
 334-320B (3) Economics of Agriculture Production
 334-331A (3) Farm Business Management
 334-350B (3) Agricultural Finance

plus a minimum of 12 credits selected from the course list given below

- 333-310A (3) Postharvest Fruit & Vegetable Technology
 367-215A (1) Orientation in Plant Sciences
 367-220A (1) Introduction to Vascular Plants
 367-221A (1) Introduction to Fungi

- 367-322B (3) Greenhouse Management
 367-331A (3) Field Crops
 367-341A,B (1) Horticulture - the Alliums
 367-342A,B (1) Horticulture - Perennial Vegetable Crops
 367-343A,B (1) Horticulture - Root Crops
 367-344A,B (1) Horticulture - Salad Crops
 367-345A,B (1) Horticulture - Solanaceous Crops
 367-346A (1) Horticulture - Temperate Tree Fruits
 367-347A (1) Horticulture - Small Fruits
 367-348A,B (1) Horticulture - the Brassicas
 367-421A (3) Landscape Plant Materials
 367-460A (3) Plant Ecology
 367-535B (3) Plant Breeding

MINOR IN AGRICULTURAL PRODUCTION

Academic Adviser: Professor K. A. Stewart

This Minor program is designed to allow students in non-agricultural production Majors to receive credit for courses in agricultural production and to stimulate "cross over" studies. The Minor can be associated with existing Major programs in the Faculty, but in some instances it may require more than 90 credits to meet the requirements of both the Major and the Minor.

Students are advised to consult their Major Program adviser and the Academic Adviser of the Minor in their first year. At the time of registration for their penultimate year, students must declare their intent to obtain a Minor in Agricultural Production. With the agreement of their Major Program adviser they must submit their program of courses already taken, and to be taken in their final year, to the Academic Adviser of the Agricultural Production Minor. The Academic Adviser of the Agricultural Production Minor will then certify which courses the student will apply toward the Minor and that the student's program conforms with the requirements of the Minor.

General Regulations

To obtain a Minor in Agricultural Production, students must:

- ensure that their academic record at the University includes a C grade or higher in the courses as specified in the course requirements given below.
- offer a minimum total of 24 credits from the courses as given below, of which not more than 6 credits may be counted for both the Major and the Minor programs. This restriction does not apply to elective courses in the Major program.

Required Courses: 12 credits

Complementary Courses: 12 credits.

	CREDITS
Required Courses:	12
342-250A Principles of Animal Science	3
367-211A Principles of Plant Science	3
367-300B Cropping Systems	3
372-210A Principles of Soil Science	3

Complementary Courses:

12 credits chosen from the following list in consultation with the Academic Adviser for the Minor:

- 342-450A (3) Dairy Cattle Production
 342-452B (3) Beef and Sheep Production
 342-454B (3) Swine Production
 342-456A (3) Poultry Production
 367-331A (3) Field Crops
 367-341A,B (1) Horticulture - the Alliums
 367-342A,B (1) Horticulture - Perennial Vegetable Crops
 367-343A,B (1) Horticulture - Root Crops
 367-344A,B (1) Horticulture - Salad Crops
 367-345A,B (1) Horticulture - Solanaceous Crops
 367-346A,B (1) Horticulture - Temperate Tree Fruits
 367-347A,B (1) Horticulture - Small Fruits
 367-348A,B (1) Horticulture - the Brassicas

Notes:

- 1) Most courses listed at the 30 0level and higher have prerequisites. Although instructors may waive prerequisite(s) in some cases, students are urged to prepare their program of study well before their final year.
- 2) Not all courses are available in any given year. Consult departmental listings for full course descriptions and offerings.

7 Description of Courses

Courses are listed numerically by prefix. For courses in the following areas, consult listings with the appropriate prefix:

- Agricultural and Biosystems Engineering - 336 (page 457)
- Animal Science - 342 (page 459)
- Biology - 344 (page 460)
- Biotechnology - 394 (page 466)
- Economics - 334 (page 456)
- English - 348 (page 460)
- Entomology - 350 (page 460) and 373
- Ethics - 260 (page 454)
- Extension - 352 (page 461)
- Food Science and Agricultural Chemistry - 333 (page 455)
- Forest Resources - 374 (page 464)
- General Agriculture - 330 (page 454)
- Genetics - 356 (page 461)
- Mathematics - 360 (page 461)
- McGill School of Environment - 170 (page 454)
- Microbiology - 362 and 373 (page 461)
- Natural Resource Sciences - 373 (page 463)
- Nutrition and Dietetics - 382 (page 465)
- Parasitology - 391 (page 466)
- Physics - 338 (page 459)
- Plant Science - 367 (page 463)
- Renewable Resources - 375 (page 464)
- Soil Science - 372 and 373 (page 463)
- Zoology - 349 (page 460)

All pre- and co-requisites in a course sequence leading to a more advanced course must be successfully completed before registration will be permitted in the advanced course.

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

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

- Denotes courses not offered in 2001-02.
- ★ Denotes courses offered only in alternate years.
- Denotes limited enrolment.

7.1 Environment

A listing of McGill School of Environment courses is given below. Refer to the MSE section, page 486 of this Calendar, for descriptions, prerequisites, restrictions, and information on availability of courses.

Note: all MSE courses have limited enrolment.

- 170-200A The Global Environment (3 credits)
- 170-201A Society and Environment (3 credits)
- 170-202B The Evolving Earth (3 credits)
- 170-203A,B Knowledge, Ethics and Environment (3 credits)
- 170-380A,B Topics in Environment 1 (3 credits)
- 170-400A Environmental Thought (3 credits)
- 170-401A Environmental Research (3 credits)
- 170-451B Research in Panama (6 credits)
- 170-480A,B Topics in Environment 2 (3 credits)
- 170-485A,B Readings in Environment 1 (3 credits)
- 170-580A,B Topics in Environment 3 (3 credits)
- 170-585A,B Readings in Environment 2 (3 credits)

7.2 Ethics

260-270A ETHICS AND THE ENVIRONMENT. (3) Survey of issues and debates in environmental ethics. The challenge posed to human and religious values by the present ecological crisis and some ethical and religious responses to this challenge, Native American spirituality, Eastern and African religions, ecofeminism and liberation theology will be discussed, as will recent environmental debates concerning technology and large scale development projects. Lectures supplemented by guest speakers and audiovisual presentations.

7.3 Agriculture

330-210B AGRO-ECOLOGICAL HISTORY. (3) (3 lectures) Introduction to the environmental consequences of agriculture through time, relating the cultural diversity of agronomic practices to regionally varied ecological processes.

330-250B PRINCIPLES OF ECOLOGICAL AGRICULTURE. (3) (3 lectures and one 2-hour seminar) Historical overview; ecological basis; environmental, nutritional, socio-cultural, economic and international implications; practical examples of soil management, pest and disease control; integrated crop and livestock production and marketing systems; appropriate technology; agronomic, economic, institutional and political opportunities for change.

330-305B TROPICAL FOOD SYSTEMS FIELD COURSE. (3) An examination of agricultural enterprises and their effect on the environment and society in the tropics. The course which is taught in conjunction with the University of the West Indies, includes a twelve day session at the Bellairs Research Institute in the Barbados. The course combines conferences, field trips, and small-group case studies. The timing of the field trip in this course does not conflict with students' other courses/exams, or at the most, a maximum of one (1) day of other classes will be missed.

330-411B INTERNATIONAL AGRICULTURE. (3) (3 lectures and 1 conference) A study of the climate, soils and major economic plant and animal species in tropical and sub-tropical regions; cropping and agro-forestry systems; pest and disease problems; soil and water management; environmental, health and nutrition, and economic issues in rural development; energy and technology for developing countries; the role of international aid and development agencies; case studies on various aspects of food and agricultural systems in developing countries will be presented.

330-430A ECOLOGICAL AGRICULTURE SYSTEMS. (3) (2 lectures and 1 conference) (Prerequisite: 330-250B) A detailed examination of a representative range of ecological vegetable, fruit, cash crop and livestock operations using a systems approach. The transition process, and optimal design and management of the operation will be emphasized. The course will include a number of weekend visits.

330-435A,B SOIL AND WATER QUALITY MANAGEMENT. (3) (3 lectures and one 3-hour lab.) Management of soil and water systems for sustainability. Cause of soil degradation, surface and groundwater contamination by agricultural chemicals and toxic pollutants. Human health and safety concerns. Water-table management. Soil and water conservation techniques will be examined with an emphasis on methods of prediction and best management practices.

330-491G Co-OP EXPERIENCE. (3) A co-op experience program of at least 12 weeks duration. Students will be exposed to the main areas of operation of their employer. The cooperating employer and the Instructor (or designate) will develop an individualized co-op experience for each student. Students will be supervised by staff of their employer who will be in contact with the instructor (or designate). A site visit by the Instructor (or designate), a report by the student's employer and a final written and oral report by the student will form the basis for evaluation.

330-495D,N SEMINAR AND ASSIGNMENT. (2) (1 lecture) Preparation, presentation and discussion of reports upon approved agricultural subjects chosen in consultation with staff members involved in the subject concerned.

330-550B SUSTAINED TROPICAL AGRICULTURE. (3) (Restricted Enrolment. Location in Panama. Student must be registered for a full semester of studies in Panama) (Prerequisites: 144-218A,B or equivalent; 189-203 or 360-310A or equivalent) Contrast theory and practice in defining agricultural environmental "challenges" in the Neotropics. Indigenous and appropriate technological means of mitigation. Soil management and erosion, water scarcity, water over-abundance, and water quality. Explore agro-ecosystem protection via field trips and project designs. Institutional context of conservation strategies, NGO links, and public participation.

7.4 Food Science and Agricultural Chemistry

Students should check with their Academic Adviser as to which of the ★ (alternate year) courses will be given in 2001-02.

333-110B INORGANIC CHEMISTRY. (4) (3lectures and one 3-hour lab) The course will be a study of the fundamental principles of atomic structure, valence theory and the periodic table.

333-200A INTRODUCTION TO FOOD SCIENCE. (3) (3lectures) This course enables one to gain an appreciation of the scope of food science as a discipline. Topics include introductions to chemistry, processing, packaging, analysis, microbiology, product development, sensory evaluation and quality control as they relate to food science.

333-211A BIOCHEMISTRY I. (3) (3lectures) (Corequisite: 333-230A) Biochemistry of carbohydrates, lipids, proteins, nucleic acids; enzymes and coenzymes. Introduction to intermediary metabolism. (awaiting University approval prerequisite change to corequisite)

333-212A BIOCHEMISTRY LABORATORY. (2) (1 lecture, 1 lab) (Corequisite: 333-211A) The laboratory use of ionic strength and pH; the chemical properties of carbohydrates, lipids, proteins and enzymes; the instruction of laboratory techniques such as titration, chromatography, the use of the analytical balance and the pH meter.

333-213A ANALYTICAL CHEMISTRY I. (3) (3lectures and one 3-hour lab) Theoretical aspects of wet chemical techniques including gravimetric and volumetric analyses, redoximetry, and separation techniques.

333-230A ORGANIC CHEMISTRY. (4) (3lectures and one 3-hour lab) Atomic and molecular structure, modern concepts of bonding, overview of functional groups, conformational analysis, stereochemistry, mechanisms and reactions of aliphatic compounds.

333-233B PHYSICAL CHEMISTRY. (3) (3lectures) Introduction to kinetic theory, thermodynamics, properties of liquids and solids, chemical equilibrium and the law of mass action, phase rule, properties of solutions, chemical kinetics.

333-251B FOOD CHEMISTRY I. (3) (3lectures and one 3-hour lab) (Prerequisite: 333-211A) A study of the chemistry and functionality of the major components comprising food systems, such as water, proteins, carbohydrates and lipids. The relationship of these components to food stability will be studied in terms of degradative reactions and processing.

333-300A FOOD ANALYSIS I. (3) (3lectures and one 3-hour lab) (Prerequisite: 333-251B) The theory and methodologies for the analysis of food products for moisture, fat, protein, ash and fibre (proximate analysis). The quantitative aspects of colour measurement and infrared spectroscopy are also developed in relation to the analysis of food systems.

333-305A FOOD CHEMISTRY II. (3) (3 lectures and one 3-hour lab) (Prerequisite: 333-251B) A study of the chemistry and functionality of the minor components comprising food systems, such as enzymes, anthocyanins, carotenoids, additives, vitamins and essential oils. The relationship of these components to food stability in terms of degradative reactions and processing.

333-310A POSTHARVEST FRUIT & VEGETABLE TECHNOLOGY. (3) (3 lectures and one 3-hour lab) The post harvest chemistry and physiology of horticultural crops as they affect quality and market-

ability, handling methods pre and post harvest, principles and practices in cooling, storage, transportation and packaging.

333-315B FOOD ANALYSIS II. (3) (3lectures and one 3-hour lab) (Prerequisite: 333-300A) A more detailed treatment on the principal analytical techniques associated with the analysis of carbohydrates, lipids, proteins and vitamin constituents in food systems.

333-319B FOOD CHEMISTRY III. (3) (2 lectures and one 3-hour lab) (Prerequisite: 333-305A) The relationship between the chemistry of food constituents present in common commodities, such as milk, meat, eggs, cereals, oilseeds etc. and the common processing methodologies associated with their transformation into stable food product.

333-330B FOOD PROCESSING. (3) (3lectures and one 3-hour lab) (Prerequisite: 333-251B) The principles and practices of food processing with an emphasis on canning, freezing, and dehydration. A survey of the newer methods of food preservation such as irradiation, reverse osmosis etc.

333-334B ANALYTICAL CHEMISTRY II. (3) (3lectures and one 3-hour lab) (Prerequisite: 333-213A or equivalent) Theoretical and practical aspects of potentiometric measurements (pH and other ion-selective electrodes), spectrophotometry, atomic absorption spectroscopy and automated chromatography.

333-400A FOOD PACKAGING. (3) (3lectures and one 3-hour lab) (Prerequisite: 333-305A) An integrated approach to the materials used for the packaging of food products, considering the physical, chemical and functional characteristics of such materials and their utility, relative to the chemistry of the food system they are designed to enclose and preserve.

333-405A PRODUCT DEVELOPMENT. (3) (3 lectures and one 3-hour lab) (Pre/co-requisite: 333-305A) The chemical, technological and procedural aspects of product development. An understanding of the role and functionality of food ingredients such as acidulants, phosphates, modified starches, gums, emulsifiers, food additives and other functional components in relation to the formulation of food products.

333-410B FLAVOUR CHEMISTRY. (3) (3lectures) (Prerequisite: 333-305A) The chemistry of the flavour constituents of foods, synthesis, modification, extraction and use.

333-425B PRINCIPLES OF QUALITY ASSURANCE. (3) (3lectures) (Prerequisite: 360-310A,B) The principles and practices required for the development, maintenance and monitoring of systems for food quality and food safety. The concepts and practices of Hazard Analysis Critical Control Point; ISO 9000; Total Quality Management; Statistical Sampling Plans, Statistical Process Control; Tools of Quality; Government Regulations.

□ **333-490A,B RESEARCH PROJECT 1.** (3) A course designed to give final year undergraduate students research experience. The project will be carried out under the supervision of a Department staff member and will consist of a literature survey, experimental or theoretical work, a written report and an oral examination.

333-491A,B RESEARCH PROJECT 2. (3) (Pre-or co-requisite: 333-490. Registration by Department permission only.) A laboratory research project.

333-495D,N FOOD SCIENCE SEMINAR. (3) (2 lectures) Two 20-minute presentations (1 per term) on an assigned or selected topic. The purpose is to research a subject and present to a peer audience the essence of the subject investigated. Development of presentation and communication skills at a professional level is stressed and rapport with the industry will be established through guest speakers.

★ **333-500B FOOD ENZYMOLOGY.** (3) (3lectures) (Prerequisite/ Corequisite: 333-305A) Enzymes as they pertain to the deteriorative processes, as processing aids and their use as analytical tools in food.

★ **333-510B FOOD HYDROCOLLOID CHEMISTRY.** (3) (3lectures) (Prerequisite: 333-319B. Corequisite: 333-305A) The concepts of colloid chemistry as it applies to food systems. Components such as proteins, gums, carbohydrates, and emulsions are studied in

terms of their chemical and physical properties (i.e., rheology, optical characteristics, etc.) and how they can be used to advantage in food systems.

★ **333-519B ADVANCED FOOD PROCESSING.** (3) (3 lectures) (Prerequisite: 333-330B) Advanced technologies associated with food processing studied in more detail. Topics include food irradiation, reverse osmosis, super critical fluid extraction and extrusion.

★ **333-520A BIOPHYSICAL CHEMISTRY OF FOOD.** (3) (3 lectures) (Prerequisite: 333-233B) This courses will cover recent advances in the application of spectroscopic techniques, including infrared, Raman, near-infrared, circular dichroism, and fluorescence spectroscopy, to the study of biomolecules of relevance to food. Particular emphasis will be placed on the molecular basis of structure-function and structure-functionality relationships.

★ **333-530A ADVANCED ANALYTICAL CHEMISTRY.** (3) (3 lectures) (Prerequisite: 333-213A) Selected instrumental methodologies including advances in automated chromatography, wide band NMR, chemical sensors, and the application of other spectroscopic techniques to the analysis of food constituents.

333-535A FOOD BIOTECHNOLOGY. (3) (3 lectures) (Prerequisite: 362-230B) Developments in biotechnology as it relates to food production and processing concerning traditional food fermentations as well as novel food biotechnology enzymes, ingredients, genetic engineering, plant tissue culture and developments for microbiological and food analysis.

7.5 Agricultural Economics

334-200A PRINCIPLES OF MICROECONOMICS. (3) (3 lectures) The field of economics as it relates to the activities of individual consumers, firms and organizations. Emphasis is on the application of economic principles and concepts to everyday decision making and to the analysis of current economic issues.

334-201B PRINCIPLES OF MACROECONOMICS. (3) (3 lectures) (Prerequisite: 334-200A or equivalent.) The overall economic system, how it works, and the instruments used to solve social problems. Emphasis will be on decision-making involving the entire economic system and segments of it.

334-230B ECONOMICS OF MARKETING. (3) (3 lectures) (Prerequisite: 334-200A or equivalent.) Marketing principles and practices, their relationship to the agriculture-food system, and the economic impact on all segments of this system. Emphasis on the application of marketing principles in problem-solving and in developing marketing and communication skills of the individual.

334-231B ECONOMIC SYSTEMS OF AGRICULTURE. (3) (3 lectures) (Prerequisite: 334-200A or equivalent.) The structure and organization of Canada's agriculture-food system, the operation, financing, linkages, and functions of its components. Focus to be on management of the various components and the entire system, types of problems confronted now and in the future.

334-242A MANAGEMENT THEORIES AND PRACTICES. (3) (3 lectures) An introduction to contemporary management theories and practices in organizations of the food sector.

334-320B ECONOMICS OF AGRICULTURAL PRODUCTION. (3) (3 lectures) (Prerequisite: 334-200A or equivalent.) An intermediate theory course in agricultural economics, dealing with economic concepts as applied to agricultural production and cost functions. Includes theory and application of linear programming as related to production decisions.

334-331A FARM BUSINESS MANAGEMENT. (3) (3 lectures) (Prerequisite: 334-200A or equivalent.) Managing a farm business. Topics include: the decision making process, farm business centre and farm records, farm management and economic concepts, farm planning and budgeting, input management (land, capital, labour and time), tax management (farm organization, estate planning, etc.).

334-333A RESOURCE ECONOMICS. (3) (Prerequisites: 334-200A or equivalent.) The role of resources in the environment, use of resources, and management of economic resources within the

firm or organization. Problem-solving, case studies involving private and public decision-making in organizations are utilized.

334-343B ACCOUNTING AND COST CONTROL. (3) (3 lectures) An introduction to the basic principles and concepts of responsibility accounting and cost control, analysis and utilization of financial statements and control system data for decision making.

334-344A ENTREPRENEURIAL LEADERSHIP. (3) (3 lectures) Leadership concepts and theory, with applications in the context of small and medium-sized organizations. An examination of behaviour models and their relationship to various leadership functions, such as how to set objectives, give praise and instructions, mentor, resolve conflicts, and negotiate.

334-350B AGRICULTURAL FINANCE. (3) (3 lectures) (Prerequisite: 334-331A) The economic study of acquisition and use of capital in agriculture. Topics include: the analysis of financial statements; farm appraisal; investment analysis; risk in financial management; the cost of capital and the role of financial intermediaries serving agriculture; aggregate financing in agriculture.

334-425A AGRICULTURAL ECONOMETRICS. (3) (3 lectures) (Prerequisites: 360-310A,B, 334-200A and 334-201B or equivalents.) Concepts and procedures used in defining and estimating econometric models applied in agriculture. Emphasis on application and estimation of single equation models and solutions to problems such as auto-correlation, heteroscedasticity and multicollinearity. Use of dummy variable technique.

334-430B AGRICULTURE, FOOD AND RESOURCE POLICY. (3) (3 lectures) (Prerequisites: 334-201B or equivalent, and 334-320A.) Examination of Canadian, North American and international agriculture, food and resource policies, policy instruments, programs and their implications. Economic analysis applied to the underlying principles, procedures and objectives of various policy actions affecting agriculture.

334-440A ADVANCED AGRICULTURE AND FOOD MARKETING. (3) (3 lectures) (Prerequisites: 334-201B or equivalent, and 334-320A.) The nature and the economic organization of agricultural and food marketing including the application of economic concepts to problems and procedures, and their impact on Canadian and North American agriculture. Pricing and marketing of principal agricultural products in Canada is examined.

334-442B ECONOMICS OF INTERNATIONAL AGRICULTURAL DEVELOPMENT. (3) (3 lectures) (Prerequisites: 334-200A or 334-201B or equivalent.) The course deals with economic aspects of international development with emphasis on the role of food, agriculture and the resource sector in the economy of developing countries. Topics will include, world food analysis, development project analysis and policies for sustainable development. Development case studies will be used.

334-450B AGRI-BUSINESS MANAGEMENT. (3) (3 lectures) (Prerequisites: 334-230B and 360-310A,B) Management of operations in agribusiness firms. The use of computer models to make decisions on output mix, facility location, expansion, inventory management and production and strategy.

334-452B STUDIES IN AGRIBUSINESS. (3) (Open only to U3 students in Agribusiness Management option in Agricultural Economics.) This course integrates subject matter from agricultural economics and management through the use of case studies. Topics include feasibility analyses for new ventures, market research, strategic management decisions, workforce management, and international dimensions of agribusiness. Students will prepare written and oral presentations of individual and group case studies.

334-453A VENTURE CAPITAL OPPORTUNITIES. (3) (3 lectures) (Prerequisite: 334-343) A course for students in non-business programs to assist them to assist in navigating local financial markets and to obtain financing. The course examines financing for new business, expansion, and specific needs such as seasonal fluctuations, working capital, expanding sales, new product development, management buyouts, and succession planning.

334-491A RESEARCH SEMINAR IN AGRICULTURAL ECONOMICS. (3) (3 lectures) (Prerequisites: 334-201B or equivalent, and 334-320A.) The nature, methods, and objectives of agricultural economics research concerned with the economic problems affecting the agriculture and food system. Emphasis is on problem identification, and the collection, analysis, and presentation of evidence. Students will present one or more seminars on a research project in agricultural economics.

334-492A,B SPECIAL TOPICS IN AGRICULTURAL ECONOMICS. (3) (Prerequisite: 334-201B or equivalent.) Students will pursue topics that are not otherwise available in formal courses. An individual course of study will be followed under the supervision of a member of the staff qualified in the appropriate discipline or area.

334-493D,N SPECIAL TOPICS IN AGRICULTURAL ECONOMICS. (3) Presentation and discussion of current problems in agricultural economics by staff and/or special guests. This course is offered on an irregular basis under special circumstances.

334-495D,N PROJECT. (3) Under the supervision of a staff member of the Department of Agricultural Economics. Project topic will concern the economics of agriculture, food, or resource development. An agreement between the students and involved staff members must be reached prior to registration.

7.6 Agricultural and Biosystems Engineering

NOTE: Instructors may refuse registration in a course to any student who does not have, in their opinion, an adequate background in the area.

336-103A,B LINEAR ALGEBRA. (3) (3 lectures and 1 conference) Vectors: equality and inequality, geometric representation, polar form, addition and subtraction, unit vectors, dot product, cross product, triple scalar and vector products, use of vectors in 3-D geometry. Matrices: definition, equality and inequality, addition and subtraction, multiplication, null matrix, identity matrix, triangular and diagonal matrices, determinants, matrix inverse, matrix applications.

336-200B ELEMENTS OF AGRICULTURAL ENGINEERING. (3) (3 lectures and one 2-hour lab) Principles of the engineering infrastructure supporting the symbiotic/parasitic agricultural ecosystem. Topics include the thermodynamic, equipment, systems and environmental considerations of land development, cultivation, drainage and irrigation; soil and water quality conservation; plant and animal production environments; food and feed harvesting, storage and processing; automation, robotics and information systems.

336-210A MECHANICS I. (4) (3 lectures and 2 hours lab or problems) Non-concurrent force systems; analysis of simple trusses and multiframe frames; friction, shearing forces and bending moments in beams and frames; centres of gravity; solution of problems by energy methods.

336-211B MECHANICS II. (4) (3 lectures and 2 hours labs or problems) (Prerequisite: 336-210A) Kinematics, dynamics, energy, momentum, relative motion, the moment of momentum of particles and rigid bodies; the inertia tensor; introduction to vibrations.

336-212A GRAPHICS. (3) (1 lecture and two 2-hour labs) This is a computer based course taught using personal computer technology. The course content includes principles of engineering drawing, the use of drafting instruments, computer graphics, engineering design, and 2D and 3D drafting with AUTOCAD.

★ **336-214A SURVEYING.** (3) (2 lectures and one 3-hour lab) The engineer's level and the theodolite are used to perform benchmark circuits, profile levelling, topographic maps and straight line extensions. A total station, computer programs and use of GPS are introduced.

336-216B MATERIALS SCIENCE. (3) (2 lectures and one 2-hour lab) Relation between structure and properties in ceramic and organic materials. Bonding, structures, imperfections. Phase diagrams. Shaping, joining and testing of materials. Heat treatment, work in hardening and annealing of metals, introduction to physical metallurgy and processes. Failure theories.

336-217B HYDROLOGY AND DRAINAGE. (3) (3 lectures, one 2 hour lab) Measurement and analysis of components of the water cycle, and their relation to drainage. Precipitation, mass curves, intensity-duration frequency relationships. Evaporation from lakes, soil and vegetal covers. Interception, infiltration, groundwater, runoff hydrograph components. Estimation of water quantities and water flow rates for design of water control projects. Design of drainage systems.

336-251A,B MICROCOMPUTER APPLICATIONS. (3) (3 lectures and one 2-hour lab) A user level computing course oriented toward the use of microcomputers rather than programming. Networks, windows, FTP, web searching, e-mail, word processing, web pages, spreadsheets, slide shows, and other uses.

336-252A STRUCTURED COMPUTER PROGRAMMING. (3) (3 lectures and one 2-hour lab) A user level computer programming course in Fortran-90 language. The pros and cons of computerization, differences between mainframe and microcomputers, network basics, discussion of the use of Fortran-90 and C languages to solve engineering problems, electronic spreadsheet analysis and the use of other software packages will be studied from an engineering point of view.

336-301A BIO-THERMODYNAMICS. (3) (3 lectures and one 2-hour lab) Classical thermodynamic analysis of pure and simple compressible systems. The course covers the first and second laws of thermodynamics. It deals with basic concepts of thermodynamics and thermochemistry in biological systems

336-305A FLUID MECHANICS. (4) (3 lectures and one 2-hour lab or problems.) (Prerequisites: 336-211B, 360-202A) Properties of fluids; fluid statics; principles of flow of incompressible and compressible fluids; dimensional analysis boundary layers; conduit and open channel systems; simple applications to turbo machinery.

336-312B CIRCUIT ANALYSIS. (3) (3 lectures and one 2-hour lab or problems.) (Prerequisite: 360-205B) General circuit laws and d.c. circuits; electromagnetic circuits; inductance and capacitance, natural and forced response of circuits; analysis of single phase and three phase networks; transformers, AC and DC motors/generators.

336-314B AGRICULTURAL STRUCTURES. (3) (3 lectures and 2-hour lab) Analysis and design of structures to house animals and plants and to process and store animal and plant products. Introduction to environmental control systems and animal waste management.

336-315A DESIGN OF MACHINES. (4) (3 lectures, 2 hours problems) (Prerequisite: 336-341B) Design of shafting, bearings, gear, belt and chain drives, clutches, brakes, vibrations, fasteners, welded joints, frames. Principles and practices of Engineering Drawing will be adhered to in laboratory submissions.

336-319A APPLIED MATHEMATICS. (3) (1 lecture, two 2-hour labs) (Prerequisite: 336-252A) This is a computer-based course taught via personal computer technology. The objectives of the course are to familiarize students with a number of computer-based mathematical engineering tools and to teach them how to effectively do mathematics with these. Subjects covered are: data conversion; data modelling and curve fitting; 3D geometry; vector and matrix algebra; filtering and filter design. A number of commercial software products will be used; these will be updated as the technology evolves.

★ **336-322A FOOD PROD/PROCESSING WASTE MGMT.** (3) (2 lectures and one 2-hour lab) An introduction to engineering aspects of handling, storage and treatment of agricultural and food industry wastes. For all three of these components, design criteria will be elaborated and related to the characteristics of various wastes. Treatments reviewed will discuss physical, chemical and biological systems.

● **336-323A PHYSICAL PROPERTIES OF BIOLOGICAL MATERIALS.** (3) (2 lectures and one 2-hour lab) (Prerequisite: 336-341B)

336-324A ELEMENTS OF FOOD ENGINEERING. (3) (3 lectures) (Pre/co-requisite 333-330B.) (Not open to students in the B.Sc.(Agr.Eng.) program.) A course in basic food engineering for

non-engineering students, covering heat transfer, mass and energy balances, food process unit operations, material transport/steam/refrigeration systems.

336-325A FOOD ENGINEERING. (3) (3 lectures and one 3-hour lab) Heat and mass transfer, enthalpy and mass balances, sterilizing, freezing, fluid flow, pipes, steam, refrigeration, pumps and valves.

336-330B GIS FOR BIOSYSTEMS MANAGEMENT. (3) (2 lectures and one 2-hour lab) Applications of PC-based Geographic Information Systems (GIS) to the presentation and analysis of natural resources information. Spatial data sources and capture, data structure and analysis and modelling will be reviewed with reference to natural resource management and environmental concerns.

336-341B STRENGTH OF MATERIALS. (4) (3 lectures and one 3-hour lab) (Prerequisite: 336-210A) Stress, strain, resilience, elastic and plastic properties of materials; bending moment and shear force diagrams; bending and shear stress; deflections; simple, fixed and continuous beams, torsion and helical springs, reinforced concrete beams; columns, bending and direct stress; general case of plane stress; Mohr's circle.

● **336-411A OFF-ROAD POWER MACHINERY.** (3) (2 lectures and one 3-hour lab) (Prerequisite: 336-211B)

336-412A AGRICULTURAL MACHINERY. (3) (3 lectures and one 3-hour lab) Study and analysis of machines for tillage, harvesting, crop processing and handling. Field tests, load studies, design requirements; design of machines and components for agricultural applications.

● ★ **336-416A ENGINEERING FOR LAND DEVELOPMENT.** (3) (3 lectures and one 2-hour lab or design problems) (Prerequisite: 336-217B)

336-418B SOIL MECHANICS AND FOUNDATIONS. (3) (3 lectures and one 3-hour lab) (Prerequisite: 336-341B) The exploration of subsoils, strength theories, granular and cohesive soils, foundation design, settlement calculation, consolidation, slope stability, Atterberg limits, triaxial testing, direct shear testing, compaction, soil freezing, frost heaving.

● ★ **336-419A STRUCTURAL DESIGN.** (3) (3 lectures and one 3-hour lab or design problems) (Prerequisites: 336-341B, 303-213A)

336-490A,B DESIGN 1. (2) (1 lecture) (Prerequisite: 336-315A) The student is expected to develop a professional design project proposal with due considerations to executive summary, synthesis, methodology, milestones, budget, etc.

336-491D,N SEMINAR 1. (1) Attendance and participation in departmental seminars.

336-492D,N SEMINAR 2. (1) Attendance and participation in departmental seminars.

336-493D,N SEMINAR 3. (1) Attendance and participation in departmental seminars.

336-495A,B DESIGN 2. (3) (1 lecture) (Prerequisite 336-490A,B) The student is expected to implement, physically or virtually, the project proposed in the Design 1 course. The student is expected to present project outcome, in both written and oral forms and learn to be critical about their own work and those of others.

336-500B ADV APPLICATIONS OF MICRO IN AGRICULTURE. (3) (3 lectures and one 2-hour lab) (Prerequisite 335-251A, B or 336-252A) A computer-based course taught via personal computer technology. The course covers advances in computer use for bio-system design, construction, maintenance and operation including agricultural and environmental systems. Topics include multi-media, rule-based expert systems, neural networks and artificially-intelligent control systems.

336-504B INSTRUMENTATION AND CONTROL. (3) (3 lectures and one 2-hour lab) (Prerequisite: 336-312A or 304-281B) Principles and operation of instrument systems used for measurement and control in agricultural processes and research.

● **336-506A,B,C ADVANCES IN DRAINAGE AND WATER MANAGEMENT.** (3) (3 lectures)

336-509A,B HYDROLOGIC SYSTEMS AND MODELLING. (2) 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.

★ **336-512B SOIL CUTTING AND TILLAGE.** (3) (2 lectures and one 2-hour lab) (Prerequisite: 336-341B) Soil mechanics applied to cutting, tillage and drain installation tools. Soil cutting forces for two and three dimensional implements. Soil loosening, inversion, sorting and manipulation. Selection of traction machines to match soil cutting and tillage requirements. Depth and grade control systems. Analysis of drainage machines, wheel trenchers, chain trenchers and trenchless plows.

● **336-514B DRAIN PIPE AND ENVELOPE MATERIALS.** (3) (3 lectures)

336-515B COMPUTER MODELS IN DRAINAGE ENGINEERING. (3) (3 lectures and one 3-hour lab) A review of computer simulation models for 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.

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

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

★ **336-518A POLLUTION CONTROL FOR AGRICULTURE.** (3) (One 3 hour lecture) Special topics concerning control of pollution agents from the agricultural industry; odour control, agricultural waste treatment including biological digestion, flocculants, land disposal and sedimentation, pesticide transport.

336-519A,B ADVANCED FOOD ENGINEERING. (3) (3 lectures and one 2-hour lab) (Prerequisites: 336-325 and 305-426, or permission of instructor.) Advanced topics in food engineering. Concepts of mathematical modeling and research methodologies in food engineering. Topics include heat and mass transfer in food systems, packaging and distribution of food products, thermal and non-thermal processing, rheology and kinetics of food transformations.

★ **336-525B VENTILATION OF AGRICULTURAL STRUCTURES.** (3) (3 lectures and one 3-hour lab) (Prerequisite 336-301A) The analyses of heat and water vapour transfer through the structure of buildings are used to design heating, ventilation and refrigeration systems. Heat conduction and convection as well as radiation are included in the analysis of heat transfer. Ventilation systems are designed for livestock shelters, produce storages and greenhouses.

★ **336-530B FERMENTATION ENGINEERING.** (3) (3 lectures and one 3-hour lab) (Prerequisite 336-325 or equivalent.) Advanced topics in food and fermentation engineering are covered, including brewing, bioreactor design and control and microbial kinetics.

Graduate courses available to senior undergraduates with permission of the instructor.

● **336-605B FUNCTIONAL ANALYSIS OF MACHINES.** (3) (3 lectures) (Prerequisites: 336-211B and 336-323A.)

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

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

336-616A,B ADVANCED SOIL AND WATER ENGINEERING. (3) (3 lectures) Derivation of the governing partial differential equations for both steady and unsteady 3-D flow of groundwater through a variably saturated, heterogeneous, anisotropic and deformable medium, finite difference techniques, numerical method of lines (NMOL), computer programs, stochastic methods in soil and water engineering.

The following courses to be taken with the Faculty of Engineering, McGill Downtown Campus. (See the Faculty of Engineering section for descriptions.)

305-346B HEAT TRANSFER. (3) (3 lectures and 1 hour problem)

305-362B MECHANICAL LABORATORY. (2) (3 hour lab)

306-310B ENGINEERING ECONOMY. (3) (3 lectures)

7.7 Physics

338-112A INTRODUCTORY PHYSICS I. (4) (3 lectures and one 2-hour lab) Accelerated motion. Newton's Laws. Force, work and energy, power; momentum. Conservation principles. Circular motion. Simple harmonic motion. Waves and sound.

338-114B INTRODUCTORY PHYSICS II. (4) (3 lectures and one 2-hour lab) Electric and magnetic properties of matter: electrostatics, electric currents, the link between electric and magnetic phenomena, geometrical optics, interference diffraction.

338-201A INTRODUCTORY METEOROLOGY. (3) (3 lectures) The atmosphere – its properties (structure and motion), and thermodynamics (stability, dry and moist). Clouds and precipitation. Air masses and fronts. Radiation and the global radiation budget. Interactions between the atmosphere and the biosphere.

● **338-303A ADVANCES IN ATOMIC AND NUCLEAR SCIENCE.** (3) (3 lectures and 1 conference)

● **338-405B TRACER TECHNIQUES.** (3) (3 lectures and one 3-hour lab) (Prerequisite: 338-303A or equivalent.)

● ★ **338-510B AGRICULTURAL MICROMETEOROLOGY.** (3) (3 lectures)

7.8 Animal Science

342-234B BIOCHEMISTRY II. (3) (3 lectures and one 3-hour lab) (Prerequisite: 333-211A) Metabolism in humans and domestic animals. The chemistry of alimentary digestion, absorption, transport, intermediary metabolism and excretion.

342-250A PRINCIPLES OF ANIMAL SCIENCE. (3) (3 lectures and one 2-hour lab) Introduction to the scientific principles underlying the livestock and poultry industries. Emphasis will be placed on the breeding, physiology and nutrition of animals raised for the production of food and fibre.

342-251B COMPARATIVE ANATOMY. (3) (3 lectures and one 3-hour lab) Study of the macroscopic anatomy of mammals based on detailed dissection of the dog. Comparison with other domestic species will be emphasized.

342-301B PRINCIPLES OF ANIMAL BREEDING. (3) (3 lectures and one 2-hour lab) (Prerequisite: 360-310A,B or equivalent) The qualitative and quantitative aspects of genetics as they apply to the economic improvement of domestic mammals and birds. Topics include: animal domestication, animal cytology, Mendelian traits of economic importance, principles of population genetics, statistical tools to describe populations, environmental effects, selection and mating systems.

342-312B ANIMAL PATHOLOGY. (3) (2 lectures and one 2-hour conference) Introductory animal pathology. Includes discussion of causative agents, the development of the disease process, degenerative changes, protective mechanisms, factors influencing spread of disease and the control of disease.

342-323A MAMMALIAN PHYSIOLOGY. (4) (3 lectures and one 3-hour lab) (Prerequisite: 344-202B or equivalent.) A study of the organization, functions and regulation of various organ systems in mammals. The nervous, endocrine, muscular, cardiovascular, respiratory, urinary, digestive and reproductive systems are discussed.

342-324A ANIMAL REPRODUCTION. (3) (3 lectures and one 3-hour lab) (Prerequisites: 342-250A, 333-211A and 342-323A) Reproduction in domestic animals integrated with management techniques to improve reproductive efficiency. Laboratory training

includes anatomy, semen collection and evaluation, oestrus detection and control, artificial insemination and embryo transfer.

342-330A FUNDAMENTALS OF NUTRITION. (3) (3 lectures) (Prerequisites: 333-211A and 342-234B) A discussion of the nutrients; water, carbohydrates, lipids, proteins, minerals and vitamins, with particular emphasis on their functions in and essentially for the animal organism.

342-424B METABOLIC ENDOCRINOLOGY. (3) (3 lectures and one 3-hour lab) (Prerequisite: 342-323A) A detailed study of the endocrine system and its role in the maintenance of homeostasis in higher vertebrates, including the endocrine regulation of energy balance.

342-433B ANIMAL NUTRITION. (3) (3 lectures and one 1-hour lab) (Prerequisites: 342-250A and 342-330A) Critical discussion of nutrient utilization by farm animals, an assessment of nutritive value of feeds. Recent developments in nutritional manipulation are discussed.

342-450A DAIRY CATTLE PRODUCTION. (3) (3 lectures and one 2-hour lab) (Prerequisite: 342-250A) The application and integration of biological principles of genetics, physiology, nutrition and pathology and of economics and engineering for the maximum production efficiency of milk and meat by dairy cattle. Emphasis on recent developments. Trips to dairy farms and related enterprises included as laboratory work.

342-452B BEEF CATTLE AND SHEEP PRODUCTION. (3) (3 lectures and one 2-hour lab) (Prerequisite: 342-250A) The application and integration of biological principles of genetics, physiology, nutrition and pathology and of economics and engineering for the maximum production efficiency of beef and sheep. Trips to beef and sheep farms and related enterprises will comprise part of the laboratory work.

342-454B SWINE PRODUCTION. (3) (3 lectures and one 2-hour lab) (Prerequisite: 342-250A) The application and integration of biological principles of genetics, physiology, nutrition and pathology and of economics and engineering for the maximum production efficiency of swine. Trips to swine farms and related enterprises will comprise part of the laboratory work.

342-455A,B SPECIAL TOPICS IN ANIMAL SCIENCE. (3) Topics that are not otherwise available in formal courses. Investigation of a particular topic will be carried out under the supervision of a staff member who has expertise in the area of study chosen by the student.

342-456A POULTRY PRODUCTION. (3) (3 lectures and one 2-hour lab) (Prerequisite: 342-250A) The application and integration of biological principles of genetics, physiology, nutrition and pathology, and of economics and engineering for the maximum production efficiency of poultry meat and eggs. Trips to poultry farms and related enterprises will comprise part of the laboratory work.

342-460B BIOLOGY OF LACTATION. (3) (3 lectures) (Prerequisites: 344-202B or equivalent and 333-211A or equivalent.) An interdisciplinary approach to the study of mammary development, the onset of lactation and its cessation. The course will compare the differences in mammalian species in mammary development from embryological, pre- and post-pubertal and pre- and post-partum aspects. Lactation will be discussed at the cellular and biochemical levels.

342-465B APPLIED INFORMATION SYSTEMS. (3) (3 lectures and one 2-hour lab) (Prerequisite: 336-251A,B or demonstrated equivalency.) Introduction to concepts of an Information System and subsequent application to various scenarios in agriculture. Industry analysis in terms of users, goals, available data/information, communication, delivery structure, decision making, feedback, exploitation of technology and possible improvements using the Internet. Individual case studies and familiarisation with cutting-edge computer applications.

342-490D,N PROJECT IN ANIMAL SCIENCE. (3) A project to be completed under the supervision of a staff member of the Department of Animal Science. An agreement between student and the involved staff member must be reached prior to registration.

342-495D,N SEMINAR. (2) (1 lecture and 1 lab) Instruction on the preparation, presentation and discussion of critical reviews of topics important to animal agriculture to be followed by student presentation of above reviews.

Graduate courses available to undergraduates

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

342-504A POPULATION GENETICS IN ANIMALS. (3)

342-551B CARBOHYDRATE & LIPID METABOLISM. (3)

342-552A PROTEIN METABOLISM AND NUTRITION. (3)

Certain other graduate courses are available to undergraduates by permission. Please consult the Graduate Studies Calendar.

7.9 Biology

344-120A GENERAL BIOLOGY. (3) (2 lectures and one 3-hour lab) (Not open to students who have passed CEGEP objective 00UK or equivalent (formerly Biology 301). An introduction to the structure, function and adaptation of plants and animals in the biosphere.

344-200A BIOLOGY OF ORGANISMS. (3) (3 lectures and 1 lab) The major taxonomic divisions of living organisms; the Protozoa with special reference to parasitic forms; animal embryology; a survey of the structure and biology of the major phyla, with emphasis on animal parasites and entomology.

344-202B CELLULAR BIOLOGY. (3) (4 lectures) Organization and function of intercellular organelles in eukaryotic cells. Protein synthesis and control of protein transport within the cell. Cell division and DNA replication. Energy metabolism and electron transport. Signal transduction and transmembrane signalling. Differentiation of cells and cancer. Function and components of the immune system.

344-205B PRINCIPLES OF ECOLOGY. (3) (2 lectures and 1 conference) The interactions of organisms and the physical environment. Ecological principles will be discussed at the level of the individual, the population and the community.

● **344-306B BIOLOGICAL INSTRUMENTATION.** (3) (Two 3-hour labs)

344-495D,N ENVIRONMENTAL BIOLOGY SEMINAR. (2) (1 lecture) Presentation of papers on, and discussion of, topics from the field of environmental biology.

7.10 English

There are three types of English courses. Two of them, ESL and EAP courses, have restrictions.

ESL (English as a Second Language) restrictions:

All courses below marked ESL are open to full-time, non-anglophone students. Non-anglophone students who, for a period of more than four years, have attended secondary institutions (high school and CEGEP) where the primary language of instruction was English are not eligible for ESL courses. Students who have taken courses at other post-secondary institutions are not eligible for courses described below which are judged to be equivalent. Equivalent, McGill, ESL courses are mutually exclusive as follows: 348-300 and 128-300; 348-301 and 128-301. Students too weak in English for 348-300 should inquire about the 128-200 and 128-201 courses offered on the Downtown Campus (Faculty of Arts).

EAP (English for Academic Purposes) restrictions:

348-330 requires an entrance placement test (see below), a password, and is limited enrolment (capped). This course is not a remedial writing course, and it is not an English as a Second Language course. For this reason there are entrance requirements. The course is designed to allow students who have strong English language skills, and who have mastered basic writing skills, to develop academic and scientific writing skills. Students who are not sufficiently strong in English for this course should consider the ESL courses described below.

Entrance-Placement tests for ESL and EAP courses are co-ordinated through the office of the Associate Dean (Student Affairs). Placement tests will take place during the first regularly scheduled meeting of the class. Passwords will then be issued. Telephone (514) 398-7718 for further information. Quebec ESL students must bring copies of CEGEP transcripts. Students who have taken ESL courses for credit at a college or university other than McGill must also bring copies of transcripts. All ESL and EAP students are required to attend class without fail during their first two weeks in order to retain their places. Places for EAP and ESL courses are assigned on a first come, first served basis.

348-300A,B ESL: HIGH INTERMEDIATE I. (3) (3 hours) (Prerequisite: placement test.) (Restrictions: see above.) Improves proficiency of general writing skills while developing reading, oral and aural skills. Focuses on the structure of the English language and the process required to produce coherent short papers. Emphasis on the English of food, agriculture, and the environment.

348-301A,B ESL: HIGH INTERMEDIATE II. (3) (3 hours) (Prerequisite: 348-300 or placement test.) (Restrictions: see above.) A continuation of 300A,B. Further improves proficiency of general writing skills while developing reading, oral and aural skills. Focuses on the structure of the English language and the process required to produce coherent short papers. Emphasis on the English of food, agriculture, and the environment.

348-330A,B EAP: FUNDAMENTALS OF ACADEMIC AND SCIENTIFIC WRITING. (3) (3 hours) (Prerequisite: entrance test.) (Restrictions: see above.) The object of the course is to enable students who have previously mastered the basic elements of written English to produce well-written, well-researched, and well-documented scientific papers for an academic audience.

7.11 Zoology

349-307A NATURAL HISTORY OF THE VERTEBRATES. (3) (Lectures and modules.) Review of higher taxonomic groups of vertebrates and prochordates, emphasizing diagnostic characters evolution and distribution.

349-311B ETHOLOGY. (3) (2 lectures, one 3-hour lab) Invertebrate and vertebrate behaviour; innate behaviour, learning, motivation, agonistic behaviour, rhythms, social organization, mating systems and communication.

★ **349-312A ZOOLOGICAL SYSTEMATICS AND EVOLUTION.** (3) (3 lectures, and assignments.) Introduction to animal taxonomy; "the New Systematics"; species concept; variation; speciation; reproductive isolation; evolution; phylogeny; phenetics: zoological nomenclature; methodology, etc.

★ **349-313B ZOOGEOGRAPHY.** (3) (2 lectures, 1 conference and project) (Prerequisite: 349-312A) Factors affecting the areal, regional and world distribution of animal groups and species, with particular reference to the post-mesozoic fauna; related aspects of evolutionary and phylogenetic theory, e.g., adaptation, mimicry, parallel and convergent evolution, Plate Tectonics, climatic and topographical variation, dispersal.

★ **349-315A SCIENCE OF INLAND WATERS.** (3) (2 lectures and one 3-hour lab) (Prerequisite: Any basic Botany or Zoology course.) Nature and history of limnology; divisions of inland waters; properties of fresh water; habitats; zones; nutrient cycles; biota; adaptations; seasonal variation; distributions; pollution; succession and evolution of fresh water environments. Includes field excursions.

349-424B PARASITOLOGY. (3) (2 lectures and one 3-hour lab) Systematics, morphology, biology and ecology of parasitic protozoa, flatworms, roundworms and arthropods with emphasis on economically and medically important species.

7.12 Entomology

● ★ **350-440B SYSTEMATIC ENTOMOLOGY.** (3) (1 lecture, 1 lab and project) (Prerequisite: 373-330A)

350-452B BIOCONTROL OF INSECT PESTS. (3) (3 lectures) Modern concepts of integrated control techniques and principles of insect

pest management, with emphasis on biological control (use of predators, parasites and pathogens against pest insects), population monitoring, and manipulation of environmental, behavioral and physiological factors in the pest's way of life. Physical, cultural, and genetic controls and an introduction to the use of non-toxic biochemical controls (attractants, repellents, pheromones, anti-metabolites).

Graduate courses available to undergraduates with permission:

- ★ **350-525B INSECT ECOLOGY.** (3)
- ★ **350-535B AQUATIC ENTOMOLOGY.** (3)
- 350-600A,B INSECT PATHOLOGY.** (3)
- 350-610D ADVANCED TAXONOMY AND ZOOLOGY.** (3)

7.13 Extension Methods

- **352-300B COMMUNICATIONS – EXTENSION METHODS.** (3)
(Weekly 3-hour workshops)

7.14 Genetics

For course offering by term, refer to

<http://www.agrenv.mcgill.ca/plant/undergrad.htm>.

356-204A GENETICS. (4) (3 lectures, one 3-hour lab, one 1-hour tutorial.) The course integrates classical, molecular and population genetics of animals, plants, bacteria and viruses. The aim is to understand the flow of genetic information within a cell, within families and in populations. Emphasis will be placed on problem solving based learning. The laboratory exercises will emphasize the interpretation of genetic experimental data.

356-500A,B,E TECHNIQUES IN PLANT MOLECULAR GENETICS. (3)
This two-week intensive course uses an experimental laboratory-based approach to provide basic training in the analysis of plant genes and gene products. Some of the techniques covered will include DNA purification, restriction analysis, cloning, hybridization and protein expression.

356-501B PLANT MOLECULAR BIOLOGY AND GENETICS. (3) Photosynthesis, plant development, plant genome mutagenesis and analysis, and plant stress are discussed. Journal articles and reviews on all aspects of plant molecular biology and genetics.

7.15 Mathematics

360-101A CALCULUS I. (3) (3 lectures) (Prerequisite: a course in functions.) A review of functions and graphs. Limits, continuity, derivatives. Differentiation of elementary functions. Anti-differentiation. Applications.

360-102B CALCULUS II. (3) (3 lectures) (Prerequisite: Calculus I or equivalent.) Integration, the indefinite and definite integral. Trapezoidal and Simpson's Rule approximations for the integral. Applications to areas between curves, distance, volume, length of a curve, work, area of a surface of revolution, average values, moments, etc. Improper integrals and infinite series.

360-202A CALCULUS. (3) (3 lectures and 1 conference) Partial differentiation; multiple integrals; vector calculus; infinite series; applications.

360-205B DIFFERENTIAL EQUATIONS. (4) (4 lectures; 1 conference hour) (Prerequisite: 360-202A or equivalent.) Techniques for solution of ordinary 1st and 2nd order equations; power series solutions; systems of equations; introduction to partial differential equations; numerical techniques for solutions; applications to biological, chemical and engineering systems.

360-306A MATHEMATICAL METHODS IN ECOLOGY. (3) (3 hours) (Prerequisite: 344-205 or permission. Corequisite: 360-310 or permission.) An introduction to mathematical and graphical tools for use in ecology). Representation and interpretation of data and associated statistics in graphs and tables; theoretical modelling in plant and animal ecology, including difference and differential equation models. Introduction to stability analysis and probability theory. Emphasis is placed on graphical techniques.

360-310A,B STATISTICAL METHODS I. (3) (3 lectures and one 2-hour lab) Measures of central tendency and dispersion; normal, student's t, chi square, and F distribution; estimation and testing hypotheses; analysis of variance for simple experimental designs; regression and correlations; binomial and Poisson distribution.

360-403C ENVIRONMETRICS STAGE. (3) (Limited enrollment: Registration by application – Deadline December 15; the first seven applications received will have priority.) (Prerequisite: Permission of the instructor based on satisfactory completion of the U2 year of the Environmetrics Domain in the McGill School of Environment) Summer stage of at least four weeks, including a report. Provides students with professional experience in statistical analyses of environmental data. Can be undertaken at federal or provincial research stations and university research laboratories.

- ★ **360-411B EXPERIMENTAL DESIGNS.** (3) (2 1.5-hour lectures) (Prerequisite: 360-310A,B or equivalent) (Offered in alternate years with 360-414B)

- ★ **360-414B TEMPORAL AND SPATIAL STATISTICS.** (3) (2 1.5-hour lectures) (Prerequisite: 360-310A,B or equivalent) (Offered in alternate years with 360-411B) Temporal statistics; analysis in the time domain, Box-Jenkins forecasting methodology, analysis in the frequency domain. Spatial statistics: mapping, autocorrelation analysis, geostatistics. Statistical inference with autocorrelated sample data.

Graduate courses available to undergraduates by permission:

360-610A STATISTICAL METHODS II. (3) (3 lectures and one 2-hour lab)

- **360-611B EXPERIMENTAL DESIGNS.** (3) (3 lectures and 1 conference)

7.16 Microbiology

362-200A LABORATORY METHODS IN MICROBIOLOGY. (3) (Two 3-hour labs) A practical application of techniques relating to morphology and physiology, enrichment, isolation and identification of selected classes of microorganisms.

362-230B THE MICROBIAL WORLD. (3) (3 lectures and one 3-hour lab) The occurrence and importance of microorganisms (especially bacteria) in the biosphere. Principles governing growth, death and metabolic activities of microorganisms. An introduction to the microbiology of soil, water, plants, food, man and animals.

362-337D,N FRONTIERS IN MICROBIOLOGY. (1) (Irregular meetings) This course involves the preparation of a comprehensive term paper based on a search of the literature on a topic assigned to include an area of recent development new to the student.

- ★ **362-341A MECHANISMS OF PATHOGENICITY.** (3) (3 lectures, one 3-hour lab) (Prerequisite: 362-230B) A study of the means by which bacteria cause disease in animals and humans. Includes response of host to invading bacteria, bacterial attachment and penetration processes, and modes of actions of exotoxins and endotoxins.

362-492D,N PROJECT. (5) (Equiv. three 3-hour labs) A project involving laboratory work assigned each Microbiology Major student in his or her final year.

362-495D,N SEMINAR. (3) (Equivalent of 1 lecture)

Graduate courses available to undergraduates with permission:

362-764A READING AND CONFERENCE. (3) (2 conferences)

362-765B READING AND CONFERENCE. (3) (2 conferences)

7.17 Plant Science

For course offerings by term, refer to

<http://www.agrenv.mcgill.ca/plant/undergrad.htm>.

367-201B COMPARATIVE PLANT BIOLOGY. (3) (3 lectures plus 1-hour conference) Comparative study of the ways in which photo-

synthetic organisms acquire resources, develop and grow, reproduce, and interact with various groups of fungi and herbivores. Comparisons will be made among the following major groups: cyanobacteria, algae, liverworts, mosses, seedless vascular plants, gymnosperms, and angiosperms.

367-211A PRINCIPLES OF PLANT SCIENCE. (3) (3lectures and one 2-hour lab) A study of major world crop species with emphasis on their adaptation and distribution in relation to the economic botany of the plants.

367-215A ORIENTATION IN PLANT SCIENCES. (1) An orientation to selected themes and problems in the pure and applied plant sciences, including crop production, plant ecology and diversity and biotechnology using case-studies based on field and laboratory situations. Offered during the week prior to the start of regular classes and open to all students. Grading, pass/fail.

367-220A INTRODUCTION TO VASCULAR PLANTS. (1) (Four 4-hour field labs plus project, given during the first 4 weeks of semester) Field survey of different habitats to introduce major groups of vascular plants (ferns, horsetails, clubmosses, gymnosperms, and flowering plants) in natural environments and demonstrate their role in the ecosystem. Emphasis on differences among groups as reflected in their classification. (First 4 weeks of term only).

367-221A INTRODUCTION TO FUNGI. (1) (Four 4-hour field labs, given during the second 4 weeks of semester) Field and laboratory survey of local representatives of the major groups of fungi, including edible and poisonous mushrooms. The role of each group in terrestrial and aquatic ecological niches will be studied with respect to saprophytism, parasitism and symbiosis. Economic importance of fungi in medicine and biotechnology will be introduced. (Second 4 weeks of term only.)

367-300B CROPPING SYSTEMS. (3) (3 lectures and 1 3-hour lab) (Prerequisite: 367-211A) Application of plant science and soil science to production of agronomic and horticultural crops. Use and sustainability of fertilization, weed control, crop rotation, tillage, drainage and irrigation practices.

367-304B BIOLOGY OF FUNGI. (3) (3lectures and 1 3-hour lab) This course describes the various groups of fungi and explores in depth their biology and physiology, their ecological niches and the role in various ecosystems and their benefits and uses in industry and biotechnology.

367-305A PLANT PATHOLOGY. (3) (3 lectures and one 3-hour lab) The theory and concepts of plant pathology, including the disease cycle, infection, symptoms, resistance, epidemiology and control. The biology and taxonomy of pathogens will be studied, including fungi, bacteria, viruses and nematodes. Techniques of inoculation, isolation of pathogens from diseased plants, disease diagnosis and pathogen identification will be demonstrated.

367-310A PLANT PROPAGATION. (3) (3lectures and one 3-hour lab) Principles and practical aspects of plant propagation are examined. The course consists of two parts. The first third deals with sexual propagation; the production, processing storage certification and analysis of seeds. The remaining two-thirds deals with vegetative propagation; cutting, budding, grafting, layering, and tissue culture.

367-322B GREENHOUSE MANAGEMENT. (3) (3 lectures and one 3-hour lab) Greenhouse design and operation, including environmental regulation, fertilization and pest management. Focus will be on the production of major floricultural and vegetable crops.

367-331A FIELD CROPS. (3) (3lectures and one 3-hour lab period.) (Prerequisite: 367-211A or 367-201B) (Not open to students who have taken 367-333A and/or 367-332B) A study of economically important field crops (cereals, forages, oilseeds and crops grown for fibre and other industrial products), historical development, botany, distribution and adaptation, cultural practices and factors that affect the utilization of crop products. Laboratories emphasize morphological study of major field crop species.

367-341A,B HORTICULTURE - THE ALLIUMS. (1) (Prerequisite: 367-211A or 367-201B or permission of instructor.) An independent

study course in CD-ROM format. Modules contain an introductory section on crop establishment and a section dealing with the botany, physiology and management of the Alliums. Students make use of the Internet. Electronic discussion groups are used for tutorials. Grading is through the submission of written assignments.

367-342A,B HORTICULTURE - PERENNIAL VEGETABLE CROPS. (1) (Prerequisite: 367-211A or 367-201B or permission of instructor.) An independent study course in CD-ROM format. Modules contain an introductory section on crop establishment and a section dealing with the botany, physiology and management of perennial vegetable crops. Students make use of the Internet. Electronic discussion groups are used for tutorials. Grading is through the submission of written assignments.

367-343A,B HORTICULTURE - ROOT CROPS. (1) (Prerequisite: 367-211A or 367-201B or permission of instructor.) An independent study course in CD-ROM format. Modules contain an introductory section on crop establishment and a section dealing with the botany, physiology and management of root crops. Students make use of the Internet. Electronic discussion groups are used for tutorials. Grading is through the submission of written assignments.

367-344,B HORTICULTURE - SALAD CROPS. (1) (Prerequisite: 367-211A or 367-201B or permission of instructor.) An independent study course in CD-ROM format. Modules contain an introductory section on crop establishment and a section dealing with the botany, physiology and management of salad crops. Students make use of the Internet. Electronic discussion groups are used for tutorials. Grading is through the submission of written assignments.

367-345A,B HORTICULTURE - SOLANACEOUS CROPS. (1) (Prerequisite: 367-211A or 367-201B or permission of instructor.) An independent study course in CD-ROM format. Modules contain an introductory section on crop establishment and a section dealing with the botany, physiology and management of the solanaceous crops. Students make use of the Internet. Electronic discussion groups are used for tutorials. Grading is through the submission of written assignments.

367-346A,B HORTICULTURE - TEMPERATE TREE FRUITS. (1) (Prerequisite: 367-211A or 367-201B or permission of instructor.) An independent study course in CD-ROM format. Modules contain an introductory section on crop establishment and a section dealing with the botany, physiology and management of temperate zone tree fruits. Students make use of the Internet. Electronic discussion groups are used for tutorials. Grading is through the submission of written assignments.

367-347A,B HORTICULTURE - SMALL FRUITS. (1) (Prerequisite: 367-211A or 367-201B or permission of instructor.) An independent study course in CD-ROM format. Modules contain an introductory section on crop establishment and a section dealing with the botany, physiology and management of small fruit crops. Students make use of the Internet. Electronic discussion groups are used for tutorials. Grading is through the submission of written assignments.

367-348A,B HORTICULTURE - THE BRASSICAS. (1) (Prerequisite: 367-211A or 367-201B or permission of instructor) An independent study course in CD-ROM format. Modules contain an introductory section on crop establishment and a section dealing with the botany, physiology and management of Brassicas. Students make use of the Internet. Electronic discussion groups are used for tutorials. Grading is through the submission of written assignments.

367-353B PLANT STRUCTURE AND FUNCTION. (4) (3lectures and one 3-hour lab) (Prerequisite: 367-211A or 367-201B.) (Not open to students who have taken 367-252B.) The general anatomy and physiology of vascular plants with emphasis on the cells, tissues, organs and chemical components of plants and the physiological processes associated with their function.

367-358A FLOWERING PLANT DIVERSITY. (3) (2 lectures, one 3-hour lab, plus a 4-day field week held the week preceding the start of classes) (Prerequisites: 367-211A or 367-201B or permission of instructor) Principles of classification and identification of flowering plants and ferns, with emphasis on 35 major families of flowering plants and the habitats in which they grow.

367-361B PEST MANAGEMENT AND THE ENVIRONMENT. (3) (3 lectures) Pests, pest impacts on the global food system and strategies for pest management. Pest management methods, models and programs, and how to reduce pest management impacts on the environment.

367-421A LANDSCAPE PLANT MATERIALS. (3) (2 lectures and one 3-hour lab) (Prerequisites: 367-211A or 367-201B) A study of the major types of woody and herbaceous ornamental plants used in landscaping and how the landscaping industry uses plants to improve the environment. Laboratory includes a specimen collection of landscape plants widely used in Québec.

367-434B WEED BIOLOGY AND CONTROL. (3) (3 lectures and one 3-hour lab) (Prerequisite: 367-211A or 367-201B) A study of the biology of undesirable vegetation as related to the principles of prevention and physical, biological, managerial and chemical control. Emphasis on the environmental impact of the different methods of weed control.

367-450A,B SPECIAL TOPICS IN PLANT SCIENCE I. (2) A course of independent study by the student with the guidance of a professor of recognized competence in the area of the chosen topic.

367-451A,B SPECIAL TOPICS IN PLANT SCIENCE II. (3) A course of independent study by the student with the guidance of a professor of recognized competence in the area of the chosen topic.

367-458B FLOWERING PLANT SYSTEMATICS. (3) (1 lecture plus one 3-hour lab plus required summer plant collection) (Prerequisite: 367-358A or 177-358A or permission of instructor) Principles and methods of phylogenetic analysis of flowering plants with emphasis on new classification systems resulting from analysis of DNA sequence data. Laboratory sessions will focus on 40 temperate and tropical families not covered in 367-358A as well as on identification techniques for difficult plant families.

367-460A PLANT ECOLOGY. (3) (3 lectures and one 3-hour lab) A study of the major vegetation units; the influence of environmental factors on the evolution, distribution, and succession of plant communities; and on the distribution, form and function of plant species. Methods of ecological analyses.

367-490D,N PROJECT. (3) (1 lecture) Directed study on approved problem requiring both oral and written presentation.

367-495D,N SEMINAR. (2)

367-525B ADVANCED MICROPROPAGATION. (3) (One 3-hour lecture) A detailed study of the principles and techniques of plant micro propagation. Includes lectures, laboratories, discussion sessions and visits to local laboratories. Evaluation is based on contribution to discussions, laboratory reports and an individualized project.

367-535B PLANT BREEDING. (3) (Prerequisite: 356-204A, 367-211A, or 334-210B.) Principles and practices of plant breeding, including reproduction of crop plants; plant hybridization; sources of genetic variation; selection methods used for self- and cross-pollinated crops and for clonally reproduced crops; breeding for diseases and pest resistance; applications of biotechnology in plant breeding.

Certain graduate courses are available to undergraduates. Please consult the Graduate Calendar.

7.18 Soil Science

372-200B INTRODUCTION TO EARTH SCIENCE. (3) (3 lectures, one 3-hour lab) Introductory concepts of geology and geomorphology will be presented including: rocks and minerals, surface deposits, history and structure of the earth.

372-210A PRINCIPLES OF SOIL SCIENCE. (3) (3 lectures and one 3-hour lab) Origin, development and classification of soils, biology, chemical and physical properties related to crop production, soil conservation and land use.

372-315B SOIL FERTILITY AND FERTILIZERS. (3) (3 lectures and one lab) (Prerequisite 372-210A or permission of instructor) Plant nutrients in the soil, influence of soil properties on nutrient absorption and plant growth, use of organic and inorganic fertilizers.

● ★ **372-326A SOIL GENESIS AND CLASSIFICATION.** (3) (3 lectures and one 3-hour lab) (Prerequisite: 372-200A or equivalent)

● ★ **372-331B SOIL PHYSICS.** (3) (3 lectures and one 3-hour lab)

372-410B SOIL CHEMISTRY. (3) (1 lecture, 1 tutorial, problem sets) (Prerequisite: 372-210A or 183-305A or permission of instructor.) Soil chemical principles are presented in a series of problem sets covering basic concepts as well as applications to environmental and agricultural situations.

7.19 Natural Resource Sciences

373-330A INSECT BIOLOGY. (3) (2 lectures and one 2-hour lab) An introduction to insect structure, physiology, development, systematics, evolution, ecology and control.

373-331B MICROBIAL ECOLOGY. (3) (Prerequisites: 333-211A and 356-204A) Aspects of microbial ecology and environmental microbiology ecology and environmental microbiology will be studied, emphasizing the underlying microbial genetics and physiology. Microbial interactions, diversity, evolution (the position of microorganisms in the universal phylogenetic tree), and the roles of microbes in biogeochemical cycles, biodegradation, and bioremediation will be discussed.

● ★ **373-338A BACTERIAL MOLECULAR GENETICS.** (3) (Prerequisites: 356-204A, 344-202B or permission of instructor)

● **373-350A BIOLOGICAL ILLUSTRATION I.** (3) (2 lectures, 2 hours research/reading and 2 hours tutorial)

● **373-351B BIOLOGICAL ILLUSTRATION II.** (3) (2 lectures, 2 hours research/reading and 2 hours tutorial) (Prerequisite: Preference for students with 373-350A or equivalent.)

373-370A,B,C SPECIAL TOPICS. (1) Students will pursue topics that are not otherwise available in formal courses. An individualized course of studies will be followed under the supervision of a member of staff qualified in the appropriate discipline or area.

373-371A,B,C SPECIAL TOPICS. (1) Students will pursue topics that are not otherwise available in formal courses. An individualized course of studies will be followed under the supervision of a member of staff qualified in the appropriate discipline or area.

373-372A,B,C SPECIAL TOPICS. (2) Students will pursue topics that are not otherwise available in formal courses. An individualized course of studies will be followed under the supervision of a member of staff qualified in the appropriate discipline or area.

373-373A,B,C SPECIAL TOPICS. (2) Students will pursue topics that are not otherwise available in formal courses. An individualized course of studies will be followed under the supervision of a member of staff qualified in the appropriate discipline or area.

373-374A,B,C SPECIAL TOPICS. (3) Students will pursue topics that are not otherwise available in formal courses. An individualized course of studies will be followed under the supervision of a member of staff qualified in the appropriate discipline or area.

373-375A,B,C SPECIAL TOPICS. (3) Students will pursue topics that are not otherwise available in formal courses. An individualized course of studies will be followed under the supervision of a member of staff qualified in the appropriate discipline or area.

The following three courses constitute the Macdonald Summer Field Semester. For more information, consult the McGill Summer Studies Calendar or the Summer Studies website (<http://www.mcgill.ca/Summer/>).

373-382L ECOLOGICAL MONITORING & ANALYSIS. (3) Students use a variety of methods to sample physical, biological and human systems, to analyse and interpret these data to assess ecosystem health. Methods include GIS, population sampling, land use, resource and biodiversity mapping.

373-383L LAND USE: REDESIGN & PLANNING. (3) (Prerequisite: 24 credits of university training in a field relating to the environment, including one course in statistics, 360-310A, or equivalent.) Issues related to historical and modern land use, environmental impacts, current structures of governance. Needs assessment, and the redesign of human systems of organization and decision making

according to ecological principles. Land use in peri-urban and rural settings, and the use of participatory action research.

373-384L FIELD RESEARCH PROJECT. (3) (Prerequisite: 24 credits of university training in a field relating to the environment, including one course in statistics, 360-310A, or equivalent. Pre- or co-requisite: 373-381/) Small group field research project.

373-421B TOPICS IN WILDLIFE CONSERVATION. (3) (3 lectures) Study of current controversial issues focusing on wildlife conservation. Topics include: animal rights, exotic species, ecotourism, urban wildlife, multi-use of national parks, harvesting of wildlife, biological controls, and endangered species.

373-442A FOOD MICROBIOLOGY AND SANITATION. (3) (3 lectures and 1 3-hour lab) (Prerequisite: 362-230B) Microorganisms, and their products important to the food industry. These will be discussed in terms of production of foods, preservation and processing of foods, facility sanitation and waste disposal, potential for causing food borne disease outbreaks.

373-496D,N PROJECT I. (3) Development of research techniques through selection of problem, formulation of hypotheses and objectives, research design, review of pertinent literature, experimental work, discussion and conclusion of results with oral presentation of completed report, all in consultation with research director.

373-497D,N PROJECT II. (5) Development of research techniques through selection of problem, formulation of hypotheses and objectives, research design, review of pertinent literature, experimental work, discussion and conclusion of results with oral presentation of completed report, all in consultation with research director. Similar to 373-496D,N, with a more elaborate research program.

★ **373-515B PARASITOID BEHAVIORAL ECOLOGY.** (3) (3 lectures and one 2-hour seminar) (Prerequisite: 373-330A or equivalent) The origin and diversity of parasitoid species will be presented. Aspects of behavioral ecology that pertain to host selection, optimal allocation of progeny and sex and host-parasitoid interactions are examined. The importance of these processes is discussed in a biological control perspective.

373-520B INSECT PHYSIOLOGY. (3) (Prerequisite: Permission of instructor) Organismal approach to insects, emphasizing the physiology and development, and the physiological relations of insects to their environment.

★ **373-521B SOIL MICROBIOLOGY AND BIOCHEMISTRY.** (3) (Prerequisite: 372-210A) Soil environments, soil microorganisms and their function in the biogeochemical cycles of C, N, P and S. Basics of soil bioremediation.

373-550B VETERINARY AND MEDICAL ENTOMOLOGY. (3) (Prerequisite: Permission of instructor) Environmental aspects of veterinary and medical entomology. An advanced course dealing with the biology and ecology of insects and acarines as aetiological agents and vectors of disease, and their control. Integrated approaches to problem solving.

373-772A ADVANCED MICROBIAL GENETICS. (3)

373-773B ADVANCED MICROBIAL PHYSIOLOGY. (3)

7.20 Forest Resources

★ **374-300A URBAN FORESTS AND TREES.** (3) (3 lectures and one 3-hour lab) (Prerequisites: 367-201B and 372-210A) The effects of environmental factors such as soil fertility, soil contamination and compaction, extremes of temperature and air pollutants on trees and forests growing in an urban environment, and means to increase their tolerance will be discussed. Emphasis in the laboratory will be on diagnosis and solving of tree problems in urban environments.

374-410A THE FOREST ECOSYSTEM. (3) (3 lectures and one 3-hour lab) (Prerequisites: 367-201B and 372-210A or permission of instructor.) Interactions among biotic and abiotic components of forests, and their direct and indirect control of productivity and nutrient cycling in forest ecosystems. The laboratory involves a

series of 3-hour field trips to local forests during September and October, followed by analysis of data collected.

374-420B ENVIRONMENTAL ISSUES IN FORESTRY. (3) (3 lectures and one 2-hour tutorial) (Prerequisites: 367-201B and 372-210A or permission of instructor.) The science behind current environmental issues relating to forests including the effects of management on productivity and biodiversity, conservation of old-growth forests and endangered species, pesticide use, and industrial pollution. The role of scientific knowledge, relative to social and economic forces, in forest resource decision-making is discussed.

374-441B INTEGRATED FOREST MANAGEMENT. (3) (3 lectures and one 3-hour lab) (Prerequisite: 344-205B or permission of instructor.) The study of silviculture and silvics and their application to forest management to sustain the production of wood and other resources such as wildlife, water and landscape in natural forests and rural environments (agroforestry). Acquisition of practical skills in forest survey and computer simulation of forest growth.

7.21 Renewable Resources

375-333A PHYSICAL AND BIOLOGICAL ASPECTS OF POLLUTION. (3) (3 lectures) The environmental contaminants which cause pollution; sources, amounts and transport of pollutants in water, air and soil; waste management.

375-350B MAMMALOLOGY. (3) (2 lectures and one 3-hour lab) (Prerequisites: 344-200A and 349-307A) This course focuses on the evolution, classification, ecology and behaviour of mammals and relations between humans and mammals. Also structure, systematics and identification of local and world mammals, as well as field methods will be emphasized.

375-375B ISSUES IN ENVIRONMENTAL SCIENCES. (3) (3 lectures) Principles and trends in global ecology as they pertain to agricultural and natural ecosystems and the impact of environmental change on food production.

● **375-380B LAW AND LAND USE POLICY.** (3) (3 lectures, 3 hours tutorial)

★ **375-382A FISH AND WILDLIFE PROPAGATION.** (3) (2 lectures and field trips) (Enrollment limited to 20) An overview of the care and reproduction of wildlife species in captivity for commercial, scientific, conservation, and educational purposes through field trips, lectures, and class discussions.

375-401A FISHERIES AND WILDLIFE MANAGEMENT. (4) (3 lectures, one 2-hour lab and one week field laboratory prior to fall term) (Prerequisite: 367-348A) Principles of fisheries and wildlife management are considered and current practices of research and management are discussed.

375-410B WILDLIFE ECOLOGY. (3) (3 hours) (Prerequisite: 344-205 or permission.) Ecological processes and theories in animal populations. Interrelationships among biological processes, biotic and abiotic factors, and life history strategies. Topics include population dynamics, optimization strategies, predation, habitat selection, risks and decision making, and social behaviour. Application of problem-solving approach to wildlife ecology through individual and group work.

375-415A CONSERVATION LAW. (2) (2 lectures) A study of the various federal, provincial and municipal laws affecting wildlife habitat. Topics include: laws to protect wild birds and animals; the regulation of hunting; legal protection of trees and flowers, sanctuaries, reserves, parks; techniques of acquiring and financing desirable land, property owner rights.

375-420A TOPICS IN ORNITHOLOGY. (3) (3 lectures and occasional field trips) (Prerequisite: 349-307A or permission of instructor.) Taxonomic relationships and evolution of birds are outlined. Reproduction, migration and population processes of North American birds are examined.

375-437B ASSESSING ENVIRONMENTAL IMPACT. (3) (2 lectures) Theories and procedures of assessing environmental impact. An examination of the environmental impact of existing programs and

projects to examine their accuracy in predicting consequences and attenuating undesirable effects.

- ★ **375-475B DESERT ECOLOGY.** (3) (Field course) (Prerequisites: 367-460A, 349-307A, 375-420A) (Enrolment limited to 20)

375-491D,N SEMINAR. (2) Includes basic lectures on synthesis and interpretation of multifaceted subjects; preparation and publication of one semi-technical article; participation in two oral presentations of technical subjects all under the supervision of academic or staff adviser.

7.22 Nutrition and Dietetics

* **Successful completion of all components parts of each level of Professional Practice (Stage) in Dietetics is a prerequisite for the next level. All required and complementary courses listed in semesters prior to or with a Stage are prerequisites for that level.**

Undergraduate registration is restricted to students in the Dietetics Major, CGPA greater than or equal to 2.50. Visiting students contact the Advising Coordinator regarding eligibility for specific courses.

Students are reminded that unethical conduct on Professional Practice (Stage) rotations is considered a serious offence. The Faculty reserves the right to require the withdrawal of any student at any time if it (Faculty) feels the student has displayed unprofessional conduct or demonstrates incompetence.

382-200C CONTEMPORARY NUTRITION. (3) (Not open for credit to students with a biology or chemistry course in their program, or to students registered in the School of Dietetics and Human Nutrition, or to students who take 382-207A,B.) Provides students without a biology/chemistry background with the fundamental tools to critically assess nutrition related information, to evaluate their own diets, and to implement healthy changes. Emphasis is on current issues and maximizing health and disease prevention at different stages of the lifecycle.

382-207A,B NUTRITION AND HEALTH. (3) (3lectures) (Prerequisite: CEGEP objective 00XU or equivalent – formerly Biology 401) (Not open to students who take 382-200C or 382-307A/B or who have taken 552-311A or 507-311A.) Provides students who have a basic biology/chemistry background with the fundamental information on how macronutrients, vitamins and minerals are metabolized in the body, followed by application to evaluate current issues of maximizing health and disease prevention at different stages of the lifecycle.

* **382-208B PROFESSIONAL PRACTICE (STAGE) IN DIETETICS – LEVEL 1A.** (1) (Prerequisites: all Required courses in Term 1 of the Dietetics Major. Corequisites: All Required courses in Term 2 of the Dietetics Major.) (Restricted to Dietetics Major or Special Students (professional credentialing).) Introduction to the dietetics profession; principles and policies in food and nutrition essential to entry-level dietetics experiences; practice in dietary interviewing, problem solving and report writing related to level 1 Professional Practice placements.

* **382-209G PROFESSIONAL PRACTICE (STAGE) IN DIETETICS – LEVEL 1B.** (3) (Four weeks summer ; 1 -6hours Fall Term) (Prerequisites: all Required courses in Terms 1 and 2 of the Dietetics Major.) (Restricted to Dietetics Major or Special Students (professional credentialing).) Directed, supervised experiences in nutrition services and food service operations management; integration into the professional team.

382-214A FOOD FUNDAMENTALS. (3) (2lectures and one 4-hour lab) (Prerequisite: 333-230A. Corequisite 333-211A and 333-212A) Study of composition, structure and chemical and physical properties of foods. To understand the scientific principals underlying chemical and physical phenomena that occur during the preparation of food. Laboratory emphasis on developing skills in handling and preparing food, and food assessment by sensory evaluation.

382-217B APPLICATION OF FOOD FUNDAMENTALS. (3) (2lectures and one 4-hour lab) (Prerequisite, 382-214A) A more intensive

study of food and complex food mixtures, including their chemical and physical properties. Learning how to control the changes that take place during the preparation of food to obtain palatable, nutritious and safe food. An introduction to culturally determined food habits. Laboratory emphasis on acquiring new knowledge and application to basic food preparation and cooking principles.

382-301A PSYCHOLOGY. (3) (2 lectures and 1 conference) A study of the general characteristics of physical, social, emotional and intellectual development, the psychology of learning, and the growth and development of personality.

382-307B HUMAN NUTRITION. (3) (3 lectures and 1 project) (Pre- or co-requisites: 177-201, 180-212) (Not open to students who have taken 382-207A,B) Cellular and organismal aspects of nutrition with emphasis on biochemical and physiological roles of carbohydrates, lipids, proteins, minerals and vitamins in disease prevention and promotion of optimum health.

* **382-310B PROFESSIONAL PRACTICE (STAGE) IN DIETETICS – LEVEL IIA.** (1) (One 2-hour conference/week) Human food intake assessment and evaluation will be practiced including modules on dietary interviewing, nutrition education teaching plans and documentation for the medical record. Practical aspects of health and food service administration will be addressed.

* **382-311C PROFESSIONAL PRACTICE (STAGE) IN DIETETICS – LEVEL IIB.** (5) (7 weeks; summer) Two interrelated modules of directed experience in normal and clinical nutrition and foodservice management, in health care settings and the private sector.

382-322A INSTRUCTIONAL COMMUNICATIONS. (2) (2 lectures, 1 lab) (Prerequisite: 382-207A/B) Instructional communication principles and techniques as applied to individuals and groups; from children to seniors and from non-professionals to professionals. Using nutrition principles, effective public speaking; development and use of audiovisual aids, brochures and handouts; writing for the media; non-verbal communication; giving and receiving feedback; group management techniques will be covered.

382-337B NUTRITION THROUGH LIFE. (3) (3 lectures, 1 conference) (Prerequisite 342-330A or 382-307B) Emphasis on applied quantitative aspects of human nutrition. Nutrient utilization, evaluation and requirements, as related to dietary standards.

382-344B CLINICAL NUTRITION I. (3) (Two 2-hour lectures) (Pre/co-requisite: 342-323A, 382-337B) Clinical nutrition assessment and dietary modification of pathological conditions including hypertension, lipid disorders and cardiovascular disease, obesity, diverticulosis, cancer, COPD, anorexia nervosa and bulimia.

382-345D FOOD SERVICE SYSTEMS MANAGEMENT. (5) (2-hour lecture and one 3 to 5-hour lab) (Prerequisite: 382-214A, 382-217B) An introductory course applying the principles of organization and management in the direction of a food service department. Emphasis on establishing standards to control and measure performance of the system and evaluate performance against standards. Students learn quantity food production principles and sanitation and safety regulations involved in operation of a food service establishment.

- **382-361B ENVIRONMENTAL TOXICOLOGY.** (3) (3 lectures)

382-403B COMMUNITY NUTRITION. (3) (3 hour conference) (Prerequisite: 382-337B) A study of the characteristics and prevention aspects of community health problems. Methods of nutritional assessment, dietary surveys and program planning will be examined. Opportunity to plan a nutrition program for a target population will be provided.

382-406A ECOLOGY OF HUMAN NUTRITION. (3) (3lectures) (Prerequisite: 382-214A) (Not open to students who have taken 382-502A,B.) The scientific basis of contemporary food selection for human nutrition; change in North American food availability and use patterns; sociological, behavioural, and economic influences on food choice; topics on the interaction of environment and food availability, quality and consumption.

* **382-409B PROFESSIONAL PRACTICE (STAGE) IN DIETETICS – LEVEL III.** (8) (Ten weeks) Four interrelated modules of directed experience in clinical nutrition, foodservice management, normal

nutrition education and community nutrition, in health care settings and the private sector.

* **382-410A PROFESSIONAL PRACTICE (STAGE) IN DIETETICS – LEVEL IV.** (14) (16 weeks) (Prerequisite 382-409B) Interrelated modules of directed experience in clinical nutrition, foodservice management, normal nutrition education and community nutrition, in health care settings and the private sector.

● **382-420A FOOD TOXICANTS AND HEALTH RISKS.** (3) (3 lectures) (Prerequisite: 333-211A, 177-201B or 507-212B)

382-430A,B DIRECTED STUDIES IN DIETETICS/NUTRITION I. (3) An individualized course of study in dietetics/human nutrition under the supervision of a staff member with expertise on a topic not otherwise available in a formal course. A written agreement between student and staff member must be made before registration and filed with the Program Coordinator.

382-431D,N DIRECTED STUDIES IN DIETETICS/NUTRITION II. (3) An individualized course of study in dietetics/human nutrition under the supervision of a staff member with expertise on a topic not otherwise available in a formal course. A written agreement between student and staff member must be made before registration and filed with the Program Coordinator.

382-432A,B DIRECTED STUDIES IN DIETETICS/NUTRITION III. (3) An individualized course of study in dietetics/human nutrition under the supervision of a staff member with expertise on a topic not otherwise available in a formal course. A written agreement between student and staff member must be made before registration and filed with the Program Coordinator.

382-433A,B,C DIRECTED STUDIES IN DIETETICS/NUTRITION IV. (5) (Prerequisite: registration in 382-409B or equivalent. Restricted to students in the Dietetics Major or documentation of requirement for professional registration.) (Limited enrolment.) An individualized course of study in dietetics and human nutrition not available through other courses in the School. Emphasis will be placed on application of foods and nutrition knowledge, analytic and synthesis skills, and time management. A written agreement between student and instructor must be made before registration. A "C" grade is required to pass the course.

382-436A NUTRITIONAL ASSESSMENT. (2) (2 lectures) (Prerequisite: 382-337B) Review of literature covering current methodology and information related to the assessment of nutritional status in health and disease. Nutritional and clinical implications of nutrient interactions and how they relate to nutritional status.

382-438B INTERVIEWING AND COUNSELLING. (1) (One 2-hour conference) (Prerequisite: 382-344B and 382-311C) Techniques and strategies to increase proficiency in interpersonal skills, specifically "helping skills". To review skills used in professional practice in the dietitian's role as communicator, interviewer, counsellor, educator, motivator and behavioral change specialist.

382-445A CLINICAL NUTRITION II. (4) (Two 2.5-hour lectures) (Prerequisite: 382-344B and 342-424B) Rationale for clinical nutrition intervention for gastrointestinal and liver disease, hypermetabolic states, diabetes mellitus, renal disease and inborn errors of metabolism. Introduction to enteral/parenteral feedings.

382-446A PERSONNEL MANAGEMENT. (3) (3 lectures, 1 conference) (Prerequisite: 334-242A) The management of people at work. Employee development and the leadership role. The nature of collective bargaining, the role of unions and management.

382-450A RESEARCH METHODS IN HUMAN NUTRITION. (3) (2 lectures, 3 hours research, 4 hours other) (Prerequisite: 382-337B, 360-310A/B or 177-373A) Introduction to methods of clinical, community, international, and laboratory-based nutrition research. Lectures, readings and assignments will cover basic research concepts. Students undertake a computer directed literature search and analysis.

382-451A NUTRITION RESEARCH. (3) (Prerequisite: 382-337B. Corequisite: 382-450A) An applied course in analysis and interpretation of nutrition data sets. Introduction to specialized dietary and anthropometric computer programs. Written and oral presentation of results.

Graduate courses available to undergraduate students at the U3 level, with permission of instructor. Note: not all graduate courses are offered each year.

382-501A NUTRITION IN DEVELOPING COUNTRIES. (3) (2 lectures and one seminar) (Prerequisite: consent of instructor.) This course will cover the major nutritional problems in developing countries. The focus will be on nutrition and health and emphasize young children and other vulnerable groups. The role of diet and disease for each major nutritional problem will be discussed.

● **382-504A,B SENSORY EVALUATION OF FOOD.** (3) (2 lectures, one 3-hour lab) (Prerequisite: a university level course in each of food/ food science and statistics.)

382-511B NUTRITION AND BEHAVIOUR. (3) (2 lectures and one seminar) (Prerequisite: 382-445A for undergraduate students or consent of instructor.) Discussion of knowledge in the area of nutrition and behaviour through lectures and critical review of recent literature; to discuss the theories and controversies associated with relevant topics; to understand the limitations of our knowledge. Topics such as diet and brain biochemistry, stress, feeding behaviour and affective disorders will be included.

382-512A HERBS, FOODS AND PHYTOCHEMICALS. (3) (3 lectures and a project.) (Prerequisite: 333-211A or 177-201B or 507-212B) An overview of the use of herbal medicines and food phytochemicals and the benefits and risks of their consumption. The physiological basis for activity and the assessment of toxicity will be presented. Current practices relating to the regulation, commercialization and promotion of herbs and phytochemicals will be considered.

7.23 Parasitology

Professors at the Institute of Parasitology are prepared to supervise students doing undergraduate projects within the Faculty of Agricultural and Environmental Sciences.

391-400B EUKARYOTIC CELLS AND VIRUSES. (3) (4 lectures) (Prerequisite: 356-204A) The basic principles of molecular biology and the underlying molecular basis for various methodologies in molecular biology are covered. The molecular genetic basis for viral infections and tumorigenesis will be covered as examples of the use of molecular genetic approaches to address biological problems.

391-410B ENVIRONMENT AND INFECTION. (3) (2 lectures per week) (Prerequisite: 177-111A or 344-120A or equivalent) Infectious pathogens of humans and animals and their impact on the global environment are considered. The central tenet is that infectious pathogens are environmental risk factors. The course considers their impact on the human condition and juxtaposes the impact of control and treatment measures and environmental change.

391-438A IMMUNOLOGY. (3) (2 lectures per week) (Prerequisite: 344-202B or permission of instructor.) An in-depth analysis of the principles of cellular and molecular immunology. The emphasis of the course is on host defense against infection and on diseases caused by abnormal immune responses

7.24 Biotechnology

202-505A SELECTED TOPICS IN BIOTECHNOLOGY. (3) (one 3-hour lecture per week) Current methods used in the biotechnology industry and research, as applied to medical, biological, environmental, agricultural and food sciences aspects of biotechnology, will be described and discussed. This multidisciplinary course will include lectures from outstanding biotechnology researchers from industry and McGill professors, and visits to leading centres of biotechnology in the region.

394-501A,B BIOINFORMATICS. (3) (2 lectures and 1 laboratory) This course introduces the application of computer software for analysis of biological sequence information. An emphasis is placed on the biological theory behind analytical techniques, the algorithms used and methods of developing a statistical framework for various types of analysis.

8 Graduate Programs

Graduate work, in the Faculty of Graduate Studies and Research, McGill University, Montreal, may be undertaken on the Macdonald Campus, through the Departments of Agricultural and Biosystems Engineering, Agricultural Economics, Animal Science, Food Science and Agricultural Chemistry, Natural Resource Sciences, and Plant Science; the Institute of Parasitology; and the School of Dietetics and Human Nutrition.

The advanced courses of study offered lead to the degrees of Master of Science, and Doctor of Philosophy, Master of Science/Master of Business Administration, Graduate Certificate in Biotechnology.

Information on these programs and related fellowships is available from the Student Affairs Office, Macdonald Campus of McGill University, Sainte-Anne de Bellevue, QC H9X 3V9.

The Faculty of Graduate Studies and Research Calendar and full information regarding graduate courses, theses, registration, fellowships, etc. can be accessed on the Faculty of Graduate Studies and Research Website <http://www.mcgill.ca/fgsr/>.

9 Farm Management and Technology Program

Farm Management and Technology Program
Faculty of Agricultural and Environmental Sciences
P.O. Box 204, Macdonald Campus of McGill
21,111 Lakeshore Road
Sainte-Anne de Bellevue, Quebec, H9X 3V9

Telephone: (514) 398-7814

Fax: (514) 398-7955

Email: fmt@macdonald.mcgill.ca

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

Director - Marcel J. Couture

This 3-year academic and practical program is offered on the Macdonald Campus and taught by the staff of the Faculty of Agricultural and Environmental Sciences of McGill University. The program is funded by the Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec and authorized by the Ministère de l'Éducation du Québec (M.E.Q.).

The educational goals of the program are:

- 1) to make our graduates competent in the exercise of their profession;
- 2) to help the student's integration into professional life;
- 3) to foster professional mobility;
- 4) to foster an interest in continual development of professional knowledge.

Six (6) academic terms are spent on the Macdonald Campus studying a sequence of courses in Soil, Plant, and Animal Science; Engineering; Economics; and Management. One summer "stage" or practicum is spent on a farm other than the home farm where the student learns the many skills and encounters the many problems related to modern commercial agriculture. Students will also have a one-week internship on farms (other than the home farm) during the academic semesters in year one. This will enable them to relate their academic work to the reality of farming. Courses in English, French, Humanities, Physical Education and two complementary courses taken during the program will entitle the student to receive a Diplôme d'études collégiales (D.E.C.) from the Ministère de l'Éducation du Québec. The students will also receive a document from Macdonald Campus attesting that they have successfully completed the requirements of the Farm Management and Technology Program.

Entrance Requirements

1. Students should have a good practical knowledge of farming under Eastern Canadian conditions. One year of experience is

recommended but under special conditions a four-month summer season is acceptable.

2. The minimum academic entrance requirements are a Quebec High School Leaving Certificate (Secondary V), or its equivalent and any other academic requirement set by the MEQ.
3. All candidates for admission must make arrangements to come to the Macdonald Campus for an interview prior to admission to the program.
4. Admission to this program is only in the Fall semester.
5. We strongly encourage incoming students to acquire their driver's permit (both for cars and farm equipment) before coming to Macdonald Campus. This is first for safety reasons given that students work with farm equipment (soil preparation) very early on as they arrive at Macdonald. As well, most farmers require that their employees and stagiaires possess a driver's license.

Academic Standing

Attendance at class is compulsory. Students with an attendance of less than 80% may not be permitted to write examinations.

Examinations and other work in courses will be marked according to the percentage system. The minimum passing mark in a course is 60%

When a student's cumulative percent average (CPA) or semester percent average (SPA) first drops below 60%, withdrawal is advised. Students who choose to remain in the program are on probation.

Students on probation are normally permitted to register for not more than 10 credits per semester. They are not permitted to be on probation for more than one semester unless they obtain a SPA of 70% or higher.

Students who do not raise their CPA to 60% (or obtain a SPA of 70%) while on probation are not permitted to continue. They are required to withdraw from the Program for one year. If after this period students wish to be readmitted, they must apply in writing to the Director of the Program.

Students have other specific rights and responsibilities that are found in the McGill Handbook of Student of Rights and Responsibilities and in the Macdonald Policy on the Evaluation of Learning.

Fees

Tuition fees for all full-time students who are eligible for the Farm Management and Technology Program are paid by the Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec.

Student Services and Student Societies' fees, as well as Course Material fees will be charged according to the schedule in effect for all Macdonald Campus students. At the time of printing, the fees were \$552 per semester (charged twice a year).

Textbooks and Supplies

The cost of textbooks and supplies is estimated at \$150 per semester.

Sessional Dates

The number of teaching and examination days is set by the Ministère de l'Éducation du Québec. The sessional dates vary from year to year. At the present time, each semester has 75 teaching days and 7 days of exams.

Program Outline

COMMON COURSES

Administrative Unit

Farm Practice 1

Farm Practice 2

Farm Practice 3

Health and Farm Safety

Agricultural and Biosystems Engineering

Building Maintenance

Farm Building Planning

Machinery Management

Microcomputing
Precision Farming
Soil and Water Conservation
Soil Preparation
Tools and Machinery Maintenance

Agricultural Economics

Agricultural Marketing
Introduction to Economics
Farm Business Management 1
Farm Business Management 2
Farm Business Management 3
Farm Project
Management of Human Resources

Animal Science

Animal Anatomy and Physiology
Introduction to Animal Science

English

English 1
(B10) English for Farm Management and Technology
(Section 1 or 2)
English 2
(A11) Composition & Literature (Section 1)
(A10) Introduction to Literature (Section 2)
English 3
(A20) Literary Genre
English 4
(A30) Literary Themes

French

Français 1: Communication
Français 2: Communication en Agriculture

Humanities

Humanities 1: Knowledge...Learning...To Be
Humanities 2: World Views and Ethical Issues
Humanities 3: Social and Organizational Issues

Natural Resource Sciences

Agro-Environmental Fertilization Plan 1 (Fr.: PAEF 1)
Agro-Environmental Fertilization Plan 2 (Fr.: PAEF 2)
Soil Fertilization

Physical Education

Physical Education and Health
Physical Education: Practical
Physical Education in Daily Life

Plant Science

Agricultural Botany
Pesticide Use

ELECTIVE PRODUCTION COURSES

We offer two specializations. Students must take two courses in one specialization and one course in the other. In total, they must take three courses in the following list of eight courses*:

Animal Science specialization

Dairy Heifer Management
Dairy Herd Management
Swine and Poultry
Beef and Sheep

Plant Science specialization

Feed Crops
Industrial Crops
Greenhouse Crops
Fruit and Vegetable Crops

*After consultation with their academic advisor and the timetable

COMPLEMENTARY COURSES *

Students must take the following two (2) complementary courses to meet the program requirements:

- Fermentation Technology
- Forests, Forestry and Society

* After consultation with their academic advisor, students can take their complementary courses at another collegial institution.

COMPREHENSIVE ASSESSMENT

1. The objective of this examination is to ensure that the students have attained the objectives and standards for the competencies that are involved in the entire program. The passing of this exam is mandatory to obtain the D.E.C.
2. The passing grade will be 60%. The mark stating that the student has passed this examination will appear on the student's transcript. The student who failed this assessment will be offered the possibility of a second try the following year.

ENGLISH EXIT TEST

All students who wish to graduate and obtain a D.E.C. must pass the uniform English Exit Test that is offered by the M.E.Q.

10 Instructional Staff

Alli, Inteaz; B.Sc.(Guyana), M.Sc., Ph.D.(McG.); Professor of Food Science and Agricultural Chemistry, and Chair of Department
Baker, Laurence; B.B., M.Sc.(Man.), Ph.D.(McG.); Associate Professor of Agricultural Economics
Barrington, Suzelle; B.Sc.(Agr.Eng.), Ph.D.(McG.); Professor of Agricultural and Biosystems Engineering
Beech, Robin N.; B.Sc.(Nottingham), Ph.D.(Edinburgh); Associate Professor of Parasitology
Berteaux, Dominique; B.Sc.(Rennes), M.Sc.(Tours), Ph.D.(Sherbrooke); Assistant Professor of Wildlife Biology
Bird, David M.; B.Sc.(Guelph), M.Sc., Ph.D.(McG.); Fellow A.O.U.; Professor of Wildlife Biology and Director, Avian Science and Conservation Centre
Bissonnette, David; B.Sc.(F.Sc.)(McG.), Ph.D.(Tor.); Assistant Professor of Dietetics and Human Nutrition
Blackwood, A. Clark; B.Sc., M.Sc.(Alta.), Ph.D.(Wis.), F.R.S.C.; Emeritus Professor of Microbiology
Bonnell, Robert B.; B.Sc.(C'dia), B.Sc.(Agr.Eng.), M.Sc., Ph.D.(McG.); Associate Professor of Agricultural and Biosystems Engineering (*Brace Associate Professor*)
Broughton, Robert S.; B.S.A., B.A.Sc.(Tor.), S.M.(M.I.T.), Ph.D.(McG.), L.L.D.(Dal.); F.A.S.A.E., F.C.S.A.E. Emeritus Professor of Agricultural and Biosystems Engineering
Brown, Peter G.; B.A.(Haverford), M.A., Ph.D.(Columbia); Professor and Director, McGill School of Environment, Professor of Natural Resource Sciences (*joint appt. with Geography and McGill School of Environment*)
Brown, William Mark; B.A.(St. Mary's), M.A., Ph.D.(McM.); Assistant Professor of Agricultural Economics (*joint appt. with Geography*)
Buckland, Roger B.; B.Sc.(Agr.), M.Sc.(McG.), Ph.D.(Maryland); Professor of Animal Science
Buszard, Deborah J.I.; B.Sc.(Bath), Ph.D.(Lond.); Dean and Professor of Horticulture
Chadee, Khrisendath; B.Sc.(Wpg.), M.Sc.(Manit.), Ph.D.(McG.); Associate Professor of Parasitology
Chan, Laurie H.M.; B.Sc., M.Phil.(Hong Kong), Ph.D.(London); Associate Professor of Dietetics and Human Nutrition
Chavez, Eduardo R.; Agr.Eng.(Chile), M.Sc., Ph.D.(Calif.); Professor of Animal Science
Côté, Benoit; B.Sc., Ph.D.(Laval); Associate Professor of Woodland Resources
Couture, Marcel J.; B.Sc.(Agr.)(McG.), M.Sc.(Guelph); Associate Dean (Community Relations), Faculty Lecturer of Agricultural Economics, and Director, Farm Management and Technology
Cue, Roger I.; B.Sc.(Newcastle-upon-Tyne), Ph.D.(Edin.); Associate Professor of Animal Science
Curtis, Mark; B.Sc., M.Sc., Ph.D.(McG.); Associate Professor of Natural Resource Sciences
Donnelly, Danielle J.; B.Sc.(Agr.)(McG.), M.Sc.(U.B.C.), Ph.D.(S. Fraser); Associate Professor of Plant Science

- Downey, Bruce R.; D.V.M.(Tor.), Ph.D.(McG.); Professor of Animal Science
- Driscoll, Brian T.; B.Sc., Ph.D.(McMaster); Assistant Professor of Microbiology
- Dunphy, Gary B.; B.Sc.(U.N.B.), M.Sc., Ph.D.(Mem.); Associate Professor of Entomology
- Dutilleul, Pierre R.; B.Sc., Ph.D.(Belgium); Associate Professor of Statistics
- Ellyett, William R.; B.A.(Sir G. Wms.), B.Ed.(P.E.)(McG.); Faculty Lecturer, Farm Management Technology Program and Director of Athletics
- Enright, Peter; B.Sc.(Agr. Eng.), M.Sc.(McG.); Faculty Lecturer, Agricultural and Biosystems Engineering
- Estey, Ralph H.; B.Ed.(U.N.B.), M.S.(Maine), D.I.C.(Imp. Coll.), B.Sc.(Agr.), Ph.D.(McG.), F.L.S.; Emeritus Professor of Plant Pathology
- Faubert, Gaétan M.; B.Sc.(Sherbrooke), M.Sc.(Mtl.), Ph.D.(McG.); Professor of Parasitology
- Fortin, Marc G.; B.Sc., M.Sc.(Laval), Ph.D.(McG.); Associate Professor of Plant Science and Chair of Department (*William Dawson Scholar*)
- Fyles, James W.; B.Sc., M.Sc.(Vict.), Ph.D.(Alta.); Associate Professor of Woodland Resources
- Georges, Elias; B.Sc., Ph.D.(McG.); Associate Professor of Parasitology
- Gougeon, Rejeanne; B.Sc.(Laval), M.Sc.(Col.), Ph.D.(Montr.); Assistant Professor (PT) of Dietetics and Human Nutrition
- Grant, William F.; B.A., M.A.(McM.), Ph.D.(Virginia), F.L.S.; Emeritus Professor of Genetics
- Gray-Donald, Katherine; B.Sc., Ph.D.(McG.); Associate Professor and Director of School of Dietetics and Human Nutrition
- Grenier, Aline; B.Sc., M.Sc.(McG.); Faculty Lecturer, Farm Management and Technology Program
- Gunjal, Kisan R.; B.Sc.(Poona), M.Sc.(New Delhi), Ph.D.(Iowa St.); Associate Professor of Agricultural Economics
- Hamel, Chantal; B.Sc., Ph.D.(McG.); Assistant Professor of Soil Science
- Hayes, J. Flannan; B.Agr.Sc., M.Agr.Sc.(Dub.), Ph.D.(N.C.St.); Professor of Animal Science
- Hendershot, William H.; B.Sc.(Tor.), M.Sc.(McG.), Ph.D.(U.B.C.); Associate Dean (Academic), Professor of Soil Science and Chair of Natural Resource Sciences
- Henning, John C.; B.Sc., Ph.D.(Guelph); Associate Professor of Agricultural Economics
- Idziak, Edmund S.; B.Sc.(Agr.), M.Sc.(McG.), D.Sc.(Delft); Professor of Microbiology and Food Science
- Ismail, Ashraf A.; B.Sc., Ph.D.(McG.); Associate Professor of Food Science and Agricultural Chemistry
- Jabaji-Hare, Suha; B.Sc.(AUB), M.Sc.(Guelph), Ph.D.(Waterloo); Associate Professor of Plant Science
- Jacobs Starkey, Linda; B.Sc.(H.Ec.)(Mt.St.Vin.), M.Sc., Ph.D.(McG.), RD, FDC; Faculty Lecturer, School of Dietetics and Human Nutrition
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