

45 Mathematics and Statistics

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Chair — K. GowriSankaran

Chair of Committee on Graduate Affairs — K. Peter Russell

45.1 Staff

Emeritus Professors

M. Barr; A.B., Ph.D.(Penn.) (*Peter Redpath Emeritus Professor of Pure Mathematics*)
J.R. Choksi; B.A.(Cantab.), Ph.D.(Manc.)
J. Lambek; M.Sc., Ph.D.(McG.), F.R.S.C. (*Peter Redpath Emeritus Professor of Pure Mathematics*)
A.M. Mathai; M.Sc.(Kerala), M.A., Ph.D.(Tor.)
W.O.J. Moser; B.Sc.(Manit.), M.A.(Minn.), Ph.D.(Tor.)
V. Seshadri; B.Sc., M.Sc.(Madras), Ph.D.(Oklahoma)
J.C. Taylor; B.Sc.(Acad.), M.A.(Queen's), Ph.D.(McM.)

Professors

W.J. Anderson; B.Eng., Ph.D.(McG.)
W. Brown; B.A.(Tor.), M.A.(Col.), Ph.D.(Tor.)
M. Bunge; M.A., Ph.D.(Penn.)
H. Darmon; B.Sc.(McG.), Ph.D.(Harv.)
S. Drury; M.A., Ph.D.(Cantab.)
K. GowriSankaran; B.A., M.A.(Madras), Ph.D.(Bomb.)
J. Hurtubise; B.Sc.(Montr.), D.Phil.(Oxon.)
N. Kamran; B.Sc., M.Sc.(Bruxelles), Ph.D.(Wat.)
O. Kharlampovich; M.A., (Ural State), Ph.D.(Lenin.), Dr. of Sc., (Steklov Inst.)
M. Makkai; M.A., Ph.D.(Bud.)
S. Maslowe; B.Sc.(Wayne St.), M.Sc., Ph.D.(Calif.)
C. Roth; M.Sc.(McG.), Ph.D.(Hebrew)
K.P. Russell; Vor. Dip.(Hamburg), Ph.D.(Calif.)
G. Schmidt; B.Sc.(Natal), M.Sc.(S.A.), Ph.D.(Stan.)
G. Styan; M.A., Ph.D.(Col.)
K.K. Tam; M.A., Ph.D.(Tor.)
L. Vinet; B.Sc., M.Sc., Ph.D.(Montr.), Doctorat 3^e cycle(Paris VI) (*joint appt. with Physics*)
D. Wolfson; M.Sc.(Natal), Ph.D.(Purdue)
K.J. Worsley; B.Sc., M.Sc., Ph.D.(Auck.)
J.J. Xu; B.S.(Beijing), Ph.D.(Ren. Poly.)
S. Zlobec; M.Sc.(Zagreb), Ph.D.(Northwestern)

Associate Professors

W. Jonsson; M.Sc.(Manit.), Dr.Rer.Nat.(Tubingen)
I. Klemes; B.Sc.(Tor.), Ph.D.(Cal.Tech.)
J. Labute; B.Sc.(Windsor), M.A., Ph.D.(Harv.)
B. Lawruk; M.Sc., Ph.D.(Lwow)
J. Loveys; B.A.(St.Mary's), M.Sc., Ph.D.(S. Fraser)
R. Rigelhof; B.Sc.(Sask.), M.Sc.(Wat.), Ph.D.(McM.)
N. Sancho; B.Sc., Ph.D.(Belf.)

Assistant Professors

M. Asgharian; B.Sc.(Shahid Beheshti), M.Sc., Ph.D.(McG)
M.J. Gander; M.S.(E.T.H.), M.S., Ph.D.(Stanford)
E.Z. Goren; B.A., M.S., Ph.D.(Hebrew)
D. Jakobson; B.Sc.(M.I.T.), Ph.D.(Princeton)
D. Leisen; B.Sc.(Mainz), M.Sc., Ph.D.(Bonn) (*joint appt. with Management*)
J.A. Toth; B.Sc., M.Sc.(McM.) Ph.D.(M.I.T.)

A. Vandal; B.Sc., M.Sc.(McG), Ph.D.(Auckland)

Adjunct Professors

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

T. Fox; B.A.(Oakland), M.Sc., Ph.D.(McG.)
V.P. Havin; M.Sc., Ph.D.(Leningrad)
R. Murty; B.Sc.(Car.), Ph.D.(M.I.T.), F.R.S.C.
B. Rowley; B.Sc.(Wat.), M.Sc., Ph.D.(McG.)
R.A. Seely; B.Sc.(McG.), Ph.D.(Cantab.)

Associate Members

L.P. Devroye (*Computer Science*); P.R.L. Dutilleul (*Plant Science*); L. Glass (*Physiology*); J.-L. Goffin (*Management*); J. Hanley (*Epidemiology & Biostatistics*)the information contained in this Calendar.

The Department offers both a Master's degree (or a M.A. or an M.Sc.) and a Ph.D. degree.

By the choice of courses and thesis (or projects) degrees can be focussed in applied mathematics or statistics.

The Institut des Sciences Mathématiques activities, coordinates intermediate and advanced courses among the following universities: Université Laval, McGill, Université de Montréal, Université de Sherbrooke. A list of courses available at the other universities can be obtained from the ISM website (<http://www.math.uqam.ca/ISM>) which offers fellowships and promotes a variety of joint activities, greatly enhancing the mathematical environment in the province of Quebec.

45.3 Admission Requirements

In addition to the general Graduate Faculty requirements the Department requirements are as follows:

Master's Degree

The normal entrance requirement for the Master's programs is a Canadian Honours degree or its equivalent, with high standing, in mathematics, or a closely related discipline in the case of applicants intending to concentrate in statistics or applied mathematics. For applicants intending to continue in a doctoral program, an Honours degree or its equivalent is the preferred background.

Applicants wishing to concentrate in pure mathematics should have a strong background in linear algebra, abstract algebra, and real and complex analysis.

Applicants wishing to concentrate in an applied area of statistics should have a strong background in matrix algebra, advanced calculus and undergraduate statistics; some knowledge of computer programming and numerical analysis is also desirable.

Applicants wishing to concentrate in applied mathematics should have a strong background in linear algebra, real and complex analysis, ordinary differential equations and numerical analysis. Some knowledge of computer programming is also desirable.

Students whose preparation in mathematics is insufficient may have to register for a Qualifying Year.

Ph.D. Degree

Students normally enter the Ph.D. program after completing a Master's degree program with high standing.

45.4 Application Procedures

Applications will be considered upon receipt of:

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

All information is to be submitted directly to the Graduate Secretary in the Department of Mathematics and Statistics.

Deadline: Applicants are urged to submit complete applications by March 1 for September admission, or by August 1 for January admission.

45.5 Program Requirements

Master's Degrees

Students must choose between the thesis option, which requires a thesis (24 credits) and 6 approved courses for a total of at least 22 credits, and the project option, which requires a project (15 credits) and 8 approved courses for at least 30 credits. Normally students must declare which option they choose to follow after one semester. It is expected that the degree be completed in at most four semesters.

The choice of courses must be approved by the advisor or thesis supervisor as well as by the Chair of the Committee on Graduate Affairs.

Some suggestions for the choice of courses in the Master's programs are:

- For students in applied mathematics: at least two of the following course sequences: 189-487 and 189-560; 189-578 and 189-579; 189-586 and 189-585.
- For students in pure mathematics: at least two of the following course sequences: 189-564, 189-565 and 189-566; 189-570 and 189-571; 189-576 and 189-577.
- Students in statistics are required to take 189-556 and 189-557 and, if they intend to continue in a doctoral program, they should also take 189-587 and 189-589.

Master's students who wish to keep open the possibility of continuing in a doctoral program should adhere closely to these suggestions since they will provide the background necessary for the comprehensive examination which all doctoral students are required to pass.

Further courses can be chosen from the departmental list of course offerings. A comprehensive list of courses, from which annual offerings are selected, is given below.

Ph.D. Degree

To complete a Ph.D. program students must:

- a) pass twelve approved courses beyond the Bachelor's level ;
- b) pass a Comprehensive Examination consisting of a written Part A, which is concerned with their general mathematical background, and an oral Part B concerned with two topics at an advanced graduate level;
- c) demonstrate a reading knowledge of French;
- d) submit a thesis judged to be an original contribution to knowledge.

45.6 Courses

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

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

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

- Denotes courses not offered in 2001-02.

This Calendar is prepared long before it is known precisely which courses will be offered. In 2001-02 most 500-level and approximately 15 of the 600- and 700-level courses will be given. Students should consult the Departmental website for an updated list of offerings.

NOTE: With the permission of the instructor, prerequisites and corequisites for courses may be waived in individual cases.

189-523B GENERALIZED LINEAR MODELS. (4) (Prerequisite: 189-423 or 513-697) (Not open to students who have taken 189-426.) Modern discrete data analysis. Exponential families,

orthogonality, link functions. Inference and model selection using analysis of deviance. Shrinkage (Bayesian, frequentist view-points). Smoothing. Residuals. Quasi-likelihood. Sliced inverse regression. Contingency tables: logistic regression, log-linear models. Censored data. Applications to current problems in medicine, biological and physical sciences. GLIM, S, software.

189-524A NONPARAMETRIC STATISTICS. (4) (Prerequisite: 189-324 or equivalent.) (Not open to students who have taken 189-424.) Distribution free procedures for 2-sample problem: Wilcoxon rank sum, Siegel-Tukey Smirnov tests. Shift model: power and estimation. Single sample procedures: Sign, Wilcoxon signed rank tests. Nonparametric ANOVA: Kruskal-Wallis, Friedman tests. Association: Spearman's rank correlation, Kendall's tau. Goodness of fit: Pearson's chi-square, likelihood ratio, Kolmogorov-Smirnov tests. Statistical software packages used.

189-525B SAMPLING THEORY AND APPLICATIONS. (4) (Prerequisite: 189-324 or equivalent.) (Not open to students who have taken 189-425). Simple random sampling, domains, ratio and regression estimators, superpopulation models, stratified sampling, optimal stratification, cluster sampling, sampling with unequal probabilities, multistage sampling, complex surveys, nonresponse.

189-555 FLUID DYNAMICS. (4) Kinematics. Dynamics of general fluids. Inviscid fluids, Navier-Stokes equations. Exact solutions of Navier-Stokes equations. Low and high Reynolds number flow.

189-556A MATHEMATICAL STATISTICS I. (4) (Prerequisite: 189-357) Probability and distribution theory (univariate and multivariate). Exponential families. Laws of large numbers and central limit theorem.

189-557B MATHEMATICAL STATISTICS II. (4) (Prerequisite: 189-556) Sampling theory (including large-sample theory). Likelihood functions and information matrices. Hypothesis testing, esti-

commutative algebra; prime ideals and localization, Hilbert Nullstellensatz, integral extensions. Dedekind domains. Part of the material of 189-571B may be covered as well.

189-571B HIGHER ALGEBRA II. (4) (Prerequisite: 189-570 or consent of instructor.) Completion of the topics of 189-570. Rudiments of algebraic number theory. A deeper study of field extensions; Galois theory, separable and regular extensions. Semi-simple rings and modules. Representations of finite groups. Cohomology of finite groups if time permits.

● **189-574 ORDINARY DIFFERENTIAL EQUATIONS.** (4) (Prerequisites: 189-325,-354)

189-575 PARTIAL DIFFERENTIAL EQUATIONS. (4) (Prerequisite: 189-375A)

189-576A GEOMETRY AND TOPOLOGY I. (4) (Prerequisite: 189-354) Basic point-set topology, including connectedness, compactness, product spaces, separation axioms, metric spaces. The fundamental group and covering spaces. Simplicial complexes. Singular and simplicial homology. Part of the material of 189-577B may be covered as well.

189-577B GEOMETRY AND TOPOLOGY II. (4) (Prerequisite: 189-576) Continuation of the Topics of 189-576. Manifolds and differential forms. De Rham's theorem. Riemannian geometry. Connections and curvature. 2-Manifolds and imbedded surfaces.

189-578A NUMERICAL ANALYSIS. (4) (Prerequisites: A first course in numerical analysis – with programming – and a background in real and complex analysis, with Instructor's approval.) Errors in computation, vector and matrix norms. Iteration methods for roots in \mathbb{R}^n and the complex plane. Interpolation including osculating and spline interpolation. Numerical differentiation and integration including Romberg and Gaussian methods and the Peano theo-

189-687 READING COURSE IN MATHEMATICAL LOGIC I. (4) A highly specialized study.

189-688 READING COURSE IN MATHEMATICAL LOGIC II. (4) A highly specialized study.

189-689 READING COURSE IN ALGEBRA I. (4) A highly specialized study.

189-690 READING COURSE IN ALGEBRA II. (4) A highly specialized study.

189-691 READING COURSE IN GEOMETRY AND TOPOLOGY I. (4)
A highly specialized study.

189-692 READING COURSE IN GEOMETRY AND TOPOLOGY II. (4)
A highly specialized study.

189-693 READING COURSE IN ANALYSIS I. (4) A highly specialized study.

189-694 READING COURSE IN ANALYSIS II. (4) A highly specialized study.

189-695 READING COURSE IN APPLIED MATHEMATICS I. (4)
A highly specialized study.

189-696 READING COURSE IN APPLIED MATHEMATICS II. (4)
A highly specialized study.

189-697 READING COURSE IN STATISTICS AND PROBABILITY I. (4)
A highly specialized study.

189-698 READING COURSE IN STATISTICS AND PROBABILITY II. (4)
A highly specialized study.

189-699 READING COURSE IN

D.L. Frost; B.A.Sc.(Br.Col.), M.S., Ph.D.(Caltech.), P.Eng.
L. Lessard; B.Eng.(McG.), M.Sc., Ph.D.(Stan.), P.Eng.
D.F. Mateescu; M.Eng.(Poli. Univ. Buch.), Ph.D.(Rom. Acad. Sci.),
Doctor Honoris Causa (Poli. Univ. Buch.), AFAIAA, ACASI
J.A. Nemes; B.Sc.(Maryland), M.Sc., D.Sc.(GWU)
P. Radziszewski; B.Sc.(U.B.C.), M.Sc., Ph.D.(Laval)
V. Thomson; B.Sc.(Windsor), Ph.D.(McM.)
P.J. Zsombor-Murray; B.Eng., M.Eng., Ph.D.(McG.), Eng.,
F.C.S.M.E.

Assistant Professors

B. Epureanu; Ph.D.(Duke)
A.J. Higgins; B.Sc.(Illinois), M.S., Ph.D.(Washington)
V.N. Krovi; B.Tech.(I.I.T. Madras), Ph.D.(Pennsylvania)

M.Eng. Aerospace Degree (minimum 45 credits)

The M.Eng. Aerospace Degree is offered to the students who wish to specialize in the general area of aerospace engineering. This degree is given in conjunction with Concordia University, Ecole Polytechnique, Université Laval and Université de Sherbrooke. Students registered at McGill are required to take two courses

ufacturing. Computer aided systems. Information modelling. Information system structures. Study of several types of production systems. Integration issues: inter-and intra-enterprise. Laboratory experience with manufacturing software systems.

305-526C MANUFACTURING AND THE ENVIRONMENT. (3) Course topics include: clean manufacturing, product and process design for minimizing materials and energy use, the product life cycle, impact of technology on the environment, environmental impact assessment, regulatory process, and managing the "political" process.

305-528A PRODUCT DESIGN. (3) A study of the design issues present in product life cycle demands. Computer aided systems. Rapid prototyping. Design for manufacturability. Integration of mechanics, electronics and software in products. Effect on design of product cost, maintainability, recycling, marketability.

305-529C DISCRETE MANUFACTURING SYSTEMS. (3) An overview of present day production machines and systems with special emphasis on automation, computer control and integration techniques. Material handling, automatic inspection, process monitoring, maintenance. Socio-economic and environmental issues. Laboratory experience with factory simulation.

305-530A MECHANICS OF COMPOSITE MATERIALS. (3) (Instructor's permission) Fiber reinforced composites. Stress, strain, and strength of composite laminates and honeycomb structures. Failure modes and failure criteria. Environmental effects. Manufacturing processes. Design of composite structures. Computer modeling of composites. Computer techniques are utilized throughout the course.

● **305-531B AEROELASTICITY.** (3) (Prerequisite: 305-533A)

305-532B AIRCRAFT PERFORMANCE, STABILITY AND CONTROL. (3) (Prerequisite: 305-533A) Aircraft performance criteria such as range, endurance, rate of climb, maximum ceiling for steady and accelerated flight. Landing and take-off distances. Static and dynamic stability in the longitudinal (stick-fixed and stick-free) and coupled lateral and directional modes. Control response for all three modes.

305-533A SUBSONIC AERODYNAMICS 3. (3) Kinematics; equations of motion; vorticity and circulation; conformal mapping and flow around simple bodies. Two dimensional flow around aerofoils.

pany. The topic is to be decided by a mutual agreement between the candidate, the participating company and the Liaison Committee on Aerospace Engineering. An evaluation of the candidate's performance during the work period becomes a part of the student's record.

305-691A,B,C M.ENG. THESIS221i

C. Tsoukas; B.Sc.(McG.), M.Sc.(Hawaii), M.D.(Athens),
F.R.C.P.(C)

M. Wainberg; B.Sc.(McG.), Ph.D.(Col.)

M. Zannis-Hadjopoulos; B.Sc., M.Sc., Ph.D.(McG.)

H. Zingg; M.D.(Basel), Ph.D.(McG.)

Associate Professors

A. Bateman; B.Sc., Ph.D.(Lond.)

N. Beauchemin; B.A., B.Sc., M.Sc., Ph.D.(Montr.)

L.F. Congote; B.Sc.(Z[u:r.]), Ph.D.(Marburg)

D. Cournoyer; M.D.(Sher.), F.R.C.P.(C)

A. Cybulsky; M.D.(Tor.), F.R.C.P.(C)

D. Eidelman; M.D., C.M.(McG.), F.R.C.P.(C)

E.A. Faust; B.Sc., Ph.D.(McG.)

M.S. Featherstone; B.Sc., M.Sc.(Ott.), Ph.D.(McG.)

R. Gagnon; B.Sc.(Montr.), M.D.(Laval), D.Phil.(Oxon.)

R. Germinario; B.A., M.Sc.(Seton Hall U., N.J.), Ph.D.(Dakota)

V. Giguere; B.Sc., Ph.D.(Laval)

S.B. Gottfried; M.D.(Penn.)

Q.A. Hamid; M.D.(Mosul, Iraq.), Ph.D.(Lond.)

L.J. Hoffer; B.Sc., M.D., C.M.(McG.), Ph.D.(M.I.T.)

L. Kleiman; B.Sc.(Ill.), Ph.D.(Johns H.)

R. Kremer; M.D., Ph.D.(Paris)

G.A. Kuchel; M.D.(McG.)

P. Laneuville; B.Sc.(McM.), M.D.(Ott.), F.R.C.P.(C)

M. Laughrea; B.Sc.(Laval), M.Sc., M.Phil., Ph.D.(Yale)

R. Loertscher; M.D.(Basel)

M.S. Ludwig; M.D.(Man.), F.R.C.P.(C)

W.H. Miller; A.B.(Prin.), Ph.D.(Rock.), M.D.(C'nell)

S. Mulay; M.Sc., Ph.D.(McG.)

J. Nalbantoglu; B.Sc., Ph.D.(McG.)

A. Nepveu; B.Sc., M.Sc.(Montr.), Ph.D.(Sher.)

M. Newkirk; B.Sc., M.Sc.(Queen's), Ph.D.(Tor.)

T. Owens; B.Sc., M.Sc.(McG.), Ph.D.(Ott.)

R. Palfree; B.Sc., M.Sc.(Lond.), Ph.D.(McG.)

K. Pantopoulos; B.Sc., Ph.D.(Aristotelian, Greece)

M. Parniak; B.Sc., Ph.D.(Wat.)

A.C. Peterson; B.Sc.(Vic., B.C.), Ph.D.(Br.Col.)

S. Rabbani; M.B.B.S.(King Edward Med. Coll., Lahore)

D. Radzioch; M.Sc., Ph.D.(Jagiellonian, Cracow)

J. Rauch; B.Sc., Ph.D.(McG.)

C.P. Rose; B.Sc.(Queen's), M.D., C.M., Ph.D.(McG.)

E. Schurr; Diplom., Ph.D.(Al. Ludwigs U., Freiburg)

G. Spurl; B.Sc.(Med.), M.D.(Man.)

C. Srikant; M.Sc., Ph.D.(Madr.)

M. Trifiro; B.Sc., M.D.(McG.)

B. Turcotte; B.Sc., Ph.D.(Laval)

B.J. Ward; M.D.(McG.), M.Sc.(Oxon.), F.R.C.P.(C)

Assistant Professors

M. Alaoui-Jamali; D.V.M.(Rabat, Morocco), Ph.D.(René-
Descartes, Paris)

S. Ali; B.Sc.(C'dia), Ph.D.(McG.)

D. Baran; M.D.C.M.(McG.), F.R.C.P.(C)

M. Behr; B.Sc.(Tor.), M.D.(Queen's), M.Sc.(McG.)

N. Bernard; B.Sc.(McG.), Ph.D.(Duke)

M. Blostein; M.D., C.M.(McG.)

L. Chalifour; B.Sc., Ph.D.(Man.), M.A.(Harv.)

K. Cianflone; B.Sc., Ph.D.(C'dia)

A.E. Clarke; M.D.(Nfld.), M.S.(Stan.), F.R.C.P.(C)

C. Couture; B.Sc., M.Sc.(Laval), Ph.D.(McG.)

W. Cupples; B.Sc.(Vic., B.C.), M.Sc.(Calg.), Ph.D.(Tor.)

S. Daly; B.Sc.(C'dia), Ph.D.(W. Ont.)

J. Falutz; B.Sc., M.D., C.M.(McG.), F.R.C.P.(C)

E. Fixman; B.Sc.(Col.), Ph.D.(Johns H.)

J. Galipeau; M.D.(Montr.)

B. Gilfix; B.Sc.(Man.), Ph.D.(W. Ont.), M.D.C.M.(McG.),
F.R.C.P.(C)

M. Götte; B.Sc., Ph.D.(Max-Planck)

M. Greenwood; B.Sc., M.Sc.(C'dia), Ph.D.(McG.)

J. Henderson; B.Sc., Ph.D.(McG.)

A.C. Karaplis; B.Sc., M.D., Ph.D.(McG.)

A.E. Koromilas; B.Sc., Ph.D.(Aristotelian U., Greece)

L. Larose; B.Sc., Ph.D.(Montr.)

D. Lasko; B.S.(Yale), Ph.D.(M.I.T.)

J.-J. Lebrun; B.Sc., M.Sc., Ph.D.(Rennes, France)

C. Liang; B.Sc., Ph.D.(Nankai)

R. Lin; B.Sc., M.Sc.(PRC), Ph.D.(C'dia)

M. Lipman; M.D.(McG.), F.R.C.P.(C)

J.-L. Liu; B.Sc., M.Sc.(Beijing), Ph.D.(McG.)

D. Malo; D.V.M., M.Sc.(Montr.), Ph.D.(McG.)

B. Mazer; B.Sc.(Columbia, NY); M.D.(McG.), F.R.C.P.(C)

M. Park; B.Sc., Ph.D.(Glas.)

B.J. Petrof; M.D.(Laval)

P. Renzi; M.D.(Montr.), F.R.C.P.(C)

S. Richard; B.Sc., Ph.D.(McG.)

A. Sherker; M.D.(Queen's), F.R.C.P.(C)

T. Takano; M.D., Ph.D.(Tokyo)

and legal, financial and human resource issues as they apply to the researcher. Given in conjunction with the Centre for Continuing Education.

516-602B ADVANCED TECHNIQUES IN MOLECULAR GENETICS. (3) (Admission by permission of instructor.) Offered in conjunction with the Department of Human Genetics. Precise description of available methods in molecular genetics, and rationales for choosing particular techniques to answer questions posed in research proposals for targeting genes in the mammalian genome. Emphasis placed on analysis of regulation of gene expression and mapping, strategies for gene cloning. Course divided between lectures and student seminars.

516-603B SEMINARS IN ENDOCRINOLOGY. (3) For graduate students to develop skills in critical reading of current literature, interpretation of research data, and seminar organization and presentation. Staff suggest topics. Each student presents two seminars on topics of their choice, supervised by professors responsible for those topics, and one mini-symposium style presentation on any topic.

516-604D RECENT ADVANCES IN CELLULAR AND MOLECULAR BIOLOGY. (6) Offered in conjunction with the Université de Montréal: given Thursdays 16:00-18:00 at Institut de Recherches Cliniques de Montréal, 110 Pine West. The course is bilingual with abstracts in the other language supplied; more than half the lectures are in French. Aimed at bringing students up to date on recent aspects of cell and molecular biology including cellular organelle structure and function, molecular genetics, signal transduction, cell growth and development, and immunology.

516-607B MOLECULAR CONTROL OF CELL GROWTH. (3) A course for graduate students in Experimental Medicine, Biology, Biochemistry, Microbiology and Physiology, dealing with molecular control in normal and malignant cell growth, including cell cycle and physiological controls (nutritional and hormonal), mammalian DNA replication, viral effects on host cell growth for DNA and RNA-tumor viruses and oncogenes, and tissue and organ growth-renewal mechanisms.

● **★516-608A MOLECULAR EMBRYOLOGY.** (3) (Offered in conjunction with the Department of Oncology.)

516-610B BIOCHEMICAL METHODS IN MEDICAL RESEARCH. (3) A course intended to introduce students to a variety of basic techniques used in medical research. Lectures and demonstrations given on the purification of biologically active substances by chromatography, analysis of compounds by spectrophotometry and mass spectrometry, immunological techniques, centrifugation, cell culture, binding of hormones to receptors, molecular biology, tumor biology and electron microscopy.

★ **516-611D SEMINARS IN** 

Renal and Electrolyte Seminar
Transplantation Conference
Gastroenterology Conference
Diabetes Conference
Chest-Cardiac Disease Conference
Clinical Endocrinology Conference
Steroid Biochemistry Research
Haematology Clinical Conference
Endocrinology and Metabolism Research Conference
Clinical Immunology Conference
Arthritis Conference
Internal Medicine
Dermatology Research
University Clinic Seminar
Cardiology Research

The Montreal General Hospital (1 hour per week, or in some cases alternate week):

Gastroenterology Conference
Respiratory Diseases
Dermatology
Internal Medicine
Allergy and Immunology
Infectious Diseases
Combined Staff Conference
Haematology
Arthritis
Metabolic Diseases
Cardiac Disease
Neurology – Neurosurgery
University Medical Clinic Seminar

49 Microbiology and Immunology

Department of Microbiology and Immunology
3775 University Street
Montreal, QC H3A 2B4
Canada

Telephone: (514) 398-3912
Fax: (514) 398-7052
Email: office@microimm.mcgill.ca
Website:

International Applicants

August 1 for the Winter Term (January)
December 1 for the Summer term (May)
February 15 for the Fall term (September)

49.5 Program Requirements

M.Sc. Degree (45 credits)

The following requirements must be satisfied:

1. Students must register for and satisfactorily complete the requirements of courses 528-611, 528-612, 528-613, 528-614, 528-615 and two of the following courses: 528-616, 528-617, 528-618 and 528-619 (see list below).
2. Other courses may be required to strengthen the student's background.
3. A satisfactory M.Sc. thesis (24 credits) must be presented.

M.Sc.A. Degree (non-thesis degree)

J.E. Gruzleski; B.Sc., M.Sc.(Queen's), Ph.D.(Tor.), Eng., F.C.I.M.,
F.A.S.M.

R.I.L. Guthrie; B.Sc., Ph.D.(Lond.), D.I.C., A.R.S.M., Eng.,
F.C.I.M.

F.P. Hassani; B.Sc., Ph.D.(Nott.), C.Eng.(U.K. Reg.)

J.J. Jonas; B.Eng.(McG.), Ph.D.(Cantab.), F.A.S.M., F.R.S.C.,
Eng.

J. Szpunar; B.Sc., M.Sc., Ph.D., D.Sc.(Krakow)

Associate Professors

M.L. Bilodeau; B.Eng.(Montr.), M.Sc.A., Ph.D.(McG.), Eng.

R. Harris; B.Sc.(Q'ld), M.Eng., Ph.D.(McG.)

M. Hasan; B.Eng.(Dhaka), M.Eng.(Dhahran), Ph.D.(McG.)

J.A. Kozinski; B.A., M.Eng., D.Sc.(Krakow)

A. Laplante; B.A.Sc., M.A.Sc.(Montr.), Ph.D.(Tor.), Eng.

H.S. Mitri; B.Sc.(Cairo), M.Eng., Ph.D.(McM.), Eng.

F. Mucciardi; B.Eng., M.Eng., Ph.D.(McG.), Eng.

J. Ouellet; B.Sc.A.(Laval), M.Sc.A., Ph.D.(Ecole Poly.), Eng.

S. Yue; B.Sc., Ph.D.(Leeds)

Lecturer

J. Mossop; B.Eng.(McG.)

Adjunct Professors

W. Caley, W. Comeau, R. Dimitrakopoulos, P.A. Distin, B. Harris,

A. Hemami, B. Mohanty, M. Pugh, J.H. Root, M.J. Scoble,

W.T. Thompson, R. Thorn, V. Vaidya, G. Van Weert, A.E. Wraith

Liaison Officer, Mining Co-op Program — M. Vachon

50.2 Programs Offered

Graduate programs leading to M.Eng., M.Sc. and Ph.D. research degrees are available in rock mechanics, mining environments,

M.Eng. (Project) Degree Mining Option

The M.Eng. (Project) program (Mining Option) consists of 45 credits of course work and projects. It is primarily designed for graduates from mining engineering programs who have received adequate academic training in modern mining technology, Mineral Economics, Computer Programming and Probabilities and Statistics. Students without this academic training must follow a qualifying semester of courses (including 306-420 Feasibility Study) established by the Mining Program Director.

The program consists of a minimum 12 credits of Departmental graduate level courses, 6 to 15 credits of M.Eng Mining Project courses, the Mining Engineering Seminar (306-673) and enough additional courses chosen from within or outside the Department to complete the 45 credit requirement. The program is established in consultation with the Program Director. The external courses are subject to Departmental approval.

Ph.D. Degree

A candidate for this degree must pass courses assigned by the Department. These are selected on the basis of the student's previous academic training and research interests. The candidate is required to participate in an appropriate Research Seminar course and is expected to take a preliminary examination within the first year of his/her Ph.D. registration.

The candidate must submit an acceptable thesis based upon successfully completed research and must satisfy the examiners in an oral examination of the thesis and related topics.

50.6 Graduate Courses Offered by the Department

The courses in this Department have been numbered to conform with the following classification system. The first three digits (i.e., 306) represent the departmental code. The next digit represents the level of instruction. The last two digits are classified as follows:

- 01 to 19 technical courses
- 20 to 39 mining courses
- 40 to 49 mineral processing courses
- 50 to 59 extractive and process metallurgy courses
- 60 to 69 metallurgy and materials courses
- 70 to 79 seminars

306-566A T

306-670D RESEARCH SEMINAR. (6) For students registered for a Master's degree in Metallurgy.

306-672D ROCK MECHANICS AND GEOPHYSICS SEMINAR. (6) Theoretical and practical aspects of ground control practice using the case study method.

306-673D,N,E,G MINING ENGINEERING SEMINAR. (6) For students registered in the Graduate Diploma or Master's programs in Mining.

306-680D,E,G METALLURGICAL/MATERIALS ENGINEERING PROJECT I. (6)

306-681D,E,G METALLURGICAL/MATERIALS ENGINEERING PROJECT II. (6)

306-682A,B,C METALLURGICAL/MATERIALS ENGINEERING PROJECT III. (3)

306-690D,N,E,G,B THESIS RESEARCH I. (6)

306-691A,B,L THESIS RESEARCH II. (3)

306-692D,N,E,G,B THESIS RESEARCH III. (6)

306-693A,B,L THESIS RESEARCH IV. (3)

306-694D,N,E,G,B THESIS RESEARCH V. (6)

306-695A,B,L THESIS RESEARCH VI. (3)

306-701A,B,C,T PH.D. THESIS RESEARCH PROPOSAL (0) For students registered in a Ph.D. program in Metallurgy. Student submits a document and takes an oral examination to demonstrate familiarity with relevant literature, define a methodology and describe a work plan.

306-771D RESEARCH SEMINAR. (6) For students registered in a Ph.D. program in Metallurgy.

306-776D MINING RESEARCH SEMINAR. (6) For students registered in a Ph.D. program in Mining.

Valerie Kinslow; B.A.(McG.)
 John Klepko; B.F.A.(C'dia.), M.Mus., Ph.D.(McG.)
 Denise Lupien; B.M., M.M.(Juilliard)
 Chris McCann
 Dennis Miller; Principal Tuba, Montreal Symphony
 Richard Roberts; B.Mus.(Ind.); Concertmaster, Montreal
 Symphony
 Dixie Ross-Neill; B.Mus.(N. Carolina), M.Mus.(Texas)
 André Roy; Montreal Symphony
 Joe Sullivan; B.A.(Ott.), M.M.(New England Cons.)
 André White; B.A.(C'dia.), M.Mus.(McG.)

Adjunct Professor

Kenneth Gilbert; D.Mus.honoris causa(McG.), O.C., F.R.S.C., Hon
 RAM

51.2 Programs Offered

The Master of Arts degree (M.A.) is available as a thesis option in Music Education, Music Technology, Musicology, and Theory and as a non-thesis option in Music Education, Musicology, and Theory.

The Master of Music degree (M. Mus.) is available in Composition, Performance, and Sound Recording. Within the Performance option are offered specializations in: piano, guitar, orchestral instruments, organ, conducting, chamber music, orchestral training, piano accompaniment, vocal, opera, vocal pedagogy, early music, church music - organ, and jazz.

The Doctor of Music degree (D.Mus.) is offered in Composition and Performance Studies while the Doctor of Philosophy degree (Ph.D.) is available in Music Education, Musicology, Music Technology, Sound Recording and Theory. Interdisciplinary studies involving Musicology or Theory are encouraged.

There are opportunities for graduate students to obtain funding by being hired as assistants through the Faculty of Music. Positions are available as: teaching assistants, apprentice writers for program notes and Music McGill, sound recording technicians, dubbing technicians, correctors, and invigilators. Inquiries should be directed to the Chair of the Department of Theory or the Chair of the Department of Performance, as appropriate.

51.3 Admission Requirements

Masters' Degrees

Applicants for the Master's degree must hold a B.Mus. or a B.A. degree with a Major or Honours in Music including considerable work done in the area of specialization.

All applicants (except those for performance and sound recording) will be required to take placement examinations. Applicants found to be deficient in their background preparation may be required to take certain additional undergraduate courses.

Applicants to the Composition, Music Education, Music Technology, Musicology, Sound Recording, and Theory programs are requested to submit samples of work done in their special area.

Applicants to the Music Education program should normally have had two years of teaching experience.

All applicants to the Performance program will be required to pass an entrance audition. Only those applicants who clearly demonstrate the potential to become professional performers on their instruments will be admitted.

Applicants to the Vocal Pedagogy option should have a minimum of three to four years experience in studio teaching.

D.Mus. Degree

(Wind Band Conducting – not available 1999-2000)

Master of Music – Performance

Chamber Music (48 credits)

(All instruments except Early Music Instruments, Organ, Harp and Double Bass.)

242-620A, 242-621B, 242-622A Performance Tutorials.

One of 215-690A, 215-691B, 215-692A, 215-693B, 215-694A or 215-695B Performance Practice Seminar.

Electives:

One graduate 3-credit seminar with the prefix 211-, 213-, 214-, 215-, 219-, 222-.

One additional graduate 3-credit seminar.

Recitals:

242-661 Chamber Music Recital I and 242-668 Chamber Music Recital II (one of these could optionally include some solo music).

Ensembles:

Three terms of 243-660 Chamber Music Ensemble.

Master of Music – Performance

Orchestral Training (45 credits)

(all orchestral instruments except Harp.)

242-620A, 242-621B, 242-622A Performance Tutorials.

One of 215-690A, 215-691B, 215-692A, 215-693B, 215-694A or 215-695B Performance

Practice Seminar.

Electives:

One graduate 3-credit seminar with the prefix 211-, 213-, 214-, 215-, 219-, 222-.

One additional graduate 3-credit seminar.

Recital/Exam:

- 211-649B THEORY TUTORIAL.** (3)
211-652A SEMINAR IN MUSIC THEORY I. (3) (3 hours)
211-653B SEMINAR IN MUSIC THEORY II. (3) (3 hours)
211-654A SEMINAR IN MUSIC THEORY III. (3) (3 hours)
211-655B SEMINAR IN MUSIC THEORY IV. (3) (3 hours)
211-656A SEMINAR IN MUSIC THEORY V. (3) (3 hours)
211-657B SEMINAR IN MUSIC THEORY VI. (3) (3 hours)
211-658A HISTORY OF MUSIC THEORY I. (3) (3 hours) Selected

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tions. Students practise the assembly of raw material into a complete final product through editing, signal processing, mixing, sound restoration and pre-mastering.

216-690A MEDIA THEORY & PRACTICE SEMINAR I. (3) (3 hours)

Topics vary from year to year and are normally chosen according to the individual instructor's area of expertise. Topics to be covered may include the following: Media Technology, Digital Restoration of Archival Recordings, Communications Systems and Standards, Audio Aesthetics of Video Musicals, Classical Music and the Television Medium, etc.

216-691B MEDIA THEORY & PRACTICE SEMINAR II. (3) (3 hours)

216-692A MEDIA THEORY & PRACTICE SEMINAR III. (3) (3 hours)

216-693B MEDIA THEORY & PRACTICE SEMINAR IV. (3) (3 hours)

216-694A MEDIA THEORY & PRACTICE SEMINAR V. (3) (3 hours)

216-695B MEDIA THEORY & PRACTICE SEMINAR



253-700A,B,C VOCAL REPERTOIRE COACHING 1. (2)

253-701A,B,C VOCAL REPERTOIRE COACHING 2. (2)

253-702A,B,C VOCAL REPERTOIRE COACHING 3. (2)

253-703A,B,C VOCAL REPERTOIRE COACHING 4. (2)

ADVANCED UNDERGRADUATE COURSES

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

Students deficient in their background preparation may be required to take some of the following undergraduate courses in addition to their required graduate courses.

For an up-to-date listing of upper-level music history courses that will be offered, please consult the final 2001-02 Faculty of Music timetable.

With the exception of 211-501, 211-502 and 211-503, all

1-credit seminar courses, the last of which will consist of a formal presentation of the student's final thesis research. Candidates must also register in the three M.Sc. Thesis Research courses (373-691, -692, -693; 36 credits) and present a satisfactory thesis based on their research.

Ph.D.

Course requirements are specified by the staff in the discipline but are flexible and depend largely on the student's background, immediate interests, and ultimate objectives. Students are required to register for four 1-semester seminar courses.

Also required are satisfactory performance in the Ph.D. Comprehensive Examination (373-701) and the presentation, and subsequent defence, of a satisfactory thesis based on the student's research.

52.6 Courses for Higher Degrees

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

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

- Denotes courses not offered in 2001-02.
- ★ Denotes courses offered in alternate years.
- ★ **338-510B AGRICULTURAL MICROMETEOROLOGY.** (3)
(3 lectures)
- **338-602B ISOTOPIC TRACER TECHNIQUES.** (3) (3 lectures and

A. Pfitz; Ph.D.(Montr.)

J. Montes; B.Sc.(Inst.Pot.-Mex.), M.D.(Univ.Auto.de San Luis
Pot.-Mex)

J. Nalbantoglu; B.Sc., Ph.D.(McG.)

53.5 Program Requirements

GENERAL

1. Students must select an Advisory Committee, in conjunction with their thesis supervisor. This committee will consist of the thesis supervisor and two other individuals who will participate in discussions with students about their research program.
2. Students are required to submit a written thesis proposal to the

54.2 Programs Offered

Master's Programs

Two types of Master's degrees are offered: Master of Science (Applied) and Master of Science (with thesis) (not offered 2001-02). These programs are designed to prepare clinicians and researchers for the expanding function of nursing within the health care delivery system.

Master of Science (Applied)

The objective of this program is to prepare specialists in nursing able to participate in the development, implementation and management of services in all domains of health care. Opportunity is provided for the advanced clinical study of nursing, and for incorporating research and evaluation methods in the investigation of nursing problems.

Master of Science (with thesis) (not offered 2001-02).

Doctoral Studies in Nursing

The School of Nursing of McGill University and the Faculté des Sciences Infirmières of the Université de Montréal offer a joint doctorate program leading to a Ph.D. in Nursing. This program is offered in English at McGill.

The program is designed to train researchers who will make a contribution to the advancement of knowledge in the field of nursing and assume a leadership role both in the profession and in the health care system.

54.3 Admission Requirements

Master's Programs

Non-Canadian applicants shall normally be required to submit documented proof of competency in oral and written English, e.g. TOEFL (600 minimum on the paper-based test, 250 minimum on the computer-based test) or equivalent.

GRE – may be required in individual circumstances.

Nurse applicants

Applicants for the Master's degree must have completed a bachelor's degree in nursing with a minimum GPA of 3.0 on a scale of 4.0. This preparation must be comparable to that offered in the bachelor's program at McGill. Experience in nursing is suggested. An introductory statistics course (3 credits) is strongly recommended.

Nurses with a general B.Sc. or B.A. (comparable to the McGill undergraduate degrees) may be considered on an individual basis.

All nurse applicants are expected to hold current registration in the province or country from which they come. Nurses who are not licensed in Quebec must obtain a special authorization for graduate nurse students from the Order of Nurses of Quebec.

Non-nurse applicants (generic Master's students)

Applicants holding a B.Sc. or B.A., which includes a number of pre-requisite courses, may be admitted to a Qualifying Year. Upon successful completion of their studies, candidates may apply directly to the Master's program. (Persons prepared in another professional discipline or in nursing are not eligible for this program.) A GPA of 3.0 or above on a scale of 4.0 is required for entry.

Ph.D. Program

Applicants admitted to the Doctoral program through McGill University must satisfy the following conditions:

1. hold a Master of Science in Nursing or equivalent;
2. GPA of 3.3 or high B standing;
3. demonstrated research ability;
4. be accepted by a faculty member who has agreed to serve as the thesis adviser;
5. submit a 5-page outline of proposed research including literature review and abbreviated methods sections;
6. submit letters of references from two professors who are familiar with the candidate's work and research aptitude;

7. submit a curriculum vitae;
8. submit two official copies of academic transcripts of undergraduate and graduate records,
9. be eligible to hold nursing registration in Quebec;
10. submit results of the Graduate Record Examination General Test.

54.4 Application Procedures

Application for admission to any of these programs is made on application forms available from the Graduate Program Office in the School of Nursing. Applications must be completed according to the instructions that accompany the forms.

Deadline for receipt of application for September admission is March 30. All documents required for admission should be submitted by this deadline.

54.5 Program Requirements

Master's Programs

The general rules concerning higher degrees apply. (See the Faculty of Graduate Studies General Information and Faculty Regulations.) A minimum of two years of study is required for the Masters programs.

Nurse applicants to the Master's program may complete their studies on a part-time basis, i.e. minimum of 6 credits per term to a maximum of four years.

Non-nurse applicants must complete their qualifying year and the Master's program of study on a full-time basis.

M.SC. (APPLIED)

(48 credits nurse students; 52 credits non-nurse students)

First Year

(24 credits nurse students; 28 credits non-nurse students)

- | | |
|----------|--|
| 573-611D | (6) Seminar in Nursing I |
| 573-612A | (3) Research Methods in Nursing I |
| 573-614D | (6) Clinical Laboratory in Nursing I |
| 573-627B | (3) Nursing Practicum |
| | one 3-credit Statistics course |
| | and |
| 573-616C | (4) Advanced Clinical Skills (Generic students only) |
| 573-623A | (3) Clinical Assessment and Therapeutics (Generic students only) |

Complementary course (3 credits) (Nurse students only)

Second Year (24 credits)

- | | |
|----------|--|
| 573-615B | (3) Health Care Evaluation |
| 573-620A | (2) Current Theories of Nursing |
| 573-621D | (6) Seminar in Nursing II |
| 573-624A | (4) Clinical Laboratory in Nursing II |
| 573-625B | (6) Clinical Laboratory in Nursing III |
| 573-626A | (3) Developments in Education & Administration |

M.SC. (THESIS) (50 credits) (not offered 2001-02)

QUALIFYING YEAR

(non-nurse applicants entering with B.A. or B.Sc.)

- | | |
|----------|--|
| 572-222A | (1) McGill Model of Nursing |
| 572-235B | (3) Health and Physical Assessment |
| 573-511D | (6) Practice and Theory in Nursing – Par tl |
| 573-514D | (10) Clinical Laboratory in Nursing |
| 573-512C | (8) Practice and Theory in Nursing – Par tII |

Complementary Courses (12 credits)

12 credits from the physical sciences, social sciences and nursing, are chosen in consultation with faculty to complement the student's previous academic background.

Students must successfully complete the Qualifying Year and be recommended by the Standing and Promotions Committee for entry to the Master of Science (Applied) Program.

Ph.D. PROGRAM

Each student's program is designed with the research director and thesis supervisor, taking into account the student's previous aca-



theory development with special emphasis placed on the approaches theory development and the factors affecting these approaches. Issues such as the level of theory, where theory derives are examined in light of the needs of a practice discipline. Future directions for theory development in nursing are explored.

573-780 ADVANCED NURSING. (3) (3 hours seminar weekly)
(Prerequisite: 573-621D, 573-624A, 573-625B or equivalent and permission of instructor). An in-depth analysis of selected issues and developments within nursing and health care. Included will be topics relevant to the areas of research and clinical expertise of the student and faculty.

55 Occupational Health

Department of Occupational Health
Purvis Hall
1020 Pine Avenue West
Montreal, QC H3A 1A2
Canada

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

Chair — G. Thériault

M.Sc. (Resident) and Ph.D. programs:
Telephone: (514) 398-4229
Fax: (514) 398-4503

moderate their study time within their work schedule as well as a \$60(Cdn) application fee.

Ph.D. Program

Candidates must submit with their application two official copies of their university transcripts (undergraduate and graduate), two letters of reference (or completed special forms), a copy of their curriculum vitae and a letter describing their field of interest as well as a \$60(Cdn) application fee.

Candidates must also submit with their application an outline of their scientific interests, indicating the field and the topic of their proposed research. Each student will be assigned to one academic staff member of the Department, who will act as his/her supervisor, who will guide him/her in the preparation of a definite research protocol.

55.5 Program Requirements

M.SC. APPLIED PROGRAM (FULL-TIME) (RESIDENT) (ON CAMPUS)

Teaching is organized in eight 3-credit courses and one 6-credit course totalling 30 credits. Promotion to the following semester is dependent upon passing grade. A comprehensive examination is held at the end of the course program.

After successfully completing the course requirements and passing the comprehensive examination, students must carry out an extended project (15 credits). The project requires students to identify an issue in their area of specialization, to review the present state of knowledge relevant to that issue, and either to carry out a survey to assess a particular work situation and make recommendations, or to devise a research protocol to extend knowledge in the area and to carry out a preliminary study to assess the feasibility of the protocol proposed.

Normally, students extend the duration of their project into the Fall term by registering for an additional session.

Required Courses (30 credits)

Courses

Each course has a final examination at the end of the term. Students must obtain at least 65% (B-) in each course in the program. Students who fail one course will be invited to withdraw from the program. Special circumstances can be examined.

Project Component – Required (15 credits)

PH.D. PROGRAM

Three years of resident study are required for this program.

Students are required to take course 392-706D Occupational Health and Hygiene Seminars (2 credits) and are encouraged to take up to 12 credits in areas pertinent to their specialty or in areas necessary to complete their knowledge of occupational health.

All Ph.D. students must take a comprehensive examination within 18 months of registration.

A thesis committee will be established to ensure proper supervision and coverage of the different fields of expertise as required.

55.6 Courses

The names of course instructors are listed on the Course Timetable available at www.mcgill.ca/graduate-studies.

Project Component – Required (15 credits)

M.SC. APPLIED PROGRAM (DISTANCE EDUCATION)

The Master distance education program takes three and one-half years to complete.

The first part (3 years) consists of 10 three-credit theory courses. Students enrolled in the program must successfully complete ten courses (30 credits). Equivalencies may be granted upon examination of the application by the professors concerned, and the Faculty of Graduate Studies.

On campus Practicums may be held at the discretion of each professor. These sessions are held in Montréal on the McGill University Campus. Their aim is to offer students direct exposure to various industrial hygiene situations and laboratory activities. Each course has a final examination at the end of the term. Participation in the practica is an essential component of the program.

The second part consists of writing an extended project report (15 credits). The project report will be carried out under the supervision of a member of the teaching staff. Note that students must pass the comprehensive exam before writing their report. A total of 45 credits is offered, the number required to complete the M.Sc. program.

trial processes and their associate health and safety hazards and the control measures.

392-612A PRINCIPLES OF

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