UNIVERSITY
OF MANITOBA

Graduate Calendar

For the Academic Year 2003 - 2004

The University of Manitoba
Winnipeg, Manitoba
R3T 2N2

Website: www.umanitoba.ca/graduate_studies

Cover design by Pat Goss
Photography by Paula Horeczy

Important Notice

The University of Manitoba reserves the right to make changes in the information contained in the *Undergraduate Calendar,* the *Graduate Calendar,* and the *Registration Guide* without prior notice. The University of Manitoba Web site, www.umanitoba.ca is a source for updated information.

Not every course listed in the *Undergraduate Calendar* or the *Graduate Calendar* will be offered in this academic year.

Courses which are offered this year are listed in the *Registration Guide*.

It is the responsibility of all students

- To familiarize themselves each year with the university's academic regulations and policy in general;
- To familiarize themselves with the regulations and policies applying specifically to their faculty, school, or program;
- To familiarize themselves with the specific graduation requirements of the degree, diploma, or certificate they are seeking; and
- To ensure that the courses they have selected are appropriate to their programs.

In the event of an inconsistency between the general academic regulations and policies published in the *Undergraduate Calendar* and the *Graduate Calendar,* and such regulations and policies established by Senate and the councils of the faculties and schools, the version established by Senate and the councils of the faculties and schools shall prevail.

The regulations and policies contained in this year's editions of the *Undergraduate Calendar,* the *Graduate Calendar,* and the *Registration Guide* apply, subject to change, only for the academic year indicated on the cover page of each publication.

The material in the current editions of the *Undergraduate Calendar,* the *Graduate Calendar* and the *Registration Guide* was submitted by the academic and administrative units concerned. The university neither represents nor warrants that all general information and course references used in these publications is accurate although reasonable efforts have been used to check the accuracy of the information.

Students also agree by the act of registration to be bound by the regulations, policies, and bylaws of the University of Manitoba that are in effect at the time of registration, including any amendments which may be enacted during the period of their registration. Students agree by the act of registration to be bound by the regulations, policies, and bylaws of the faculty or program in which they have registered, including any amendments which may be made during the period of their registration. Students also acknowledge that such amendments may have retroactive application.

No liability shall be incurred by the University of Manitoba for any loss or damage suffered or incurred by any student, or any party claiming through or under any student, as a result of delays in, or termination of, services, courses or classes by acts of God, fires, floods, riots, wars, strikes or lockouts, damage to university property, financial exigency, or any occurrence beyond the reasonable control of the university. Further, the University of Manitoba shall not be liable for any losses or damage suffered by a student who discloses his/her personal identification number (PIN) to anyone other than a university employee in the course of registration.

***The Freedom of Information and Protection of Privacy Act* and *The Personal Health Information Act* at the University of Manitoba**

***The Freedom of Information and Protection of Privacy Act* (FIPPA) and *The Personal health Information Act* (PHIA) both apply to the University of Manitoba. Should any of the University's policies conflict with FIPPA or PHIA, the provisions of FIPPA or PHIA shall prevail unless otherwise expressly provided for at law.**

Notice Regarding Collection, Use, and Disclosure of Personal Information by the University

The University collects personal information in the course of admission, registration and related activities. This personal information is collected under the authority of *The University of Manitoba Act*. It may be shared with other educational institutions, government departments, and co-sponsoring organizations and, for those students who are members of UMSU, it will be disclosed to the University of Manitoba Students' Union. Information regarding graduation and awards may be made public. Upon graduation, name and address together with information on degrees, diplomas, and certificates earned will be given to and maintained by the alumni records department in order to assist in the University's advancement and development efforts. All personal information is protected by the protection of privacy provisions of the *Freedom of Information and Protection of Privacy Act*. Questions about the collection of information should be directed to the FIPPA Coordinator's Office, University of Manitoba Archives and Special Collections, 331 Dafoe Library, University of Manitoba, Winnipeg, Manitoba, R3T 2N2 (telephone: 204 474 8339).

Notification of Disclosure of Personal Information to Statistics Canada

Statistics Canada is the national statistical agency. As such, Statistics Canada carries out hundreds of surveys each year on a wide range of matters, including education.

It is essential to be able to follow students across time and institutions to understand, for example, the factors affecting enrolment demand at post-secondary institutions. The increased emphasis on accountability for public investment means that it is also important to understand "outcomes." In order to carry out such studies, Statistics Canada asks all colleges and universities to provide data on students and graduates. Institutions collect and provide to Statistics Canada student identification information (student's name, student ID number, Social Insurance Number), student contact information (address and telephone number, student demographic characteristics, enrolment information, previous education, and labour force activity.

Under the Federal *Privacy Act*, individuals can request access to their own, individual information held on federal information banks, including those held by Statistics Canada.

The Federal *Statistics Act* provides the legal authority for Statistics Canada to obtain access to personal information held by educational institutions. The information may be used only for statistical purposes, and the confidentiality provisions of the *Statistics Act* prevent the information from being released in any way that would identify a student.

Students who do not wish to have their information used are able to ask Statistics Canada to remove their identifying information from the national database.

Further information on the use of this information can be obtained from Statistics Canada's web site: www.statcan.ca or by writing to the Postsecondary Section, Centre for Education Statistics, 17th Floor, R. H. Coates Building, Tunney's Pasture, Ottawa, Ontario, Canada, K1A 0T6.

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The University of Manitoba

As Manitoba's largest post-secondary institution, the only one that is research-intensive, and the only one that offers medical and doctoral degrees, the University of Manitoba plays an unrivaled role in contributing to the vitality of this province. It educates the majority of the province's professionals – whether they be nurses, architects, lawyers, pharmacists, teachers, engineers, dentists, or doctors. It also educates most of the province's community, political and business leaders.

More than 22,000 students, and 4,000 teaching and support staff combine to make the University of Manitoba a vibrant community committed to teaching, learning, and the search for new knowledge.

The location of the Fort Garry campus, nestled inside a loop of the Red River, is as unique a setting as that of any university in Canada. This campus is the location of most of the university's faculties and schools. There is also the Bannatyne Campus, adjacent to the Health Sciences Centre in central Winnipeg, where the faculties of Dentistry and Medicine are located. Other places where the University of Manitoba is visible include the Winnipeg Education Centre, the location for social work education for inner city residents; agricultural research farms at Glenlea and Carman; field stations at Delta Marsh on Lake Manitoba, Star Lake in the Whiteshell, and Wallace Lake in eastern Manitoba. In addition, a number of distance education programs provide a province-wide presence for the university throughout Manitoba.

The University of Manitoba is a coeducational, nondenominational, government-supported institution. It is a member of the Association of Commonwealth Universities and of the Association of Universities and Colleges of Canada.

The University of Manitoba was established in 1877 to confer degrees on students graduating from its three founding colleges: St. Boniface College, St. John's College, and Manitoba College. It was the first university to be established in western Canada.

In 1900 the Manitoba legislature amended the University of Manitoba Act so that it could begin teaching in its own right. In 1904 a building in downtown Winnipeg became the first teaching facility with a staff of six professors, all scientists. The U of M moved to its present permanent location in Fort Garry following the transfer of the Manitoba Agricultural College to the university.

In its early years the University of Manitoba expanded through the addition of colleges to its corporate and associative body. In 1882 the Manitoba Medical College, originally founded by physicians and surgeons in the province, became a part of the university. Other affiliations followed: the Methodist church's Wesley College joined in 1888; the Manitoba College of Pharmacy in 1902; the Manitoba Agricultural College in 1906; St. Paul's College in 1931; and Brandon College in 1938. St. Andrew's College, initially an associated college in 1964, became an affiliated college in 1981.

In 1967 two of the colleges of the University of Manitoba were given university status by the provincial government. United College, which was formed by the merging of Wesley College and Manitoba College, became the University of Winnipeg, and Brandon College became Brandon University.

St. Boniface College, now called Collège universitaire de Saint-Boniface, and St. John's College, two of the original founding colleges, are still part of the University of Manitoba.

St. Boniface, a Roman Catholic institution which traces its beginnings to 1818 and the earliest days of the Red River settlement, is the university's only French-speaking college.

St. John's College, which dates to 1820 and founded by the Anglican church, is situated on the Fort Garry campus and is committed to fostering a sense of community and belonging among its faculty, students and staff.

St. Paul's College was founded in 1926 by the Archdiocese of Winnipeg and became part of the University of Manitoba in 1931. In 1933 the Jesuit order assumed responsibility for the college and organized the college's academic program in accordance with its internationally recognized educational principles. The college moved into its Fort Garry Campus premises in 1958.

St. Andrew's College was established in 1946 by the Ukrainian Orthodox Church of Canada and moved to the Fort Garry Campus in 1964. It offers programs in Ukrainian Canadian heritage studies and, in addition, prepares candidates for the ordained ministry and lay leadership in the Ukrainian Orthodox church and other Orthodox churches.

The Mission and Vision of the University of Manitoba

Universities serve society by contributing to: the development of an educated and enlightened population, capable of informed judgment and responsible citizenship; the availability of persons who have the knowledge, skills and adaptability required by public and private enterprise, or by individuals seeking professional service; and the advancement of knowledge, skill and human creativity. It is within this context that the University of Manitoba has articulated the following statement concerning its mission, goals, distinctive role and accountability.

Mission

The mission of the University of Manitoba is to create, preserve and communicate knowledge and, thereby, contribute to the cultural, social and economic well-being of the people of Manitoba, Canada and the world.

Goals

In fulfilling its mission, the University of Manitoba seeks to:

- Provide the highest possible quality of undergraduate and graduate university teaching in the humanities, social sciences, natural and applied sciences, the fine and performing arts and the professions;
- Enhance student success by fostering an environment conducive to intellectual and personal growth;
- Conduct original scholarship and basic and applied research, and produce creative works of highest quality as judged by international standards;
- Serve the community directly by making its expertise available to individuals and institutions, and by providing as much access to the university's intellectual, cultural, artistic and physical resources as its primary teaching and research responsibilities permit;
- Preserve and protect academic freedom and intellectual independence, and provide a forum for critical inquiry and debate; and,
- Promote equity in access and employment and in the conduct of the university's affairs.

Role

The University of Manitoba as the largest and most comprehensive institution of higher learning in Manitoba plays a distinctive role within the province. In addition to offering undergraduate liberal education in arts, science and education, the University of Manitoba provides programs in a broad range of professional studies, applied sciences and fine and performing arts and is responsible for the vast majority of graduate education and research in Manitoba. The University of Manitoba serves all parts of the province, including inner city and suburban areas, rural and northern regions and attracts students from all population groups and from all walks of life.

It manages and delivers a comprehensive array of both degree and non-degree credit courses not only on its campuses but also by correspondence and other distance education modalities both throughout the province and beyond the province, thereby significantly increasing accessibility to university education.

The University of Manitoba is also distinctive among post-secondary institutions in the province by virtue of the multi-disciplinary activity within the university and through its participation in multi-institutional consortia and networks. It seeks to advance its traditional role in teaching and learning, research and community service through the establishment of new linkages with business, industry, arts organizations, social agencies, non-profit organizations and governments designed to contribute directly to the economic life of Manitobans and to provide lifelong learning opportunities for them. Through residential educational programs for seniors, Mini-University for youngsters, the summer ballet school, the music preparatory program, public lectures, concerts, recitals, theatrical productions, art exhibits, library and archival services, athletic and recreational programs and in many other ways, the university seeks to reinforce its role as an important part of the culture and heritage of Manitoba.

The university is an active contributor to national and international development by conducting educational programs and research under contract. It also contributes to international development through the opportunities provided to students and visiting scholars from other countries to study at the University of Manitoba. Recognizing that many of the intellectual and practical challenges facing society require an integrated disciplinary approach, the university has established a variety of centres, institutes and specialized research groups designed to tackle important problems in a number of areas.

Accountability

In recognition of its mission, goals and role, the University of Manitoba is accountable for:

- Facilitating access to its programs for as many students as meet its admission requirements and as can be accommodated and effectively educated within the available resources;
- Providing programs that meet accepted and appropriate standards for admission, evaluation and graduation of students and for curriculum content and teaching effectiveness;
- Facilitating research, scholarship and creative works that are of high quality as judged by international standards;
- Providing an exemplary environment for work and study with particular attention to policies and procedures designed to foster equity; and,
- Exhibiting responsible management of physical and human resources.

Vision

The following vision statement was articulated in Building on Strengths, the report of the Task Force on strategic planning in 1998:

We believe that the University of Manitoba will be a leader among Canadian universities as it becomes known for meeting challenges while it advances knowledge and understanding. We will not only be the oldest of western Canada's universities we will also be among the best of Canada's universities. We will be respected for our knowledge of the world and for our understanding of the complexities of our Prairie region in its cultural, socioeconomic and scientific dimensions, which we will articulate according to international standards of science and scholarship. We will be recognized for our centrality in the development of Manitoba's knowledge-based society in a knowledge-based global economy.

We will attain our vision by:

- Providing outstanding education in undergraduate and selected professional and graduate areas;
- Producing research, scholarship and creative work that is recognized internationally, nationally, and locally;
- Providing an equitable environment focused on learning; and
- Enhancing a strong tradition of community and professional service.

Members of the Board of Governors

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Anthony Secco, B.Sc. (Hons.), Ph.D.
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James Kusie
Nicholas Louizos
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Beverly M. M. Sawicki, B.A.(Hons.), LL.B.

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Carolynne Presser, A.B., M.L.S.

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Leanne Burkowski, B.Comm.(Hons.), C.A.

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Principal: Vivian Olender, B.A.(Hons.), M.A., Ph.D.

Collège Universitaire de Saint-Boniface
Recteur: Paul Ruest, B.A. (Lat. Phil.), B.Ed. M.Ed., Ph.D.

St. John's College
Warden: Janet A. Hoskins, B.E.S., M.Sc., Ph.D.

St. Paul's College
Rector: John J. Stapleton, B.S., M.T.S., M.A., Ph.D.

University College
Provost: Eugene P. Walz, B.A., M.A., Ph.D.

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William and Catherine Booth College
Prairie Theatre Exchange

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Anna, T.E., B.A., M.A., Ph.D. (Duke); **Anthonisen**, N.R., A.B. (Dartmouth), M.D. (Harvard), Ph.D. (McGill); **Card**, H.C., B.Sc.(E.E.), M.Sc. (Manitoba), Ph.D. (Manchester); **Cohen**, H., B.Sc.(Hons.) (Manitoba), Sc.M. (Brown), Ph.D. (Minnesota); **Dhalla**, N.S., B.Sc. (Punjab), M.Sc. (Pennsylvania), Ph.D. (Pittsburgh); **Eales**, J.G., B.A.(Hons.) (Oxford), M.Sc., Ph.D. (UBC), F.R.S.C.; **Fortier**, P., B.A.(Hons.) (Toronto), D.E.S. (Strasbourg), M.A., Ph.D. (Wisconsin); **Friesen**, G., B.A. (Saskatchewan), M.A., Ph.D. (Toronto); **Gratzer**, G., F.R.C.S., Ph.D. (Budapest); **Gupta**, N.D., B.A. (Kashmir), LL.B., M.A. (Aligarh), Ph.D. (Australian National), F.R.S.C.; **Hawthorne**, F.C., B.Sc. (Spec.) (Imperial College), A.R.S.M. (Royal School of Mines, London), Ph.D. (McMaster), F.R.S.C., F.G.A.C., F.M.S.A.; **Israels**, L.G., B.A. (Saskatchewan), M.D. (Manitoba) (Medicine); **Mendelsohn**, N.S., B.A., M.A., Ph.D. (Toronto), F.R.C.S. (Mathematics); **Morrish**, A.H., F.R.S.C., B.Sc.(Hons.) (Manitoba), M.A. (Toronto), Ph.D. (Chicago); **Plummer**, F., B.Sc. (Hons.), M.D. (Manitoba), F.R.C.P.C.; **Ronald**, A.R., M.D., B.Sc., (Med.) (Manitoba); **Schaefer**, T., B.Sc. (Hons.), M.Sc. (Manitoba), D.Phil. (Oxford), F.R.S.C.; **Sehon**, A., B.Sc., M.Sc., Ph.D., D.Sc. (Manchester), F.R.S.C.; **Shafai**, L., B.Sc. (Tehran), M.Sc., Ph.D. (Toronto), F.R.S.C.; **Smil**, V., M.S. (Prague), Ph.D. (Pennsylvaina State), F.R.S.C.; **Stanton**, R.G., B.A.(Hons.) (Western), M.A., Ph.D. (Toronto), D.Sc. (Newcastle, NSW); **van Oers**, W.T.H., Ph.D. (Amsterdam); **Wolfart**, H.C., [B.A. equiv.] (Albert-Ludwigs-Universität, Freiburg im Breisgau), M.A. (Yale), M.A. (Cornell), M.Phil., Ph.D. (Yale), F.R.S.C.; **Younes**, M., Ch.B., D.P.H. (Egypt), F.R.C.P., Ph.D.,

Distinguished Professor Emeritus

Bowman, J.M., M.D. (Manitoba); **Friesen**, H.G., O.C., B.Sc. (Med.), M.D. (Manitoba), D.Sc. (Western Ontario), F.R.C.P.(C), F.R.S.C.; **Hamerton**, J.L., B.Sc., D.Sc. (London), F.C.C.M.G., F.I.Biol.; **Klostermaier**, K.K., D.Phil. (Gregorian), Ph.D. (Bombay); **Kroetsch**, R.P., B.A. (Alberta), M.A. (Middlebury), P.S. (Iowa), F.R.S.C.

Academic Schedule 2003-2004

Regular Session: September 2003 - April 2004

Summer Session: May 2003 - August 2003

- **Spring Intersession May 5 - June 27, 2003**
- **Spring/Summer Evening May 5 - August 9, 2003**
- **Summer Day July 2 - August 23, 2003**

APRIL 2003

April 1 Tuesday Last date for reports on theses/practica (and the corrected copies of the theses/practica), comprehensive examinations and M. Eng. projects to be submitted to the Faculty of Graduate Studies by students expecting to graduate in May.

April 5 Saturday Language reading tests for graduate students.

April 18 GOOD FRIDAY University closed. No classes or examinations.

MAY 2003

May 2 Friday Last date for registration in Spring Intersession and Spring/Summer Evening courses without late registration fee. Last date to register and pay fees for Challenge for Credit where the final examination is held during the Spring Intersession/first term Spring/Summer Evening exam series in June.

May 3 Saturday Annual traditional graduation Powwow in honour of Aboriginal graduates.

May 5 Monday Classes begin in Spring Intersession and Spring/Summer Evening.

May 19 Monday VICTORIA DAY University closed. No classes or examinations.

May 28 - 29 Wednesday - Thursday One Hundred and Twenty-Fourth Annual Convocation.

JUNE 2003

June 2 Monday Convocation ceremony, Collège Universitaire de Saint-Boniface.

June 9 Monday The sale of student parking permits begins through the telephone registration system (UMREG - 958-7600)

June 16 Monday Deadline for receipt by Faculty of Graduate Studies of Annual Progress Reports for Masters' and Ph.D. students.

June 20 Friday Deadline for payment of parking fees.

June 23 Monday Last date for receipt in Graduate Studies Office of Ph.D. theses (for distribution) from students expecting to graduate in October.

June 24 Tuesday Classes end in Spring Intersession.

June 27 Friday Exams end in Spring Intersession.

Last day for registration in Summer Day courses without late registration fee.

JULY 2003

July 1 Tuesday CANADA DAY University closed. No classes or examinations.

July 2 Wednesday Classes begin in Summer Day.

Last date for distribution of Master's theses/practica (to examining committee) by students expecting to graduate in October.

AUGUST 2003

August 1 Friday Last date to apply for graduation in October 2003 via UMREG - the telephone/web registration system.

August 4 Monday CIVIC HOLIDAY University closed. No classes or examinations.

August 7 Thursday Classes end in Spring/Summer Evening.

August 9 Saturday Exams end in Spring/Summer Evening.

August 20 Wednesday Classes end in Summer Day.

August 23 Saturday Exams end in Summer Day.

August 25 Monday Last date for reports on theses/practica (and the corrected copies of the theses/practica), comprehensive examinations and M. Eng. Projects to be submitted to the Faculty of Graduate Studies by students expecting to graduate in October.

SEPTEMBER 2003

September 1 Monday LABOUR DAY University closed. No classes or examinations.

September 3 Wednesday Last day to register and pay fees without penalty for all programs.

September 4 Thursday Classes begin in most faculties and schools (including evening classes)

September 4 - 17 Thursday - Wednesday Period for late registration and registration revisions in all programs. A financial penalty is assessed on all late registrations during this period.

September 6 Saturday Language reading tests for graduate students.

September 17 Wednesday Registration revisions and late registration in courses other than those offered in second term only, including Challenge for Credit, are not permitted after this date

First Term and Full courses dropped after this date are recorded as Voluntary Withdrawals. (See refund schedule in the *Registration Guide* for financial implications.)

Last date to apply for graduation in February 2004 via UMREG - the telephone/web registration system.

OCTOBER 2003

October 13 Monday THANKSGIVING University closed. No classes or examinations.

October 20 Monday Last date for receipt in Graduate Studies Office of Ph.D. theses (for distribution) from graduate students expecting to graduate in February.

October 21 Tuesday Enrolment Services/Admissions Evening of Excellence

October 22 - 23 Wednesday-Thursday Thirty-Sixth Annual Fall Convocation.

October 27 Monday Last date for distribution of masters' theses/practica (to examining committee) by students expecting to graduate in February.

NOVEMBER 2003

November 11 Tuesday REMEMBRANCE DAY University closed. No classes or examinations.

November 12 Wednesday Last date for Voluntary Withdrawal from all first term half-courses in all Faculties and. (See refund schedule in Registration Guide for financial implications). Note that some courses have irregular voluntary withdrawal and refund schedules. See Faculty chapters of the Registration Guide. UMREG telephone and web registration closes at 5:30 p.m.

DECEMBER 2003

December 3 Wednesday Last day of lectures in Agricultural and Food Sciences, Architecture, Arts, Education Engineering, Art, Human Ecology, Management, Music, Nursing, Pharmacy, Physical Education/Recreation Studies, Science, and Social Work.

December 6 Saturday On this date in 1989, 14 women were murdered at l'École Polytechnique, Université de Montréal. The university remembers these women at memorial events scheduled on or near this date.

December 5 - 18 Friday - Thursday Examination period. Students are reminded that they must remain available until all examination and test obligations have been fulfilled.

December 5 Friday Last day of lectures in Law.

December 6 Saturday Examinations begin in Law.

December 9 Tuesday Last day of lectures in fourth-year Dentistry and all years of Dental Hygiene

December 18 Thursday End of examinations and first term

December 23 Tuesday Last working day. University closes until January 5.

JANUARY 2004

January 5 Monday University re-opens

January 5 - 16 Monday - Friday Period for registration and registration revisions in second term half-courses in all programs .

January 6 Tuesday Last date for reports on theses/practica (and the corrected copies of the theses/practica), comprehensive examinations and M. Eng. projects to be submitted to the Faculty of Graduate Studies by students expecting to graduate in February.

January 10 Saturday Language reading tests for graduate students.

January 16 Friday Last date for registration in second term half courses, including Challenge for Credit, and/or registration revisions in all programs. Second term and full courses dropped after this date from any program are recorded as Voluntary Withdrawals. (See *Registration Guide* Refund Schedule for financial implications.)

Final date for receipt of second term and full courses fee payments.

Last date to apply for graduation in May 2004 via UMREG - the telephone/web registration system.

January 26 Monday Last date for receipt, in Graduate Studies office, of Ph.D. thesis (for distribution) from students expecting to graduate in May.

FEBRUARY 2004

February 2 Monday Last date for distribution of Masters' theses/practica (to examining committee) by students expecting to graduate in May.

February 16 - 20 Monday - Friday MID-TERM BREAK No classes or examinations.

MARCH 2004

March 17 Wednesday Last date for Voluntary Withdrawal from full courses and second term half-courses in all Faculties and Schools. See refund schedule in the *Registration Guide* for financial implications. NOTE: Some courses have irregular voluntary withdrawal and refund schedules. See the faculty chapters of the *Registration Guide*. UMREG telephone and web registration closes at 5:30 p.m.

March 27 Saturday Language reading tests for graduate students.

March 30 Tuesday Last date for reports on theses/practica (and the corrected copies of the theses/practica), comprehensive examinations and M. Eng. Projects to be submitted to the Faculty of Graduate Studies by students expecting to graduate in May.

APRIL 2004

April 8 Thursday Final lectures in all faculties and schools.

April 9 GOOD FRIDAY University closed. No classes or examinations

April 12 - 28 Monday - Wednesday Examination period - Students are reminded that they must remain available until all examination and test obligations have been fulfilled.

April 28 Wednesday End of examinations and second term in those Faculties and Schools where examinations commenced April 12.

April 30 Friday Last date for registration in Spring Intersession and Spring/Summer Evening courses without late registration fee.

MAY 2004

May 1 Saturday Annual traditional graduation Powwow in honour of Aboriginal graduates.

May 3 Monday Classes begin in Spring Intersession and Spring/Summer Evening Session.

May 24 Monday VICTORIA DAY University closed. No classes or examinations.

May 26 - 27 Wednesday - Thursday One Hundred and Twenty Fifth Annual Spring Convocation.

May 31 Monday Convocation ceremony at Collège universitaire de Saint-Boniface.

JUNE 2004

June 14 Monday Deadline for receipt, by the Faculty of Graduate Studies, of Annual Progress Reports for Master's and Ph.D. students.

June 21 Monday Last date for receipt, in Graduate Studies Office, of Ph.D. thesis (for distribution) from students expecting to graduate in October.

June 28 Monday Last date for distribution of Master's thesis/practica (to examining committee) by students expecting to graduate in October.

June 30 Wednesday Classes begin in Summer Day Session.

JULY 2004

July 1 Thursday CANADA DAY University closed. No classes or examinations.

Deadline Dates

Where deadline dates fall on a weekend or statutory holiday, the normal closing time of the next working days will be used.

Examination Obligations

Students are reminded that they must remain available until all examination and test obligations have been fulfilled.

Observance of Religious Holidays.

The university acknowledges the right of all students to observe recognized Holy Days of their faith which fall within the above schedule and will, at its discretion, upon request, make necessary arrangements to ensure that studies are not jeopardized.

Instructors should be notified of a student's intended absence in advance, and at least three weeks notice of absence from scheduled examinations should normally be given where special arrangements are sought.

Schedule of Registration Activities

The dates for the registration in each faculty and school for the 2003-2004 session are published in the *Registration Guide* which is issued to all returning and new students and sent on request to others interested in this information.

For further information on registration activities contact:

Student Records Office
400 University Centre
University of Manitoba
Winnipeg, Manitoba R3T 2N2
Telephone: 204 474 9423
Email : student_records@umanitoba.ca

Web Address : www.umanitoba.ca/student/records

Faculty of Graduate Studies

Admissions

General Office

500 University Centre

Telephone: (204) 474 9377
Fax: (204) 474 7553
Web: www.umanitoba.ca/graduate_studies
e-mail: Graduate_Studies@umanitoba.ca
Acting Dean: Anthony Secco

Chapter Contents

SECTION 1: Preface

At the University of Manitoba graduate study and research were conducted on a modest scale from the foundation of the university and during its early years. In 1949 a Faculty of Graduate Studies and Research was established to systematize efforts in these fields. Currently more than 2,600 graduate students are registered at the university. A substantial number of graduate students received fellowships, scholarships, or assistantships made available under such arrangements as the Natural Sciences and Engineering Research Council, and the university itself. Providing additional opportunity for graduate students, research work funded through grants from business corporations and government bodies is now conducted at the university.

Agriculture Canada and the Department of Fisheries and Oceans maintain major research establishments on the Fort Garry campus. Additional and extensive research facilities are available in the faculties of Dentistry and Medicine located in central Winnipeg and the university's Bannatyne Campus. The Faculty of Medicine operates in close conjunction with the major teaching hospitals.

Graduate work at the doctoral level is offered in the faculties of Agricultural and Food Sciences, Arts, Dentistry, Education, Engineering, Human Ecology, Medicine, Science, Social Work, the Asper School of Business/Faculty of Management, and the Natural Resources Institute.

The Faculty of Graduate Studies is governed by the Faculty Council of Graduate Studies. The Faculty Council delegates powers to the Executive Committee of Graduate Studies which in turn delegates responsibilities to standing committees of the faculty, such as the Guidelines and Policy Committee and the Awards Committee.

SECTION 2: Admission to Graduate Studies

2.1 Degrees and Diplomas Offered

The Faculty of Graduate Studies offers advanced courses of instruction and facilities for research leading to the following:

Master of Architecture (M.Arch.)
Master of Arts (M.A.)
Master of Arts (Collège universitaire de Saint-Boniface)
Master of Business Administration (M.B.A.)
Master of City Planning (M.C.P.)
Master of Dentistry (M. Dent.)
Master of Disability Studies
Master of Education (M.Ed.)
Master of Education (Collège universitaire de Saint-Boniface)
Master of Engineering (M.Eng.)
Master of Interior Design (M.I.D.)
Master of Landscape Architecture (M. Land. Arch.)
Master of Laws (LL.M.)
Master of Mathematical, Computational and Statistical Sciences (M.M.C.S.S.)
Master of Music (M.Mus.)
Master of Natural Resources Management (M.N.R.M.)
Master of Nursing (M.N.)
Master of Occupational Therapy (M.O.T.)
Master of Public Administration (M.P.A.)
Master of Science (M.Sc.)
Master of Social Work (M.S.W.)
Doctor of Philosophy (Ph.D.)
Diploma in Population Health

See the index at the back of the *Calendar* for listings of graduate programs by unit.

2.2 Admission

General Policy on Admission

The general policy on admission to the Faculty of Graduate Studies is found in the Academic Guide section of this *Calendar*. Note that admission standards as well as criteria and procedures for admission may vary from program to program. Consult the specific departmental listing in this *Calendar* for details.

Admission to the Faculty of Graduate Studies is competitive and a combination of factors is considered in the admission decision, including:

- The past academic performance of the applicant and assessments of referees. These are used as indicators of the likelihood that the applicant can successfully complete the course of studies and research for the degree.
- The capacity of the department (unit, faculty, institute, etc.) to provide the program of study and research requested by the applicant, including adequate study and research facilities.

The availability and willingness of a faculty member competent to supervise the program of study and research of the applicant.

Application Forms

Application forms are available from the Faculty of Graduate Studies. For final deadline dates for application refer to the departmental listing below. Application to live in residence is made separately (See Housing and Student Life in the Student Affairs chapter.)

2.3 Application

Departmental Deadlines

Please refer to the Department to which you wish to apply in the Graduate Programs Section of this *Calendar*.

Application Fee

This fee must accompany all admission applications: $50 (Canadian)

Application Declaration

All persons seeking admission to the University of Manitoba must sign the following declaration on the Application for Admission Form: "I hereby certify that I have read and understood the instructions and information sheet attached to this application form and that all statements made in conjunction with this application are true and complete. I understand that my application will be rejected if I have not disclosed my complete academic record or have submitted false information in support of my application to the Faculty of Graduate studies. In such an event I understand that future applications from me will not be considered."

Application Fraud or Misconduct

It should be noted that the commission of application fraud or misconduct may result in acceptance and registration being withdrawn and the applicant disqualified from consideration, not only in the year of application, but, in all subsequent sessions. If discovered in a subsequent session it may result in dismissal from the university. Application fraud or misconduct includes the following:

- Failure to declare attendance at another post-secondary institution;
- Presenting falsified academic documentation or causing or encouraging another person to falsify records through translation or data changes;
- Presenting falsified personal documentation, e.g. using a false name, date of birth, country of origin, etc.;
- Presenting falsified or fictitious reference documentation;
- Cheating on or having another person write a standardized entry exam such as TOEFL, MCAT, LSAT, DAT or GMAT;
- Presenting another person's standardized test score as one's own to falsify a test result; and
- Failure to report suspensions from another post-secondary institution.

2.4 Classification of Students

The classification of a student at the University of Manitoba is determined on admission to a program of study.

Please refer to Section 1.4 of the Academic Guide in this *Calendar* for Student Status/Classification of Students.

Registration and Fees

Chapter Contents

SECTION 1: Regular Session

1.1 General Information

Registration is conducted by the Faculty of Graduate Studies beginning approximately mid-July for the September start of the regular academic session. Consult the publication *Registration Guide* for further details on this and other program start dates.

Registration material and information is made available to each student registered in the preceding session and mailed to all applicants granted admission. Others wishing details on registration for next session should write to: The Student Records Office, University of Manitoba, Winnipeg, Manitoba R3T 2N2; telephone 204 474 9428.

Course Classifications

Auxiliary Courses

Extra courses which are not actually part of the graduate degree program but which are specified and required by the student's advisor, may be classified as AX (auxiliary) so as not to be included in the student's Grade Point Average.

NOTE: Changes in course classification are regarded as course/program changes and may not be made without approval or after the deadline dates for course changes as indicated in the Academic Schedule of this *Calendar*.

Additional Courses

Graduate students in a program of study may take additional courses which are not part of the degree requirements, and will not be included in the grade point average and shall be classified as occasional (OS). Fees will be assessed on an individual course basis.

1.2 University Health Standards

All students at the University of Manitoba are required to have complete hospital and medical care insurance. A student who fails to comply with this regulation at time of registration or who fails to maintain insurance in good standing may, with reasonable notice, be debarred from further attendance at classes or examinations or both.

Canadian or Permanent Resident

Canadian and permanent residents of Canada living in Manitoba who do not already have current medical and hospital insurance must apply to the Manitoba Health Services Commission, 599 Empress Street, Winnipeg, Manitoba RJG JH2; telephone: (204) 786 7111, in order to obtain the necessary coverage. Canadian students studying in Manitoba who are residents of other provinces should make certain that their health coverage from their home province is maintained.

International Students

International students admitted to the University of Manitoba, who have been granted a Student Authorization are required by university regulations to obtain complete health insurance coverage through the purchase of the health insurance plan arranged for by the university. This plan which the university has arranged on behalf of its International students is the only plan acceptable. Proof of coverage in this plan must be presented before registration at the university can be accepted. (See *Registration Guide* for further details.) Exceptions: Students sponsored by CIDA or certain other scholarships which provide for complete health insurance coverage.

It is recommended that students in the following groups undergo a physical examination: Students who expect to participate regularly in organized sports; students whose personal or family medical history makes examination and follow-up advisable; and students from countries other than Canada.

Section 2: Registration and Fee Payment

Students must ensure that their registration is processed in accordance with the registration procedure and dates stipulated for their faculty or school. The *Registration Guide* contains full information regarding the registration process for every faculty and school.

After registering for the courses selected, a student must complete registration by making the required fee payment by mail, through the banking system, or in person on or before the published deadline. The *Registration Guide* provides detailed fee payment information.

Registration (In-person, by telephone, or by mail)

All registrations for courses being taught on campus must be completed in person or by telephone or by mail during the times stipulated in the *Registration Guide*.

Registration consists of:

- Selection of courses;
- Having the program of studies approved by the dean or director, or the faculty/school representative (excluding telephone registration);
- Obtaining space in courses selected;
- Having the fees assessed and making a payment of fees to Financial Services; and,
- Obtaining a student photo ID card.

Registration is not complete until fee payment or fee payment arrangements are made in writing. All registration periods and locations are listed in the *Registration Guide*.

2.1 Regulations Regarding Payment of Fees

Form of Payment

Payment may be made by any of the following methods. Please note that the University of Manitoba does not currently accept credit cards for tuition payment in degree and diploma programs and courses.

Web/Phone Banking

Payments can be made using PC/WEB (On-line) banking or telephone banking. Both these methods make paying your tuition easier than ever, as payments can made 24 hours a day, seven days a week, from anywhere in the world.

The University does not charge for using this service. If you are not already using on-line or telephone banking, sign up by contacting your financial institution or visit the following website for links:

www.umanitoba.ca/admin/financial_services/revcap/fees/index.shtml

When using this service you will be asked for an "account number." You must enter your seven-digit student number. It is your responsibility to ensure that this student number is correct. Using an incorrect student number could result in your payment being misapplied or delays in the processing of your payment. For assistance, call 474-9433.

By Mail

Payments payable to the University of Manitoba may be mailed to: Cashier's Office, The University of Manitoba, 138 University Centre, Winnipeg, Manitoba, R3T 2N2.

Please write your student number, session information, (e.g. Regular Session 03-04) and telephone number on the back of the cheque, money order, or bank draft made payable to the University of Manitoba. Do not send cash.

If you are mailing your payment, allow ample time for the payment to arrive at the University of Manitoba before the deadline date. **Payments received after the deadline date will be assessed a late payment fee regardless of when they were mailed.**

In Person

You can pay your fees between 8:30 A.M. and 4:30 P.M. at:

Fort Garry Campus, Cashier's Office, Rm 138 University Centre

Bannatyne Campus, Rm P001 Pathology Building

These offices will accept cash, cheques, certified cheques, bank drafts or money orders payable to the University of Manitoba. **Interac** is also accepted. **Credit cards** are not accepted. Remember; in-person payment can involve long line-ups.

You may also drop your payment (cheque, certified cheque, or money order only) into the express drop box located outside Rm 138 University Centre (Fort Garry Campus) or Rm P001 Pathology Building (Bannatyne Campus). Payments dropped into the express drop box after 4:30 P.M. on the deadline date will be considered late and you will be assessed a late payment fee. The express box is sealed after the deadline date.

Cheques must have a current date (if dated for after the fee deadline, applicable fees will be assessed); be signed; have matching written and numerical amounts; include a student number and phone number, and be payable to the University of Manitoba. A $30 charge, plus applicable late fees, will apply to all returned cheques.

Payment Via Tel-Pay

You may also pay your fees by telephone if you are a member of Tel-Pay, a computerized telephone bill payment service. Call Tel-Pay at (204) 947-9300 for details.

Sponsored Students

If your fees are to be paid by an outside agency, you must provide Financial Services, Rm 315 Administration Building, University of Manitoba, Winnipeg, R3T 2N2, with a letter from the sponsoring agency requesting that your fees be invoiced. The letter should include your name, student number, period of coverage, what the coverage includes and an authorized signature. Letters may be faxed to (204) 474-7501. If payment is not received by the due date, the student's record and access to academic services will be placed on Hold until payment is made in full. Students may be ultimately responsible for fees incurred and not paid by the sponsor. **Sponsor arrangements must be made before the fee payment deadline date to avoid late payment penalties.**

Student Loans

Students whose fee payment is dependent upon the receipt of government-sponsored student financial aid should contact the Financial Aid and Awards Office, Rm 422, University Centre, if this aid is not available at the deadline date for payment of fees

Non-Payment of Fees

Students with outstanding balances after the published fee payment deadlines in first and second term may be placed on Hold status or have their registrations cancelled, depending on the size of the balance owing.

Students who are cancelled will have a reinstatement fee of $40 added to their fee balance. Cancelled students must apply for reinstatement as soon as possible; in no case will reinstatement be granted following the voluntary withdrawal deadline in each term. Reinstatement, if granted, always applies to all courses on your record at the date of cancellation. You cannot be reinstated into some courses only. Payment for reinstatement (tuition fees owing and penalty fees) must be made by cash, interac, certified cheque, or money order.

Students who are placed on Hold Status will have access to most academic and administrative services suspended until full payment is received.

If after registering for courses, you decide not to attend, it is your responsibility to withdraw.

2.2 Auditing Fee

Students auditing courses are doing so as a matter of personal interest and not for academic credit. Such students are not entitled to examination or other evaluation privileges, and in no instance may credit standing be obtained for a course which has been audited. Students auditing any course must register and will be charged a fee equal to one-half of the fee normally associated with that course.

2.3 Challenge for Credit

Students challenging a course must register and will be charged a fee equal to one-half of the fee normally associated with the course.

2.4 Property Damage Assessment

The university may levy an assessment against a student or students for damage to or loss of university property, equipment, or materials.

2.5 Provisionally Registered Students

Students who are cancelled after being allowed to provisionally register pending receipt of documentation or clarification of their academic status are responsible for academic fees for the period during which they were provisionally registered.

2.6 Occasional Students

All occasional students are assessed the graduate studies standard fee on a pro-rated basis. In addition they are charged the appropriate undergraduate faculty fees for all courses taken.

Fees paid by a student while registered as an occasional student are not transferable to a degree program at a later date.

2.7 Age Exemption

Academic fees will be waived for students who are Canadian citizens or permanent residents of Canada and who reach the age of 65 by September 1 for the Regular Session, or May 1 for the Summer Session, provided they have been duly admitted and are eligible for registration in any degree program or credit course(s). Proof of age and citizenship status may be required.

2.8 Instalment Payments

Your fees may be paid in two installments. The UMREG fee assessment will indicate the amount due in the first term.

The first term amount must be paid by **September 3**.

The remaining balance of your fees must be paid by **January 16, 2004**.

Deferred Payment of Fees

Eligible students may get their first term fees deferred up until the cancellation date. Deferrals beyond this date will not be granted.

To apply for deferred payment of first term fees, you must be enrolled in 12 credit hours or more.

Second term fee payment may not be deferred.

Your application for a deferred payment must be made before the fee payment deadline.

If you want to defer first term fees, an initial payment of 20 percent of total academic fees plus an application fee of $10 is required.

Out-of-town students may make deferred payment arrangements by mail. The request letter must outline their reasons for the deferral request and include payment of 20 percent of the total academic fees, plus the $10 application fee and must be received before the fee payment deadline. This request should be sent to Financial Services, Rm 315 Administration Buildiing, University of Manitoba, Winnipeg, Manitoba, R3T 2N2. If you default on your deferred payment arrangements, your registration will be cancelled.

2.9 Late Payments and Late Registrations

You may use UMREG to register during the registration revision periods. (See inside front cover for dates.) If your initial registration is during this period, you will be assessed late registration fees in addition to the normal fees.

Fees must be paid immediately following your late registration. **Do not wait for a fee statement in the mail**.

If you pay your fees after the fee deadline, you will be assessed a late payment fee of $50 (or $25 if registered in less that 12 credit hours).

Appeals regarding the assessment of the late fee may be made in writing to the Director, Student Records Office, on the appropriate appeal form available in the Student Records Office, 400 University Centre.

2.10 Registration Revision (Course Change) Fee

Registration revisions (including additions, deletions, section and/or laboratory changes, transfer of faculty, or any combination of these) are permitted during specified periods. There is no charge for changes processed during this period.

See the *Registration Guide* for further information.

SECTION 3: Program Fee Schedule

Students should consult the Academic Fee Schedule published in June of each year and available from the Student Records Office. This schedule may also be viewed on the University of Manitoba website at www.umanitoba.ca

Students are responsible to acquaint themselves with the schedule and the regulations regarding the payment of fees associated with registration for their program of studies.

3.1 International Students

International students are assessed academic fees 1.75 times the fee assessed Canadian students. Because the University of Manitoba encourages and values international graduate students, academic fees for international graduate students will receive a fee reduction equal to the full .75 differential in international fees; that is, the end result is to eliminate the fee differential for international graduate students.

University Policies

Chapter Contents

- *The Freedom of Information and Protection of Privacy Act (FIPPA) and The Personal Health Information Act* (PHIA) both apply to the University of Manitoba. The Board of Governors appointed the president as the designated head under the act. The president, in turn, has delegated her duties to the FIPPA coordinator and the FIPPA Review Committee. Should any of the University's policies conflict with FIPPA or PHIA, the provisions of FIPPA or PHIA shall prevail unless otherwise expressly provided for at law. For access to university information, including personal information, apply under the appropriate act (FIPPA or PHIA). Application forms can be accessed at: www.umanitoba.ca/libraries/archives/fippa

- The University of Manitoba Policy and Procedure Manual is currently under revision. Students encountering difficulty locating documents on the website should contact the Office of the University Secretary, 312 Administration Building.

PART ONE:

SECTION 1: Policy on the Responsibilities of Academic Staff with Regard to Students

1.1. Objectives

The objectives of this policy are to identify the responsibilities of academic staff with regard to students; to promote harmonious relations between academic staff and students; and to promote fair and equitable treatment of students.

1.2 Definitions

For purposes of this document, the following terms shall be defined as provided by this article:

A. Academic staff shall include all individuals holding full- or part-time appointments at the rank of Instructor I, Instructor II, senior instructor, lecturer, assistant professor, associate professor or professor. The term shall include also academic administrators, academic librarians, counsellors, adjunct professors, professional associates, research associates, research assistants, student research assistants, and student teaching assistants, insofar as such persons perform duties within the ambit of the policy.

B. Student shall mean any person who is registered as a student in the university. The current terms of reference of the Office of Student Advocacy follows this section.

1.3 Statement of Responsibilities

Some of the responsibilities of academic staff with regard to students rest with the individual staff member, while others are collective responsibilities, to be exercised through the actions of department and faculty/school administrators and councils.

A. Individual Responsibilities

The individual responsibilities of academic staff members with regard to students are primarily instructional and scholarly, and secondarily administrative. They may include:

1. Undergraduate, graduate, and continuing education instruction, including the organization, preparation and delivery of course material, the evaluation of student academic progress, the reporting of such evaluation in accordance with approved policies and schedules, consultation with students out of class or laboratory hours, and supervision of student research and thesis preparation;

2. Scholarly attainment through personal study and research, including study for purposes of academic self-improvement or course improvement, keeping abreast of new developments, and research that leads to a useful or original contribution toward the advancement of knowledge and understanding; and,

3. Administrative work as required for instructional and scholarly activities, including committee work at various levels departmental, faculty, university as it pertains directly or indirectly to students.

B. Collective Responsibilities

The collective responsibilities of the academic staff belonging to an academic unit are to provide an effective learning environment and to endeavour to ensure fair and consistent treatment of students. They include:

1. Periodically reviewing and updating all courses and programs;

2. Ensuring that academic regulations and policies provide fair and consistent treatment of students; and,

3. Providing for convenient student access to information on policies, regulations and procedures that may affect their academic progress, including the provision of names of instructors assigned to teach particular courses and sections at the earliest possible opportunity.

1.4 Discharge of Responsibilities

A. Individual Responsibilities

1. Academic staff members shall discharge their instructional responsibilities with academic integrity, scholarly competence, and pedagogic effectiveness.

2. Academic staff members shall maintain their familiarity with current university faculty/school and/or department policies regarding plagiarism and cheating, examination impersonations, student access to final examination scripts, student discipline, grade appeals, and the university policy regarding sexual harassment.

3. In discharging their instructional responsibilities, academic staff members shall adhere to regulations pertaining to the format, content and conduct of courses and laboratories, including regulations pertaining to examinations, term work, grades, and related matters.

4. A course outline or syllabus shall be provided in each course section, within the first week of classes:

4.1 The academic staff member responsible for that section shall provide in writing to every member of the class: name of instructor; office number and telephone number; a list of textbooks, materials and readings that the student is required to obtain including the appropriate referencing style guide(s) acceptable to the instructor and/or discipline in courses where it is relevant; an outline of the topics to be covered; a description of the evaluation procedure to be used, including the weighting of the components that will contribute to the final grade and whether evaluative feedback will be given to the student prior to the voluntary withdrawal date (see note); an indication of instructor availability for individual student consultation; a tentative schedule of term assignments and tests; and a statement of the practice to be following regarding late submission of assignments.

NOTE: It is understood that the provision of this information is not intended to affect the question of equity in multi-sectioned courses in any way.

4.2 The academic staff member shall provide in writing to every member of the class information regarding academic integrity which shall include: a reference to statements on academic dishonesty including "plagiarism and cheating" and "examination personation" found in the *Calendar*; and, where appropriate, a reference to specific course requirements for individual work and group work. Students should be made aware that a group project adheres to the principles of academic integrity. Students should also be made aware of any specific instructions concerning study groups and individual assignments. The limits of collaboration on assignments should be defined as explicitly as possible.

5. Academic staff members shall teach their courses with due regard to *Calendar* descriptions.

6. It is the responsibility of academic staff members to specify textbooks and materials in accordance with announced purchasing deadlines.

7. In their dealings with students, academic staff shall:

7.1 not deny registration for instruction in those courses for which the permission of the instructor is required, except where the student lacks appropriate qualifications or where an approved policy on limited enrolment is in effect;

7.2 comply with existing human rights legislation, and refrain from differential treatment of individual students on the basis of their actual or presumed membership in, or association with, some class or group of persons;

7.3 not accept money or other goods or services from students for assistance with any course offered by the university. This clause, however, shall not prevent student teaching assistants or other part-time instructors from accepting payment for tutoring in courses/sections which do not fall within the scope of their university employment;

7.4 be available for a reasonable amount of time, on a known and posted basis, for individual consultation with students registered in their courses or laboratories;

7.5 evaluate student academic performance in a fair and reasonable manner, and by means of appropriate academic criteria only;

7.6 where appropriate, provide written evaluative feedback prior to the voluntary withdrawal deadlines specified in the *Calendar*;

7.7 foster a free exchange of ideas between themselves and their students in the classroom and allow students the freedom to take legitimate exception to the data, views, or methods presented;

7.8 respect the confidentiality of documentary information about students;

7.9 keep confidential any information about the academic performance of a student, unless release is authorized by the student, required by the instructional team, or requested by an administrative officer in accordance with the university policy on the release of information;

7.10 explicitly acknowledge in written or oral presentations any indebtedness to student research or assistance;

7.11 not obtain any improper personal advantage from a student or student work; and,

7.12 academic staff members shall not retaliate against a student who has filed a complaint, whether the complaint was substantiated or unsubstantiated.

8. Academic staff members shall not cancel, miss, terminate or shorten scheduled instruction except for good reason. Whenever a scheduled period of instruction is cancelled, the academic staff member shall:

8.1 inform the class at the earliest possible time;

8.2 inform the administrative head of the academic unit; and,

8.3 where possible, ensure that appropriate substitution or make-up instruction is provided.

9. Academic staff members who provide instruction shall comply with the schedules and formats for reporting student grades, as established by departments and the Student Records Office. Where such grades are reviewed by departmental committees, instructors should be available for the duration of the committees' work. An instructor who learns of an error, which if corrected would raise an assigned grade, should correct it without requiring the student affected to appeal the grade.

10. Academic staff members shall adhere to the relevant university, faculty/school, and/or departmental policy regarding professor-course evaluation.

B. Collective Responsibility

1.Through their faculty/school and department councils, academic staff members should review program and course descriptions periodically to ensure that the material to be presented is current and appropriate and that the *Calendar* information is clear and accurate.

2.The following material must be kept on file in faculty/school or departmental general offices and made available to students:

2.1 University, faculty/school or departmental regulations regarding class attendance and penalties, if any, for noncompliance;

2.2 The information described in Section 4.A.4, that is provided in writing to the class by the academic staff member for each course section;

2.3 University, faculty/school, and/or departmental regulations and procedures, if any, regarding the evaluation of professors and courses by students;

2.4 University, faculty/school, and/or departmental policy regarding student access to final examination scripts;

2.5 University policy on student discipline;

2.6 University, faculty/school, and departmental procedures regarding grade appeals;

2.7 University policy on the responsibilities of academic staff with regard to students; and,

2.8 University policy regarding sexual harassment.

3. Where necessitated by large class sizes or other circumstances, academic units shall ensure that course instructors and/or designated substitutes are available for individual consultation with students for a reasonable amount of time on a known and posted basis.

1.5 Cautionary Notice

Students are reminded that the initiation of frivolous or vexatious complaints may result in disciplinary action being taken against them by the university.

SECTION 2: Policy on Sexual Harassment

Approved by: Board of Governors, November 21, 1984;
Revised: March 23, 1995

The University of Manitoba endeavours at all times to provide an environment that is supportive of the fair treatment of all members of the University community and is conducive to relationships based on mutual respect, cooperation and understanding. The University does not condone behaviour that is likely to undermine the dignity, self-esteem or productivity of any staff member or student, and seeks to prevent such behaviour through special programs of education and discussion.

Sexual harassment violates not only the human rights of the victim but also the fundamental values of the University including the value it places on high standards of personal and professional integrity and responsibility. Accordingly all members of the University community have a responsibility to contribute to promoting an environment in which sexual harassment does not occur.

While the University supports the informal resolution of problems associated with such behaviour, where appropriate, the University considers sexual harassment in all its forms to be a serious offense which may lead to a range of disciplinary measures up to, and including, dismissal or expulsion.

A complaint may be made by any person who believes that he or she has been subjected to sexual harassment by any member of the University in the course of University or University-related activities. An incident involving the University may properly be considered sexual harassment under this policy whether or not it occurs on campus, or whether or not it occurs during working hours.

2.1 Definition

For the purposes of this policy, sexual harassment is deemed to include but is not restricted to:

1. Unwanted sexual attention by a person who knows or ought reasonably to know that such attention is unwanted;
2. Expressed or implied promise of reward for complying with a sexually oriented request;
3. Actual reprisal or an expressed or implied threat of reprisal for refusal to comply with a sexually oriented request;
4. Actual denial of opportunity or an expressed or implied threat of denial of opportunity for refusal to comply with such a request; or
5. Sexually oriented behaviour or gender-based abusive and unwelcome conduct or comment which has the purpose or effect of creating an intimidating, hostile or offensive environment.

Examples of sexual harassment include but are not limited to:

1. Sexist remarks, jokes, innuendos or taunting about a person's body, appearance, characteristics or clothes;
2. Displaying of pornographic or other sexually offensive or derogatory pictures or material;
3. Persistent and unwelcome invitations or requests for "dates;"
4. Leering or other sexually oriented gestures;
5. Inappropriate questions or sharing of information about a person's sexuality or sexual orientation;
6. Inappropriate touching;
7. Sexual assault.

Sexual harassment may be physical and/or psychological in nature. One incident or a series of incidents (even where a single incident would not necessarily be considered to be harassment) may constitute sexual harassment. It may involve individuals or groups. It may take the form of excluding, on the basis of gender or sex, an individual or a group from rights or privileges to which they are otherwise entitled.

Although sexual harassment has typically involved a female victim, both males and females can be harassed by members of either sex. Although sexual harassment typically involves a person in a superior position as the initiator, it is recognized that people in subordinate or equal positions may also be initiators. Thus sexual harassment may occur in a variety of ways, e.g., harassment of a student by a student; or of a staff member by a staff member; or of a student by a staff member; or of a staff member by a student.

Printed copies of this policy (which includes complaint procedures) are available from the Office of the University Secretary, 312 Administration Building, the Student Advocacy/Student Resource Services, 519 University Centre, and the University Policy and Procedure Manual (Policy 223) on the website at www.umanitoba.ca/governance

SECTION 3: Policy on Human Rights

Approved December 12, 1991; Revised March 23, 1995

The University of Manitoba endeavours at all times to provide an environment that is supportive of the fair treatment of all members of the University community and is conducive to relationships based on mutual respect, cooperation and understanding. The University does not condone behaviour that is likely to undermine the dignity, self-esteem or productivity of any staff member or student and seeks to prevent such behaviour through special programs of education and discussion. The University endorses programs to overcome systemic discrimination or historic disadvantage through formally and publicly approved policies on such issues as employment equity and pay equity, and it supports reasonable accommodation for those with special needs.

Unreasonable discrimination based on, inter alia, racial, ethnic or national origin, age, sex, sexual orientation, ancestry, disability, religious belief, or political belief, and any coercive or harassing behaviour, violates not only the human rights of the victim but also the fundamental values of the University, including the value it places on high standards of personal and professional integrity and responsibility. Accordingly the University expects members of the University community to respect all fundamental human rights and values, and to be vigilant in protecting the dignity and equality of opportunity, within the context of the Manitoba Human Rights Code, of all who participate in the University's activities.

While the University supports the informal resolution of problems associated with violations of human rights, such violations are serious offenses and may lead to a range of disciplinary measures up to, and including, dismissal or expulsion.

A complaint may be made by any person who believes that he or she has been subjected to discrimination or harassment by any member of the University in the course of University or University-related activities. An incident involving University or University-related matters may properly be considered discrimination or harassment whether or not it occurs on campus or whether or not it occurs during working hours.

3.1 Definitions

For the purposes of this policy discrimination means, except where bona fide and reasonable cause exists, or where it is based upon bona fide and reasonable requirements or qualifications, the differential treatment, whether intended or not, of an individual or group of individuals on the basis of:

1. An individual's actual or presumed membership in or association with some class or group of persons, rather than on the basis of personal merit; or

2. Any of the following characteristics set out in the Manitoba Human Rights Code:

a) ancestry, including colour and perceived race;
b) nationality or national origin;
c) ethnic background or origin;
d) religion or creed, or religious belief, religious association or religious activity;
e) age;
f) sex, including pregnancy, the possibility of pregnancy, or circumstances related to pregnancy;
g) gender-determined characteristics or circumstances other than those included under the characteristic of sex;
h) sexual orientation;
i) marital or family status;
j) source of income;
k) political belief, political association or political activity;

l) physical or mental disability or related characteristics or circumstances; or

3. the individual's or group's actual or presumed association with another individual or group whose identity or membership is determined by any of the characteristics referred to in section (2) above; or

Failure to make reasonable accommodation for the special needs of an individual or group shall be considered a violation of this policy, if such failure is based upon any characteristic referred to in section (2) above.

For the purposes of this policy harassment is deemed to include but is not restricted to behaviour or abusive and unwelcome conduct or comment which has the purpose or effect of creating an intimidating, hostile or offensive environment. (Sexual harassment is dealt with in a separate policy - see Policy 223.) Examples of discrimination and harassment include but are not limited to:

1. Derogatory written or oral comments and gestures (e.g., name-calling, slurs, graffiti, pictures, gestures, remarks, jokes) based on any of the characteristics referred to in section (2) above;

2. Evaluations of performance as a student or staff member based on any of the characteristics referred to in section (2) above;

3. Behaviour stating or implying actual or perceived abilities or inabilities based on any of the characteristics referred to in section (2) above;

4. Refusal to work with or share University facilities based on any of the characteristics referred to in section (2) above;

5. Applying stereotypes or generalizations based on any of the characteristics referred to in section (2) above.

One incident or a series of incidents may constitute discrimination or harassment. It may involve individuals or groups.

Discrimination and harassment can occur in a variety of ways, e.g., of a student by a student; or of a staff member by a staff member; or of a student by a staff member; or of a staff member by a student.

3.2 Affirmative Action

Notwithstanding any other provision of this policy, it is not discrimination or a contravention of this policy,

1. To make reasonable accommodation for the special needs of an individual or group, if those special needs are based upon any characteristic referred to in subsection (2);

or
2. To plan, advertise, adopt or implement an affirmative action program or other special program that;

a) Has as its object the amelioration of conditions of disadvantaged individuals or groups, including those who are disadvantaged because of any characteristic referred to in subsection (2),

and
b) Achieves or is reasonably likely to achieve that object.

3.3 Implementation

The University shall establish mechanisms to give effect to this policy. These mechanisms shall include:

1. Articulation of procedures to deal with the handling of complaints and the responsibilities of administrative officers in respect of complaints and any disciplinary action arising there from;

2. The appointment of a Human Rights Investigation Officer, or Officers, (the "Investigation Officer") whose duties shall include the investigation of complaints, provision of advice and assistance to staff members, students and administrative officers in connection with complaints (None of these responsibilities extends to matters falling within the responsibilities of the Sexual Harassment Investigation Officer under the Policy on Sexual Harassment.)

3. The establishment and implementation of educational programs designed to enhance awareness of human rights and the communication of the University's policy and procedures relating to the subject; and,

4. The preparation of an annual report, which shall be a public document, on the number, type and disposition of cases of human rights violations and on educational and other activities related to the prevention of such violations.

This policy replaces the Statement on Discrimination approved by the Board of Governors in December, 1991.

The printed copies of this policy (which include complaint procedures) are available from the Office of the University Secretary, 312 Administration Building, the Student Advocacy/Student Resource Services, 519 University Centre, and the University of Manitoba Policy and Procedure Manual (Policy 236) on the website at www.umanitoba.ca/governance.

SECTION 4: Accessibility Policy for Students with Disabilities

The University of Manitoba is committed to reasonable accommodation of the needs of persons with documented disabilities by making efforts to create a barrier-free campus and provide other supports and services within the limits of available resources. The University will endeavour to meet the identified needs of each student by adapting services, courses, and programs as feasible and as resources allow, while maintaining appropriate academic standards. The University expects that the responsibility for making reasonable accommodations will be shared by the students, instructors and support staff.

In applying the accessibility policy for students with disabilities, the University of Manitoba will use reasonable efforts to:

- Ensure that students with disabilities are considered for admission to programs for which they are academically qualified;
- Make appropriate disability-related accommodations for students with disabilities to assist these students in meeting the academic requirements of their programs of study, while maintaining a commitment to appropriate academic standards;
- Make facilities safe and accessible for such students;
- Foster a supportive university community by working to remove attitudinal barriers and to inform and educate community members;
- Implement delivery structures within the limits of available resources.

Printed copies of this policy are available from the Office of the University Secretary, 312 Administration Building, the Student Advocacy/Student Resource Services, 519 University Centre, and at the University of Manitoba Policy and Procedure Manual (Policy 1211) on the website at www.umanitoba.ca/governance

SECTION 5: Disclosure and Security of Student Academic Records

The University and its constituent units have a clear obligation to the student and to society concerning the disclosure and security of information about a student's academic record.

The Student's Academic Record - A Definition

For the purposes of this document, the student's academic record refers to the information accumulated on a student in relation to the student's admission to and registration and academic activity at The University of Manitoba. (The student's academic record also may be referred to as the student's academic file or simply the student's file.)

The student record described in this document does not ordinarily include detailed information held by University Health Services, Counselling Services or the University Discipline Committee. Separate records are maintained by each of these units which have developed their own set of guidelines on security and disclosure. A general statement from a physician or counsellor which is relevant to the student's academic performance and which has been furnished at the request or with the consent of the student may be included in the student's file. Similarly if a student is suspended or expelled for disciplinary reasons, only the fact of the suspension or expulsion shall ordinarily be entered on the student's academic record and only for as long as specified in accordance with the Student Discipline By-Law.

It is recognized that throughout the course of a student's academic career there are many types of records kept on the student within the University. The student's academic record or versions of it may be in the form of hard-copy files, in the form of information recorded on a computerized database, or other forms such as microfiche or microfilm. Files on an individual

student are often kept in a variety of locations, e.g., Admissions, Student Records, Faculty and Departmental Offices.

A complete copy of this policy is available in the University of Manitoba Policy and Procedure Manual (Policy 423) on the web at www.umanitoba.ca

NOTE: This policy is currently undergoing revision to comply with *The Freedom of Information and Protection of Privacy Act* (FIPPA). Students who have any questions about the status of Policy 423 should contact the Office of the University Secretary, 312 Administration Building.

SECTION 6: Language Usage Guidelines

The University of Manitoba, as an institution of higher learning, has a commitment to high standards in all communications, both written and oral as well as a prominent role in promoting desirable social change. As an employer, it is especially sensitive to the fair treatment of individuals and groups. The University of Manitoba therefore follows guidelines which are designed to avoid communicating in a manner that reinforces questionable attitudes and assumptions about people and sex roles. Often the problem is one of word choices which maybe interpreted as biased, discriminatory, or demeaning, even though they were not intended to be. These guidelines will assist administrators in choosing words which are accurate, clear, and free from bias.

Guidelines

Sexism in communications may be divided into two conceptually different categories:

- Problems of designation, and
- Problems of evaluation.

Problems of Designation

In the case of sexism, long-established cultural practice can exert a powerful, insidious influence over even the most conscientious person. Nouns, pronouns, and adjectives that designate persons can be chosen to eliminate, or at least to minimize, the possibility of ambiguity in sex identity or sex role. In the following examples, problems of designation are divided into two sub-categories: ambiguity of referent, where it is unclear whether the communicator means one or both sexes, and stereotyping, where the communication conveys unsupported or biased connotations about sex roles and identity.

Problems of Evaluation

By definition, communications should be free of implied or irrelevant evaluation of the sexes.

Difficulties may derive from the habitual use of cliches or familiar expressions such as "man and wife." The use of "man and wife" together implies differences in the freedom and activities of each. "Husband and wife" are parallel, "man and wife" are not. In the examples that follow, problems of evaluation, like problems of designation, are divided into ambiguity of referent and stereotyping.

Problems of Designation

Ambiguity of Referent:

Example: The student is usually the best judge of the value of his counselling. Options might include deleting the referent "his," changing to a plural subject (Students are...value of the counselling service they receive), or rephrase (The best judge of the value of counselling is usually the student).

Example: Man or mankind (people, human beings, etc.) the average man (average person, people in general), manpower (workforce, personnel, human resources).

Stereotyping:

Example: Research scientists often neglect their wives and children. Solution: Acknowledge that women as well as men are research scientists (Research scientists often...neglect their families).

Example: Mothering. Solution: substitute - parenting, nurturing.

Example: Woman doctor, male nurse, lady lawyer. Solutions delete sex description unless necessary to the discussion, then use female doctor, female lawyer.

Problems of Evaluation

Ambiguity of Referent:

Example: The authors acknowledge the assistance of Mrs. John Smith. Solution: Use given names in acknowledgements, e.g., Ms., Miss or Mrs. Jane Smith.

Stereotyping:

Example: men and girls. Solution: Use parallel terms - men and women, girls and boys, unless specifically wishing to denote adult and child relationship).

Example: woman driver. Solution: Specify only if necessary and then use female driver.

Example: Staff members and their wives. Solution: Staff members and their spouses/friends/guests.

Example: The girls in the office. Solution: Substitute - secretaries, staff, office assistants).

A more detailed list of examples of the sexist use of language can be obtained by contacting the Office of the President and the University of Manitoba Policy and Procedure Manual (Policy 231) on the website at www.umanitoba.ca/governance

SECTION 7: Conflict of Interest Between Evaluators and Students Due to Close Personal Relationships

The purpose of this policy it to ensure that the relationship between an evaluator and the person being evaluated is and is seen to be impartial.

An evaluator includes any person who participates, whether at first instance or on appeal, in the process of admitting or selecting a student to a course or program, determination of a student's progress or academic standing, or the receipt by a student of a prize, award or university financial support.

A conflict of interest means a close personal relationship between an evaluator and a student or applicant or between evaluators, that gives rise to a reasonable apprehension of bias and, in any event, such relationships shall include that of: parent/child, spouses, grandparent/grandchild; siblings, in-laws or persons living in the same dwelling unit.

A complete copy of this policy may be obtained from Student Advocacy/ Student Resource Services, 519 University Centre or the University Policy and Procedure Manual (Policy 1306) on the website at www.umanitoba.ca/governance

SECTION 8: Other Policies of Interest to Students

8.1 Campus Alcohol Policy

The purpose of this policy is to explicitly establish the general means by which alcohol abuse on the University of Manitoba campuses can be reduced or perhaps eliminated.

The University shall meet the policy's objective by: offering an alcohol education and awareness program within the scope of programs offered by or through Student Affairs; maintaining University guidelines with respect to the serving and consumption of alcohol on campus; requiring that events and facilities at which alcohol is served on campus be managed effectively and in accordance with the University guidelines and Manitoba Liquor Control Commission regulations; and monitoring the application and effectiveness of the policy and guidelines through an Alcohol Beverage Committee, which also will provide to the Vice-President (Administration) on relevant problems and on proposed changes to the policy and guidelines.

This policy applies broadly, and covers all activities, events, locales and facilities on the University of Manitoba campuses at which alcohol is served or is available.

A complete copy of this policy may be obtained from Student Advocacy/ Student Resource Services, 519 University Centre or The University of Manitoba Policy and Procedure Manual (Policy 240) on the website at www.umanitoba.ca/governance.

8.2 HIV/AIDS Policy

The University and the University community shall not discriminate against any individual for the reason that he/she has AIDS or has tested positive for the HIV antibody.

This undertaking applies broadly across University services, programs, admissions, employments, facilities and accommodations.

A complete copy of this policy may be obtained from Student Advocacy/ Student Resource Services, 519 University Centre or The University of Manitoba Policy and Procedure Manual (Policy 509) on the website at www.umanitoba.ca/governance

8.3 Parking Regulations

All members of the University community and persons attending on property, owned and occupied or under the charge or control of the University, including roadways (the "University property") are required to familiarize themselves and comply with the Regulations.

The Regulations are in addition to any by-lays of the City of Winnipeg and any legislation and regulations of the Province of Manitoba regulating the operation or use of motor vehicles or regulating the crossing of or walking upon roadways by pedestrians.

A complete copy of the University Parking Regulations is found in the *Registration Guide* and The University of Manitoba Policy and Procedure Manual (Policy 206) on the website at www.umanitoba.ca/governance.

PART TWO:

Students are expected to conduct themselves responsibly with due regard for the rights of others and to maintain a high level of personal and academic integrity. Students who transgress these standards, whether expressed in policy or implied in generally accepted codes of conduct, can expect disciplinary action. Penalties arising from disciplinary actions may include fines, withholding of student privileges, suspension or expulsion from programs, or some other action specific to the situation. Penalties may also affect student eligibility to continue in their programs or to graduate.

The following are some of the policies and regulations relating to student discipline and behaviour.

SECTION 1: Student Discipline Bylaw

A primary responsibility of the University is to provide its students with the opportunity for inquiry and freedom to discuss and express views openly and freely without fear of retaliation, or abuse of person of property. These attributes are the foundation of good citizenship.

To this end, students have an obligation to act in a fair and reasonable manner towards their peers, the faculty, staff, administration and the physical property of the university. Academic integrity and personal conduct, both on-campus and off-campus, are critical elements in achieving these goals. Violations of university regulations which have been adopted to protect the university community will be subject to disciplinary action. This may include, but is not limited to, violations of regulations governing plagiarism, cheating, examination impersonation, academic fraud and acts of personal behaviour such as sexual harassment, violation of human rights, vandalism and substance abuse. The Student Discipline Bylaw provides guidance to those individuals charged with administering disciplinary action while, at the same time outlining the protection to be afforded students through their right of appeal. Disciplinary authorities are encouraged, whenever possible and appropriate, to settle findings of violation by informal resolution.

Students may request information from their faculty or school offices, the Office of Student Advocacy, or may obtain a copy of the bylaw from the office of the Secretary of Senate of obtain a copy of the By-Law from the Office of the University Secretary, 312 Administration Building, Student Advocacy/Student Resource Service, 519 University Centre or the University of Manitoba Policy and Procedure Manual (Policy 1202) on the website at www.umanitoba.ca/governance

SECTION 2: Inappropriate and Disruptive Student Behaviour

Although this policy is directed to dealing with students who exhibit inappropriate or disruptive behaviour, there are some general statements which should be made:

1. The vast majority of students will complete their academic life at the University acting appropriately and without causing disruption to their fellow students or to the University.

This policy is not directed towards individual students who have a mental illness provided their behaviour is neither inappropriate or disruptive.

A staff member may notice that an individual student is exhibiting stress, even though he/she is not acting disruptively. In that case, the observation should be addressed with the student and, if appropriate, the student should be referred for voluntary counselling.

2. "Inappropriate or disruptive behaviour is behaviour which persistently interferes with the academic or administrative activities of the University (and/or) which inhibits the ability of other students to learn and of instructors to teach" -- Amanda G. "Dealing with the Disruptive College Student: Some Theoretical and Practical Considerations," *College Health*, April 1986.

Such behaviours would include, but are not limited to the following: threats to the physical safety of the individual or others; verbal threats or abuse of students or University personnel; recurring and wilful damage of University property; and actions which habitually interfere with the learning environment or requires the inordinate time and attention of faculty and staff.

The majority of students engaging in such behaviour will accept personal responsibility and appropriate referral for voluntary counselling. Additional action is detailed in the policy.

A complete copy of this policy may be obtained from Student Advocacy/ Student Resource Services, 519 University Centre or the University of Manitoba Policy and Procedure Manual (Policy 1210) on the website at www.umanitoba.ca/governance

SECTION 3: Hold Status

Students will be placed on "Hold Status" if they incur any type of outstanding obligation (either financial or otherwise) to the university or its associated faculties, schools, colleges or administrative units.

Some typical reasons for holds are:

- Outstanding fees or other unpaid university fees
- Outstanding library books and/or fines
- Parking fines
- Outstanding transcripts or documents required from other institutions
- Impending disciplinary action.

No administrative or academic services will be provided to students on Hold Status until the specific obligations have been met.

Students who have not cleared their Hold Status from previous registrations will not be permitted to register again until the hold has been cleared or permission to register has been obtained from the Office of the Vice-President (Administration).

General Academic Regulations and Requirements

Chapter Contents

SECTION 1: Introduction

This chapter contains the regulations and requirements that apply to all graduate students, regardless of their faculty or school.

Each faculty and school has its own regulations and requirements supplementary to the General Academic Regulations and Requirements of the University of Manitoba. Some units also have additional regulations and requirements governing their programs; these are available from their general offices.

It is the responsibility of each student to be familiar with the academic regulations and requirements of the University of Manitoba in general and of the specific academic regulations and requirements of the Faculty of Graduate Studies. Accordingly, students are asked to seek the advice of advisors of the appropriate unit whenever there is any question concerning how specific regulations apply to their situations.

SECTION 2: Residence Requirements

2.1 Residence Requirements for Graduation

Each faculty and school recommends to the Senate the number of credit hours each student must complete in order to graduate from its programs. Senate also requires each student to complete a minimum number of credit hours at the University of Manitoba -- this is called the "residence requirement."

SECTION 3: Grades and Grade Point Average Calculation

Final grades in most courses are expressed as letters, ranging from F to A+. Each letter grade has an assigned numerical value which is used to calculate grade point averages.

Some courses are graded on a pass/fail basis and because no numerical value is assigned to these courses, they do not affect grade point averages. Courses graded in this way are clearly identified in course descriptions and program outlines.

3.1 The Letter Grade System

Adopted by all faculties and schools commencing with the 1967-1968 session.

Letter Grade	Grade Point Value	
A+	4.5	Exceptional
A	4.0	Excellent
B+	3.5	Very Good
B	3.0	Good
C+	2.5	Satisfactory
C	2.0	Adequate
D	1.0	Marginal
F	0	Failure
P		Pass
S		Standing

For minimum grade levels, especially as they affect progression requirements, see the Faculty of Graduate Studies regulations in this calendar.

3.2 Calculation of Grade Point Average

Graduate programs require a Grade Point Average of at least 3.0 to graduate.

Credit

A term used to designate the basic unit of recognition of academic work applied towards a degree.

Weighted Grade Point

The weighted grade point for a course is the product of the credit hours for the course and the grade point obtained by the student.

Weighted Grade Point Total

The weighted grade point total is the sum of weighted grade points accumulated as students proceed through their program of studies.

Grade Point Average (GPA)

The grade point average (GPA) is the weighted grade point total divided by the total number of credit hours.

Cumulative Grade Point Total

Unless otherwise stated in the faculty/school regulations, the cumulative grade point total is the sum of the weighted grade points from the time the student enrolled in the faculty or school and it includes the original grades and subsequent grades of any subject repeated, substituted (where permitted), or graded "F", "NP" (failure, no paper).

Cumulative Grade Point Average

The Cumulative GPA is the cumulative grade point total divided by the total number of credit hours attempted at the University of Manitoba which form part of the students' approved program including transfer courses.

Sessional Grade Point Average

The Sessional GPA is calculated on the basis of all final grades received in the session. (e.g. Regular Session or Summer Session).

NOTE: Information on credit hours, courses, prerequisites and corequisites, is found in Appendix B of this chapter, entitled Course Identification.

SECTION 4: Academic Performance and Evaluation

4.1 Methods of Evaluation

Within the first week of lectures, instructors must inform the class of the method of evaluation to be used in each course. See the Responsibilities of Academic Staff to Students Policy, in the chapter University Policies. In departments where a course is offered in more than one section, the department offering the course endeavours to provide instruction so that all sections cover similar topics and that all students achieve a similar level of competency in the topic. However, there may be differences in evaluation as well as in teaching-style, readings and assignments from one section to another. Students may contact the department for additional information.

Credit for Term Work

In subjects involving written examinations, laboratories, and term assignments, a student may be required to pass each component separately. If no final examination is scheduled in a course, the student's final grade will be determined on the basis of the method of evaluation as announced in the first week of lectures.

If credit is not given for term work, the student's final grade will be determined entirely by the results of the final written examination. Where the final grade is determined from the results of both term work and final examinations, the method of computing the final grade will be as announced within the first week of classes. Should a student write a deferred examination, term grades earned will normally be taken into account as set out in the immediately preceding paragraph.

4.2 Examinations

General Regulations

Any test(s) which have an aggregate value of more than 20 per cent of the total value of the course may not be scheduled to take place during the 14 calendar days ending with the last day of classes in the term during the regular sessions as defined in the *Calendar*, or during the last two classes of Summer Evening and the last three classes of Intersession and Summer Day sessions.

No project or assignment may be announced during the periods outlined above, unless contained in the information required to be provided to all students during the first week of classes (See the Responsibilities of Academic Staff to Students in the chapter, University Policies).

Final Examinations

No final examinations or term or take home examinations shall be scheduled to occur prior to the examination periods as described in the *Calendar* except with the expressed consent of the deans and directors involved.

The weight of each question shall be clearly indicated on the examination paper.

The name of the instructor or the examination committee shall be clearly indicated on the examination paper

Students (with the exception of students auditing courses) are required to write all final examinations. Those who absent themselves without an acceptable reason will receive a grade classification of "NP" accompanied by a letter grade based on term work completed for the course using a zero value for incomplete term work and for the final examination. If no credit for term work is involved, a grade of "F" will be assigned. Under certain conditions a student may apply for a deferred examination; see Deferred Examinations.

Examinations are scheduled:

- In December for courses terminating in December.
- In April/May for both full and half courses terminating in April.
- In May/June for Intersession and certain Summer Evening courses.
- In July/August for Summer Evening and Summer Day courses terminating in July and August.

Students are not permitted to leave an examination within the first 30 minutes and any student arriving more than 30 minutes after the commencement, but before the end, of a final examination scheduled by the Student Records Office, might not be permitted to write that examination on the authority of the chief invigilator of the examination room.

Provided fairness is guaranteed beforehand, miniature electronic calculators shall be allowed during examinations, with the consent of the department.

The use of audio visual supports (including, but not limited to overhead or slide projectors, and audio/visual tape players) to display examination or test questions shall be prohibited except where arrangements have been made to display all questions simultaneously for the entire examination/test period or in courses where time limited identification is a legitimate and specified part of the examination/test process.

Answers to examination questions shall not be posted prior to the conclusion of the examination.

Final grades must be posted by faculties and schools (identifying students by student number only) as soon as the grades have been approved by the faculty/school/department (as appropriate) and have been submitted to the Student Records Office.

Student Access to Final Examinations

In order to allow proper feedback, students shall have an opportunity to read their own final examination script and any comments on it, but only in the presence of the instructor or a department-appointed staff member. Such access will be permitted normally upon reasonable notice from the day following the deadline for formal appeal or from the date of the resolution of an appeal, whichever is later, until the date on which scripts are, by these regulations, to be destroyed. Informal consultation, provided both instructor and student are available and willing, may take place during the period in which access to the scripts is not required.

Notwithstanding the above, there is no obligation upon departments to make machine-scored answer sheets available for consultation by students. It is expected that departments will provide appropriate means of feedback to students in such circumstances and, where appropriate, will encourage instructors to discuss selected questions and answers.

Regulations regarding access to answer scripts of external examinations are governed by the regulations of the institution whose examination has been written.

Special Examination - Religious Reasons

Students who, through religious obligations, are unable to write a final examination when scheduled, shall be given an opportunity to write a special examination. These students are required to give reasonable notice (approximately three weeks) to the head of the department concerned prior to the examination series and to present evidence concerning the religious obligations involved.

Deferred Examinations

Students may file an application for a deferred examination with the dean of the faculty or the director of the school in which they are registered for their program, for reasons of illness or other disability, or for compassionate reasons, setting out the reasons for deferral. The application must normally be filed within seven working days of the end of the examination series in which the examination was scheduled to be written and must be accompanied by a medical certificate or other appropriate documentation certifying the reason for the deferral, the inability of the student to write the examination at the regular scheduled time and, where possible, indicating the period of disability. Based on the evidence, the dean or director shall decide whether the application is approved.

Students requesting a deferred examination on the grounds that they are participating in an inter-university, inter-provincial, national or international scholastic or athletic event(s) shall be granted a deferral provided an application and appropriate documentation is filed with the dean or director of the faculty or school or registration well in advance (normally 20 days) of the scheduled examination, and that the dean or director is satisfied, based on the evidence, that the application should be granted.

No deferred examinations shall be granted on the basis of conflict(s) with vacation or holiday plans.

Any student leaving an examination early for reasons of illness, or other disability, or for compassionate reasons must notify the chief invigilator before leaving the room. The chief invigilator must report all such notifications. Students leaving an examination early in compliance with this section are eligible to apply for a deferred examination.

No faculty or school shall have regulations that compel students to accept deferral for any or all examinations in any examination series.

When an application for a deferred examination is approved by the faculty or school office, the head of the department in which the course is offered, in consultation with the instructor, shall schedule the deferred examination to take place normally within 30 working days from the end of the examination series from which the examination was deferred. The foregoing does not limit the ability for heads of departments, instructors and students from reaching mutually satisfactory arrangements for the scheduling of a deferred examination.

In the event that a student is unable to write the examination as outlined above, they shall write the deferred examination at the next scheduled examination series in which the course is offered, unless the head of the department, in consultation with the instructor concerned, chooses to assign a grade without examination. In such cases the grade(s) shall be assigned on the basis of term work following procedures established by faculty or school councils.

If the progression rules of a faculty or school require the successful completion of an entire academic year before a student is eligible to proceed into the next academic year, the deferred examination must be written within a time frame that enables the examination to be written and graded, and, if necessary, a supplemental examination to be written and graded, before the start of the next academic year.

Students who accept standing in a course without examination may not, at a later date, request permission to write a deferred examination.

Students who, for medical reasons, withdraw from a program or receive deferred examination for all final examination series shall be informed by their faculty or school that they may not re-register until they have established, through proper medial consultation, their fitness to resume studies.

Supplemental Examinations

Where a faculty's or school's regulations permit supplemental examinations, students are normally notified of this privilege on their grade statements or by their faculty or school following publication of the grades. Students who are granted supplemental privileges are normally required to sit the examination within 30 working days from the end of the examination series in which the supplemental grade was received unless the progression rules of a faculty or school require the successful completion of an entire academic year before a student is eligible to proceed into the next. In this case, students are obliged to sit the examination at the next ensuing examination period.

The passing grade in supplementals must be at least "C." Students are normally required to carry a full-time program in order to be eligible. Accordingly, students who are granted incomplete or deferred status may not be eligible. A student may only write a supplemental once in any course; otherwise the course must be repeated.

Students are advised to check with their faculty or school offices or consult an advisor as to specific regulations that may apply.

To write a supplemental examination an application must be made to the office of the dean or director and the appropriate fee paid. The application form will be forwarded to the Student Records Office and the supplemental grade will be submitted following completion of the examination.

Special Supervision of Off-Campus Examinations:

Students who have been given permission to write deferred or supplemental examinations off-campus may apply to the Student Records Office to write at an approved centre outside of Winnipeg.

Examinations: Personations

A student who arranges for another individual to undertake or write any nature of examination for and on his/her behalf, as well as the individual who undertakes or writes the examination, will be subject to discipline under the university's Student Discipline Bylaw, which could lead to suspension or expulsion from the university. In addition, the Canadian Criminal Code treats the personation of a candidate at a competitive or qualifying examination held at a university as an offence punishable by summary conviction. Section 362 of the code provides:

Personation at Examination

362. Every one who falsely, with intent to gain advantage for him/herself or some other person, personates a candidate at a competitive or qualifying examination held under the authority of law or in connection with a university, college or school or who knowingly avails him/herself of the results of such personation is guilty of an offence punishable on summary conviction. 1953- 54,c.51, s.347.

Both the personator and the individual who avails him/herself of the personation could be found guilty. Summary conviction could result in a fine being levied or up to two years of imprisonment.

4.3 Other Forms of Earning Degree Credit

Letter of Permission for Transfer of Credit

Students in graduate programs at this university may take courses at other recognized colleges or universities for transfer of credit provided such courses are approved at least one month prior to the commencement of classes at the other institution by the faculty or school in which they are currently registered. The approval is subject to individual faculty/school regulations and is granted in the form of a Letter of Permission. The student must obtain a Letter of Permission whether or not the course/s being taken are for transfer of credit to the University of Manitoba. Failure to obtain a Letter of Permission may have serious academic implications.

To obtain a Letter of Permission, application must be made to the Student Records Office as early as possible and at least one month prior to when required at the other institution.

Each application must be accompanied by the appropriate fee. The fees are for each application and a separate application is required for each session and institution regardless of the number of courses being considered. Students planning to seek permission to take courses elsewhere for transfer of credit to the University of Manitoba are cautioned to check the current *Calendar* for the residence and degree requirements of the degree programs in which they are enrolled.

Credit for any transferred course will be given as a grade established using a conversion table. The transferred grade will be included in the student's cumulative GPA.

All such courses must be approved for transfer to the program of study by the major department before they are taken.

Challenge for Credit

The purpose of Challenge for Credit is to provide students of the university with some means of obtaining academic credit in University of Manitoba courses (not otherwise obtainable as a transfer of credit from other institutions) for practical training and experience, or reading and study previously completed. Students who have registered to challenge would normally not attend classes or laboratories. Courses which have previously been taken at the University of Manitoba may not be challenged for credit.

To be eligible to challenge for credit a student must first be admitted to a faculty or school of the University of Manitoba. Eligible students will be required to demonstrate their competence in the courses which they are challenging for credit. Where formal, written examinations are required, these will be generally scheduled during the regular examination sessions in April/May, June, August, or December.

Challenged courses do not reduce the residence requirement.

For information regarding requirements, procedures, applications and fees a student should contact the office of the faculty or school in which the student is enrolled, or in the case of new students, the faculty or school to which the new student has been admitted.

Transfer of Credit Between Programs within the University of Manitoba

When students transfer credits into their programs from another faculty or school within the University of Manitoba, the credit hour value used by the faculty or school offering the course is used. That is, there can only be one credit weight designated for a course with a particular course number.

SECTION 5: Appeals of Grades

5.1 General

Professional Unsuitability By-Law

The University of Manitoba Senate approved a by-law granting authority to the faculty/school to require a student to withdraw for reasons of professional unsuitability. Copies of this by-law may be obtained from the office

of the dean or director. Students are reminded of their obligation to be familiar with all regulations governing their continued progress in the program.

Policy on Disclosure and Security of Student Academic Records

Students should be aware that copies of this policy are available in the Faculty of Graduate Studies general office, 500 University Centre.

Academic Dishonesty

Cheating and plagiarism are forms of academic dishonesty and, as such, are subject to disciplinary action. Offences could lead to expulsion from the university. Plagiarism is the deliberate, insufficiently credited or insufficiently acknowledged use of another's work and the representation of that work as one's own. Students in doubt as to what constitutes an offense in a particular course or department should consult the professor or department heads concerned. Refer to SECTION 7 on general academic regulations and policies in this *Calendar*.

5.2 Appeals of Grades Received for Term Work

The appeal of term work returned or made available to students before the last day of classes shall be subject to the policies and procedures established by faculty or school councils.

A student may formally appeal a grade received for term work provided that the matter has been discussed with the instructor in the first instance in an attempt to resolve the issue without the need of formal appeal. Term work grades normally may be appealed up to ten working days after the grades for the term work have been made available to the student.

Students may obtain the form "Application for Appealing a Grade Given for Term Work" from the general office of the department which offered the course. The fee which is charged for each appealed term work grade will be refunded for any grade which is changed as a result of the appeal.

5.3 Appeal of Final Grades

If a student has good reason to believe a mistake has been made in the assessment of the original grade, an appeal of the assigned grade may be made. A student may enter an appeal, through the Student Records Office, for assessment of one or more grades following the posting of grades by the faculty/school/department, but in no instance later than twenty-one (21) days following the release of grades by the Student Records Office. The fee which is charged for each appealed grade will be refunded for any grade which is changed. It should be noted that an appealed grade may not be lowered. Appeal forms may be obtained from the Student Records Office. Students should note that the deadline for appeal of assigned grades will not be extended for students who are on "hold status" nor will official grades be released by the Student Records Office until the "hold" has been cleared.

5.4 Academic Appeals

With the exception of decisions on admissions or disciplinary matters, all academic appeals from decisions of faculty or school appeals committees at the University of Manitoba or by the Comite d'appels at Collège universitaire de Saint-Boniface shall be heard by the Senate Appeals Committee regardless of the institute of registration of the student concerned.

The complete terms of reference for the Senate Committee on Appeals as well as an Appeal Form may be obtained from the Office of the University Secretary, 312 Administration Building or Student Advocacy/Student Resource Services, 519 University Centre.

SECTION 6: Attendance and Withdrawal

6.1 Attendance at Class and Debarment

Regular attendance is expected of all students in all courses.

An instructor may initiate procedures to debar a student from attending classes and from final examinations and/or from receiving credit where unexcused absences exceed those permitted by the faculty or school regulations.

A student may be debarred from class, laboratories, and examinations by action of the dean/director for persistent non-attendance, failure to produce assignments to the satisfaction of the instructor, and/or unsafe clinical or parachuting practice. Students so debarred will have failed that course.

6.2 Withdrawal from Courses and Programs

Authorized Withdrawal

Subject to the provision of satisfactory documentation to the faculty of registration, Authorized Withdrawals (AWs) may be permitted on medical or compassionate grounds. AWs will not be counted toward the numerical limit on VWs established by a faculty or school.

Required Withdrawal from Professional Programs

Senate, at the request of some faculties and schools, has approved bylaws granting them the authority to require a student to withdraw on the basis of unsuitability for the practice of the profession to which the program of study leads.

This right may be exercised at any time throughout the academic year or following the results of examinations at the end of every year.

This right to require a student to withdraw prevails notwithstanding any other provisions in the academic regulations of the particular faculty or school regarding eligibility to proceed or repeat.

Where Senate has approved such a bylaw, that fact is indicated in the *Calendar* chapter for that faculty or school. A copy of the professional unsuitability bylaw may be obtained from the general office of the faculty or school.

SECTION 7: Academic Integrity

7.1 Plagiarism and Cheating

Plagiarism or any other form of cheating in examinations or term tests (e.g., crib notes) is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty.

To plagiarize is to take ideas or words of another person and pass them off as one's own. In short, it is stealing something intangible rather than an object. Obviously it is not necessary to state the source of well known or easily verifiable facts, but students are expected to acknowledge the sources of ideas and expressions they use in their written work, whether quoted directly or paraphrased. This applies to diagrams, statistical tables and the like, as well as to written material, and materials or information from Internet sources. To provide adequate documentation is not only an indication of academic honesty but also a courtesy which enables the reader to consult these sources with ease. Failure to do so constitutes plagiarism. It will also be considered plagiarism and/or cheating if a student submits a term paper written in whole or in part by someone other than him/herself, or copies the answer or answers of another student in any test, examination, or take-home assignment.

7.2 Personation at Examinations

See section 4.2, Personation: Examinations

SECTION 8: Graduation and Convocation

8.1 Graduation

Students may graduate from the University of Manitoba in May, October, and February of each year.

Students are eligible to graduate when they have completed all of the requirements for their degree program in accordance with the regulations described in this *Calendar* and the regulations available from the general offices of their faculties and schools.

It is the responsibility of each student to be familiar with the graduation requirements of the program in which they are enrolled. Consultation with academic advisors is advised to ensure that graduation requirements are met.

8.2 Application for Graduation

Every candidate for a degree, diploma or certificate must make formal application at the beginning of the session in which the student expects to complete graduation requirements.

8.3 Convocation

Convocation ceremonies are held in May and October of each year.

February graduates are included in the May ceremonies.

Graduating students are encouraged to attend with their families and friends because it is the one ceremonial occasion that marks the successful conclusion of their program of studies.

All prospective graduating students who apply for graduation will be asked to confirm their intention to attend Convocation.

Complete details of the time, location, and ceremony arrangements will be included in the material from the Convocation Office of Student Records.

Students who, for any reason, are unable to attend Convocation will receive their degrees in absentia.

Academic Dress

Academic gowns, hoods, and caps are provided by the university as part of the Convocation arrangements.

Convocation Information

Information on Convocation may be obtained from the Student Records Office, 400 University Centre.

APPENDIX A: Course Identification

Credit Hours

Each faculty and school develops courses for its degree credit programs, subject to Senate approval, and assigns a credit hour value to each course.

The credit hours for a course are expressed as a number associated with the course which indicates its relative weight. There is a correlation between class hours and credit hours (i.e., full course: 6 credit hours = 3 hours a week, both terms; and half course: 3 credit hours = 3 hours a week, one term).

Prerequisite and Corequisite Courses

Where the sequence in which courses are taken is important, one course is stipulated as being prerequisite to another (e.g., Mathematics 1 may be prerequisite to Mathematics 2). Unless otherwise specified in the regulations of any faculty or school, the prerequisite requirement is met if at least a passing grade (D) is earned in the course. If the course is failed, permission may be granted to repeat it concurrently with the course for which it is prerequisite.

Where a course is specified as a corequisite course, it must be taken at the same time as (or prior) to the course requiring it as a corequisite.

Graduate Studies Requirements

Registration Numbers

069.600 Summer Research
069.700 Master's Thesis
069.701 Master's Comprehensive Examination
069.702 Master's Re-registration
069.703 Master's Practicum
069.704 M.Eng. Project and Report (3)
069.705 M.Eng. Project and Report (6)
069.800 Doctoral Thesis
069.801 Doctoral Candidacy Examination
069.802 Doctoral Reregistration

Course Numbers

First Three Digits

The first three digits in every course number (that is, the digits before the decimal point) indicate the academic department or program with which the course is associated.

A list of the departmental (or program) codes is published in the *Registration Guide*.

Last Three Digits

At the University of Manitoba the last three digits of the course number (that is, the digits after the decimal point) reflect the level of contact with the subject.

***For example*:**

018.120 Principles of Economics (6)

018 is the department code for Economics in the Faculty of Arts

120 indicates that it is a introductory or first year course.

(6) indicates that it is a six credit hour course.

The 200, 300, 400 course numbers after the period indicate the second, third, and fourth levels of university contact with a subject.

Numbers in the 500 range are normally associated with pre-Master's work or courses in the Faculty of Education, e.g., Post Baccalaureate Certificate and the Post-Graduate Medical Education program.

Courses numbered 600-800 are graduate courses of the Faculty of Graduate Studies.

Course numbers in the 900 series are used to identify courses taken at the University of Winnipeg by students in the University of Manitoba/University of Winnipeg Joint Master's Programs. The 900 numbers do not indicate the level of the course taken (see *Graduate Calendar* or *University of Winnipeg Calendar*).

In most cases, some correlation exists between the course number and a student's year of study; that is, third-year students will generally carry course loads comprised primarily of 300-level courses.

Other Course Information

"**F**" after the course number indicates that the course is taught at Collège Universitaire de Saint-Boniface.

✱ before the course number indicates that the course is part of the Canadian studies program.

L after the bracketed credit hour number, i.e., (6)L, indicates that the course includes a laboratory section.

In some faculties, course information includes term and scheduling information as follows:

030.414 Quantity Food Production and Management (3-L:0-0) 3

In the above example, the colon separates first term information from second term information. The figure "3" indicates the credit hours. "3-L" before the colon indicates that it there are three lectures each week in first term with a laboratory component; the "0-0" after the colon indicates that the course is not offered in second term.

Academic Guide

Faculty of Graduate Studies
Regulations, Policies and Procedures

Chapter Contents

The Faculty of Graduate Studies academic guide contains all the rules and policies pertaining to the Faculty of Graduate Studies. Adherence to these rules is of utmost importance for the effective functioning/operation of programs and for guiding and monitoring the progress of students. The integrity of the process is at stake. The major goal of this guide is to prevent potential problems that may affect the completion of a student's program. It is the responsibility of students and the unit offering a graduate program to read and follow the policies contained herein.

All regulations as laid out in the Faculty of Graduate Studies Academic Guide are subject to revision by the appropriate bodies of the Faculty of Graduate Studies. This compendium is presented as the most recent set of regulations as a guideline for students and staff. Regulations may vary from one department or program to another. The Supplementary Regulations, by department/program, are on file in the Faculty of Graduate Studies office and available from individual departments.

Section 1: Application, Admission, and Registration Policies

1.1 Application and Admission Procedures

The application (and all required documentation) be submitted directly to the department office for initial review. **Applicants should contact the department to which they are applying for the procedures, requirements and application deadlines in effect.**

Steps:

1. A completed official application for admission form must be submitted, together with the application fee and supporting documentation, to the Department to which the student is applying. Incomplete applications will not be considered.

2. International students need to pay special attention to the appropriate requirements with respect to transcripts (see application form for details).

3. The unit offering the program will decide whether the applicant meets the unit's criteria which include but are not limited to space, facilities, and advisors. Complete recommended applications are sent to the Faculty of Graduate Studies who check that the applicant meets the eligibility requirements of the Faculty of Graduate Studies. The Faculty of Graduate Studies notifies applicants of their acceptance or rejection

Internal (Faculty of Graduate Studies) Application Deadlines

The following are the deadlines for receipt by the Faculty of Graduate Studies Office for recommendations from graduate departments.

Session	Start Date	Canadian/US	International
Regular	September	July 1	April 1
Winter	January	November 1	August 1
Spring	May	March 1	December 1
Summer	July	May 1	February 1

IMPORTANT: Applicants **are** required to submit the application and documentation to the department to which they are applying at an earlier date than is listed above. Applicants should check with the specific department to which they are applying for the application deadlines in effect.

The deadlines are meant to accommodate the needs of students in securing appropriate documentation. Late applications will be considered for the next available start date.

Application Fee

All applicants $50 (CDN)

Transcripts:

Applicants must arrange for official transcripts from all post-secondary institutions attended to be sent to the University of Manitoba. **Applicants must ensure that the original transcripts bearing the university seal or attested copies are sent directly from their issuing university to the department to which they are applying .** In cases where the transcript does/will not clearly state that a degree has been conferred, an official degree certificate is required to accompany the transcript. It is important that the transcript(s) be sent so as to arrive as soon as possible to coincide with the arrival of the application.

Transcripts: International

Where academic records from a country other than Canada are produced in a language other than English the applicant must arrange for the submission of official literal translations of all records**.** To be official, original language documents and English translations must arrive together in envelopes which have been sealed and endorsed by the issuing institution.

Transcripts: University of Manitoba

University of Manitoba students may request student histories (unofficial academic records) to be mailed directly to the department or Graduate Studies free of charge. Some departments require official transcripts which may be obtained from the student records office, 400 University Centre (Please allow at least two weeks for delivery).

Proficiency in English

A successfully completed English Language Proficiency Test is required of all applicants unless they have received a high school diploma or university degree from Canada or one of the countries listed on the English Language Proficiency Test Exemption List (below). If applicable, this score is required as a basis for admission and applicants will NOT be accepted sub-

ject to receipt of an acceptable score. Documented proof of either the above must be submitted with the application for admission. Please note: scores more than two years old are not acceptable.

English Language Proficiency Test Exemption List*

Applicants holding secondary school diplomas and/or university degrees from the following countries are exempt from the English Language Proficiency Test requirement:

Australia	Nigeria
Belize	Puerto Rico
English Speaking West Indies	Singapore
Canada	South Africa
Guyana	United Kingdom
Ireland	U.S.A.
Kenya	Zambia
Lesotho	Zimbabwe
New Zealand	

* An updated list of additional countries exempt from the English Language Proficiency Test can be found at www.umanitoba.ca/graduate_studies/prospective/admissions/english.html

Thresholds required for successful completion are indicated in parentheses.*

University of Michigan English Language Examination Assessment Battery MELAB (80%)

Test of English as a Foreign Language TOEFL– Paper-based test (550); Computer-based test (213)

Canadian Test of English for Scholars and Teachers CanTEST (band 4.5 in listening and reading and band 4.0 in writing and oral interview)

International English Language Testing System IELTS (6.5)

Academic English Program for University and College Entrance AEPUCE (65%)

Note:
1. In addition, Foreign language students may be asked by the Department to complete the CanTEST prior to or following registration in the Faculty of Graduate Studies and, if need be, the Department may recommend remedial measures in language skills based on the results of the CanTEST.

*2. Some departments may require a specific test or test scores greater than those indicated above.

Letters Of Recommendation

Letters of Recommendation forms are available in the Faculty of Graduate Studies Office, 500 University Centre or on the Faculty of Graduate Studies website:
www.umanitoba.ca/faculties/graduate_studies/formlist/referee.pdf.
Two letters of recommendation must be sent to the department to which the student is applying in individual sealed envelopes with the referee's signature across the closing flap of the envelope. Applicants should check with the department to which they are applying as some departments require more than two Letters of Recommendation on a departmentally approved form.

Admission Tests

Some departments require admissions tests, such as the Graduate Record Examination (GRE) or the Graduate Management Aptitude Test (GMAT). These requirements are listed in the Supplementary Regulations of the particular department, and if required, the scores must be submitted at the time of application.

Entrance Requirements

The minimum standard for acceptance into any category in the Faculty of Graduate Studies is a 3.0 Grade Point Average (GPA) or equivalent in the last two previous years of full time study (60 credit hours).

Note: This is the minimum requirement of the Faculty of Graduate Studies and departments may have higher standards and additional criteria.

Eligibility Of University Of Manitoba Staff Members

A staff member at the University above the rank of Lecturer or Instructor II is not eligible to register for a higher degree in the department in which the appointment is held.

1.2 Registration Procedures

Undergraduate students are not allowed to register in graduate courses; that is, admission to the Faculty of Graduate Studies is a condition for registration in courses at the 600 level and above.

All graduate students must initially register in the term specified in their letter of acceptance as specified in the Academic Schedule of the Graduate Calendar. Any student not registering within one term of acceptance will be required to re-apply for admission. In exceptional circumstances and with prior approval from the Department, a student may defer registration for up to one term following acceptance into the Faculty of Graduate Studies. In the case of International students, admission may be deferred, with prior approval from the Department, for up to one year following acceptance.

The registration form must list all courses to be taken during the current year. **All programs must be approved by the head of the major department or designate.** Approval to take courses from departments outside the major department must be obtained from the outside department.

The approval or denial of admission and registration to two programs rests solely with the faculties/units concerned. The approval/denial must be submitted to the Faculty of Graduate Studies prior to the student's admission/registration.

Where a student does register in two programs the student must declare themselves as part-time in at least one of the programs. Students should note that completing a graduate program as a part-time student will affect their eligibility for the University of Manitoba Graduate Fellowship and may limit other funding possibilities.

Re-Registration

Any student whose program of study extends over more than one year must re-register for September of each succeeding year of his/her program until a degree is obtained (or in the case of Pre-Master's students their program is completed). **Failure to re-register will result in the termination of the student's graduate status.** A student whohas been discontinued and would like to be considered for continuation in a program that has been terminated must re-apply for admission**.** The re-registration requirement does not apply to, Occasional students, or students on an Exceptional or Parental Leave of Absence, (please refer to the "Leave of Absence" section of this Guide).

Note: Registration is not complete until fee payment or fee payment arrangements have been made with the Comptroller in writing prior to the fee payment deadline dates. The notation 'student discontinued program' will be placed on the academic record of any graduate student who has failed to maintain continuous registration.

Registration Revisions

For designated periods subsequent to registration, approved revisions and transfers may be made. It is required that students adhere to dates and deadlines as published in the Academic Schedule of the Graduate Academic Calendar.

Note: Graduate students are not allowed to withdraw from courses without written permission from their Department head on recommendation from their advisor/advisory committee approving the program change. The notation "student discontinued program" will be placed on the academic record of any graduate student who has withdrawn from courses without such approval.

Western Deans' Agreement

This agreement was established in 1974 as an expression of co-operation and mutual support among universities offering Graduate programs in western Canada. Its primary purpose is the reciprocal enrichment of graduate programs throughout western Canada. This agreement is not intended to preclude other agreements between participating institutions.

1. The Western Deans' Agreement provides an automatic tuition fee waiver for visiting students. Graduate students paying normal required tuition fees to their home institution will not pay tuition fees to the host institution.

2. Students may be required to pay student, activity, application, or other ancillary fees to the host institution, according to general policies in effect at the host institution. Wherever possible, these fees will also be waived.

3. Students will qualify for the fee waiver if they: present the "Authorization Form: Western Deans' Agreement" signed by the Dean or designate and the Department Head or Graduate Advisor of a participating Western

institution specifying the courses to be taken for credit toward a graduate degree program at their home institution;

are in good standing in a graduate program at the home institution;

have paid all current and back fees at the home institution.

4. Students must meet all requirements as prescribed by the host university's regulations, deadlines, class capacities, and course prerequisites.

5. Registration is possible in courses at both the graduate and undergraduate levels, and in credit courses offered through distance education or other means. To be eligible, courses must be an integral part of the applicants' graduate degree program. Fee waiver is not permitted for audit or non-credit courses.

6. Students must have the Authorization Form approved by the relevant Department Head and the Faculty of Graduate Studies at the host institution at least two weeks prior to the commencement of the course(s) requested. The fee waiver is not available retroactively.

7. Students are subject to regulations of the home institution governing credit for the courses to be undertaken. As a condition of registration at the host institution, students will arrange for official transcripts from the host institution to be sent to the home institution confirming successful completion of courses selected.

8. Students must send confirmation of registration and notice of any change to the graduate Records Office of the home institution at the time of registration or course change is completed.

9. Students may not claim fee waivers under the terms of this Agreement for a period of more than 12 months total.

10. Each institution has its own regulations regarding the maximum number of transfer credits permitted in a given degree program.

Participating Universities

University of Alberta
University of Brandon
University of British Columbia
University of Calgary
University of Lethbridge
University of Manitoba
University of Northern British Columbia
University of Regina
University of Saskatchewan
Simon Fraser University
University of Victoria

Revised January 30, 1999

1.3 Course Classifications

General Classifications

All courses for which a student registers must be approved by the Department Head or designate and classified in the space provided on the registration and course change forms as follows*:

M	Major course	Course is a major requirement of the program.
C	Ancillary	Course is a minor requirement of the program.
AX	Auxiliary course	Course is not a major requirement of the program but is required by the student's advisor.**'
AU	Audit course	Course is not taken for credit. No grade is recorded.
OS	Occasional	Course is not a requirement of the program.

* Students who register by UMREG must also have prior approval of the Department Head or designate. Students registering by UMREG should add only those courses that are a Major course (M) in their program. Courses with "AX", "AU", "C", or "OS" status must be added by the department. Courses with "AX" status must be added by the Faculty of Graduate Studies.

**Extra courses which are not actually part of the Master's or Ph.D. program but which are specified and required by the student's advisor, may be classified as AX (Auxiliary) and the grade will not be included in the GPA. The student's advisor and head of the unit must determine if there is a valid need for the registration in courses under the AX classification. A maximum of 12 credit hours under the AX course classification is permitted while registered in a given program.

Note: Changes in course classifications are regarded as course/program changes and may not be made without approval (refer to the "Registration Revision" section of this Guide.) or after the deadline dates for course changes as indicated in the Academic Schedule of the *Calendar*.

Continuing Courses (CO)

For those graduate level courses (600, 700, 800) which are being taken by students enrolled in the Faculty of Graduate Studies and which continue beyond the normal academic term, the instructor shall recommend that a mark classification of "CO" be used until such time as a final grade can be established. If the course is not completed by August 31, the student must re-register for the course(s).

Graduate Level Courses (600,700,800) which extend beyond normal academic term must be denoted as such in this *Calendar*.

In the absence of an assigned mark of "CO", the student may receive mark of "F" in that term.

Note:

1. A CO will normally not be permitted longer than twelve months.

2. In exceptional circumstances, where a CO grade is requested for a second twelve months, at the time the CO grade is submitted on the examination register the instructor and Department head must also submit the "Recommendation for Continuing Status of a Course" form stating the reason for the CO and the deadline by which the course must be completed.

Incomplete Courses

The student who is unable to complete the term work prescribed in a course may apply to the instructor prior to the end of lectures for consideration of a grade classification of "Incomplete". It is understood that the student is to write the final examination if one is scheduled for the course.

Taking into account the results of the final examination, the value of the term work completed, and the extent of the incomplete term work, the instructor shall calculate the temporary grade using a zero value for incomplete work.

Normally, the following maximum extensions are allowed:

For courses terminated in April, August 1st
For courses terminated in August, December 1st
For courses terminated in December, April 1st

If a final grade is not reported within one month of the extension deadline, the letter "I" will be dropped and the grade will remain as awarded. The student will no longer have an opportunity to improve the grade. In no case will the satisfaction of the incomplete requirements result in a lower grade being awarded.

1.4 Student Status/Categories of Students

Full-Time And Part-Time Students

A student is considered to be full-time if:

The student is planning to carry the normal academic load of the department during the registration period and;

The student status is approved by the department head prior to the student declaring him/herself as a full-time student on the registration form or on the Registration System and;

Graduate students who do not meet the criteria specified for full-time students are designated as part-time students.

Pre-Master's Or Qualifying Students

In specific cases where the academic background of the student is judged to be insufficient for the given program in a unit, the department may recommend that the student be admitted to a pre-Master's program of study. The pre-Master's program is designed to bring the student's standing to approximately the level of an Honours graduate in the major department, and to provide any necessary prerequisites for courses.

Occasional Students

A student wishing to take graduate courses with no intention of applying those toward an advanced degree at the University of Manitoba is classed as an occasional student. Occasional students must meet the same degree and grade point average entrance requirements as regular graduate stu-

dents and must write final examinations in the courses taken (unless audited), but will not receive credit toward a degree. In special circumstances, an occasional student may apply for permission to proceed to a degree program and also apply for transfer, for credit, of courses taken in the occasional category.

Note:

1 Transfer of courses from the "occasional category" to a degree program is not automatic: request for advance credit may be made within the first year of a degree program.

2. Fees paid by a student while registered as an occasional student are not transferable, at a later date, to a degree program.

3. Registration in the occasional student category can be for no more than one academic year without reapplication.

4. Graduate level course work must be taken while registered as an occasional student.

Joint Masters (With The University Of Winnipeg)

The University of Manitoba and the University of Winnipeg offer three joint Master's programs in History, Religion, and Public Administration. The University of Manitoba Faculty of Graduate Studies is responsible for the administration of the joint programs and students complete the regular University of Manitoba application and registration forms. Students taking Pre-Master's qualifying work for these programs register at the University where the courses are being taken.

Visiting Students

Visiting students are students who are registered at another institution who are taking one or more courses at the University of Manitoba on a Letter of Permission from their home university.

Provisional (Admission)

A new student is allowed provisional status in a program for up to one term from the time of registration. Registration for additional terms in that program will not be permitted until the provision is cleared. Provisional registration may be for such reasons as missing or incomplete documentation, lack of complete or appropriate academic background, etc.

SECTION 2: Academic Performance - General

Students are ultimately responsible for ensuring that they meet degree and program requirements. The advisor (co-advisor), advisory committee and the department must ensure that each student follows the guidelines and meets the program requirements. The Faculty of Graduate Studies performs a final check of program requirements for each student just prior to graduation. Students are cautioned, therefore, to check all regulations with respect to the degree requirements. Failure to meet all the requirements will result in failure to graduate.

Any student re-registering in the period between receiving unsatisfactory grades and a decision by the Faculty of Graduate Studies on a deficiency does so at his/her own risk.

Departments may make recommendations with regard to the regulations concerning minimum academic performance; however, enforcement of academic regulations rests with the Faculty of Graduate Studies. The following procedures apply to recommendations made by departments:

The department is responsible for informing the Faculty of Graduate Studies when a student's performance is unsatisfactory in research or course work and the department must describe any recommended remedial action(s).

The department must notify the student of the deficiency and of their recommendation.

If the student fails to satisfy any remedial action recommended, the student will be required to withdraw from the program.

Note:

When a graduate student is required to withdraw from a program of study, the notation on the academic record will be: "Required to withdraw: academic deficiency."

Voluntary withdrawal from a program is not permitted once the grades have been declared and indicate that the student has failed to achieve the required minimum.

Departmental recommendations will supersede student requests for voluntary withdrawal.

A student who has been required to withdraw from a graduate program at The University of Manitoba may be permitted to enrol in another graduate program only if the application for admission is approved by the Dean of Graduate Studies or designate.

Academic Performance

Student progress shall be reported annually to the Faculty of Graduate Studies on the "Annual Progress Report Form". Students who fail to maintain satisfactory performance may be required to withdraw on the recommendation by the Department head to the Dean of Graduate Studies.

Performance in Course Work

A minimum grade point average (GPA) of 3.0 with no grade below C+ must be maintained for continuance in the Faculty of Graduate Studies. Departments may specify, in their supplementary regulations, standards that are higher than those of the Faculty of Graduate Studies. Students who fail to maintain the specified grades will be required to withdraw unless a departmental remedial recommendation (as outlined below) is approved by the Dean of Graduate Studies.

A student may be permitted to remove deficiencies in grades by repeating the course or taking an equivalent substitute course only once for each course to a maximum of 6 credit hours of course-work. If a course is repeated or replaced, the highest grade obtained will be used in the determination of the grade point average.

Note:

In exceptional circumstances, the major department may appeal to the Faculty of Graduate Studies for approval of remedial recommendation(s) falling outside those prescribed above.

Students receiving a grade of C or less in more than 6 credit hours of coursework are required to withdraw.

In general, supplemental exams are not permitted to students in the Master's or Ph.D. program.

All actions taken administratively are to be reported, in summary form to the Faculty of Graduate Studies Executive Committee.

SECTION 3: General Regulations: Pre-Master's

Admission

Graduates of bachelor degree programs with a minimum grade point average (GPA) of 3.0 in the last two full years of university study will be considered for admission to a pre-Master's program. These are the minimum requirements of the Faculty of Graduate Studies. Departments may specify higher or additional criteria. **Admission to a pre-Master's program does not guarantee future admission to a Master's program.** Courses taken as part of the pre-Master's program may not be transferred to a Master's program at a later date.

Academic Performance

1. The department head or designate is responsible for assigning the courses and monitoring the progress of each student.

2. A minimum grade point average of 3.0 with no grade below C+ must be maintained for continuance in pre-Master's study. Students who fail to maintain this standing will be required to withdraw unless a departmental remedial recommendation (as below) is approved by the Dean of Graduate Studies.

3. Students deficient in 6 hours of credit or less may be permitted to write a supplemental examination (when offered) in courses in which a grade of C or less was obtained.

4. Students deficient in 6 hours of credit or less with a grade of C, D, or F in a course or courses may be permitted, if the overall average is C or better, to write one supplemental examination in each course (when offered), to repeat the courses, or to take equivalent substitute courses.

Note: In exceptional circumstances, when a student is deficient in more than 6 credit hours, the student may be permitted to repeat the pre-Master's year or to write supplemental examinations (when offered) or to substitute equivalent course work in order to make up the deficiencies.

A student may be permitted to repeat the pre-Master's year only once, and to remove deficiencies in grades by writing supplemental examination or repeating courses only once for each course to a maximum of 9 credit hours of course work.

If a course is repeated or a supplemental examination is written, the highest grade obtained in that course will be used in the determination of the GPA.

The GPA is cumulative in a pre-Master's program if more than one year is required to complete the course requirements.

All action taken administratively is to be reported in summary form to the Faculty of Graduate Studies Executive Committee.

SECTION 4: General Regulations: Master's

Diploma Programs:

The regulations for the Master's program shall also prevail for diploma programs. Students should also consult the department supplemental regulations regarding diploma programs.

Individual departments may have additional regulations that supplement these general regulations. All such supplementary procedures and regulations must be approved as specified by the By-Laws of the Faculty of Graduate Studies, be published and available to students, and kept on file in the Faculty of Graduate Studies Office.

Admission

Graduates of Honours (four-year undergraduate degree) or equivalent programs from recognized colleges and universities with a minimum GPA of 3.0 in the last two full years (60 credit hours) of study are eligible for direct admission to a program of study leading to the Master's degree. Students who have completed the pre-Master's program from the University of Manitoba or another university with a GPA of 3.0 are also eligible for admission.

Student's Advisor/Co-Advisor

Each Master's student should have an advisor upon entry into the program, and must have one assigned no later than one term following registration. The advisor is approved by the Department head, must be a member of the Faculty of Graduate Studies, be active in research, have expertise in a discipline related to the student's program, and hold a Master's degree or equivalent. Any exceptions or special circumstances must be recommended by the Head of the major department and approved by the Dean of the Faculty of Graduate Studies. It is the responsibility of the Department head to determine whether faculty members meet these criteria, and also to report on equivalency as necessary. In special circumstances, an advisor and co-advisor upon approval of the department head may advise a student. The advisor and co-advisor must be members of the Faculty of Graduate Studies. (Refer to 2.2.2.1 Membership in the document Governance of the Faculty of Graduate Studies,.)

The advisor will advise the student on a program of study, direct research, and supervise the thesis or practicum work. In departments where the choice of thesis/practicum topic and thesis/practicum advisor are postponed for some time after a student's entry into the program, the Department head shall appoint a faculty member to advise the student in the interim period before the regular advisor is assigned or chosen.

Program Requirements

All students (with the exception of those admitted to the L.L.M., M.B.A., M.P.A., M. Dent., or M. Eng. programs) must complete one of the following programs of study for the Master's degree:

Thesis/Practicum Route:

A minimum of 12 credit hours of course work plus a thesis or practicum. The minimum must include at least 6 credit hours at the 700 level with the balance

of the coursework at the 300 level or above, or,in exceptional circumstances and upon approval of the Dean of Graduate Studies, the 200 level. *A maximum of 24 credit hours of coursework is allowed toward the thesis/practicum based Master's program.

Comprehensive Examination Route:

A minimum of 24 credit hours of course work and comprehensive examination(s). The minimum must include at least 12 credit hours at the 700 level or above with the balance of the coursework at the 300 level or above, or,in exceptional circumstances and upon approval of the Dean of Graduate Studies, the 200 level. *A maximum of 48 credit hours of coursework is allowed toward the comprehensive examination based Master's program.

*Unless professional accreditation requirements or existing supplemental regulations indicate otherwise.

Notes:

The program of study is determined by the major department and may include requirements in addition to those specified above. All departmental supplemental regulations require prior approval of the Faculty of Graduate Studies.

For historical reasons, the following thesis/practicum based programs are subject to the same min/max credit hour restrictions as for the comprehensive-based Master's: Master of Nursing, Master of Architecture, Master of City Planning, Master of Landscape Architecture, Master of Natural Resource Management.

Language Reading Requirements

Some departments specify a language requirement for the Master's degree. Students are advised to check departmental supplemental regulations regarding this requirement.

Advance Credit

Advance credit for courses completed prior to admission to a Master's program will be considered on an individual basis. The student's major department makes the request to the Faculty of Graduate Studies by completion of the "Recommendation for Advance Credit (Transfer of Courses)" form.

Note:

Application for advance credit must be made within the first year of the program (see Lapse of Credit of Courses in this section).

No more than half of the required course work for the program can be given advance credit.

A course may not be used for credit toward more than one degree, diploma or certificate.

For thesis/practicum-oriented programs the student must complete the thesis/practicum at The University of Manitoba.

For the comprehensive examination route, the student must complete the comprehensive examination(s) at the University of Manitoba.

Regardless of the extent of advance credit received, all students are required to pay the program fee.

Transfer Credit

Courses within a program of study may be taken elsewhere and transferred for credit at The University of Manitoba. Courses must be approved for transfer to the program of study by the major department and the Faculty of Graduate Studies before the student may register for them. This permission is granted in the form of a Letter of Permission, which may be obtained by making application to the Student Records Office.

Transfer credit (courses taken at other universities while registered in a program at the University of Manitoba) is granted as follows: For Master's students, transfer credit must not exceed 50% of the minimum credit hours of coursework required for the program.

Note: Students seeking a Master's degree from The University of Manitoba must complete at least 50% of their required program coursework at The University of Manitoba.

Minimum Time Requirement

The minimum time for students engaged in full-time study in the Master's program is equivalent to one regular session. Most departments require more than this.

Maximum Time Limits

The maximum time allowed for the completion of the Master's degree except where indicated in specific units is as follows:

Note: Each department may have supplementary regulations for maximum time limits.

2 years: Master of Laws

6 years: Master of Business Administration, Master of Public Administration, Master of Education, Master of Nursing, Master of Social Work and Master of Engineering.

5 years: All other Master's degree and diplomas

Recommendations for extensions of time to complete the degree will be considered on an individual basis and must be approved by the Dean of Graduate Studies **at least four months** prior to expiration of the respective maximum time limit.

Note: A student who has not completed the degree requirements within the time limit or within the time limit of the extension (see also sections: "Extension of Time to Complete Program of Study" and "Leave of Absence") will be required to withdraw from the Faculty of Graduate Studies and the notation on the student record will be "Required to withdraw: time to complete program expired".

Lapse of Credit of Courses

Courses completed more than eight years prior to the date of awarding of a degree may not normally be used for credit toward that degree.

Academic Performance

Student progress shall be reported annually to the Faculty of Graduate Studies on the "Annual Progress Report Form". Students who fail to maintain satisfactory performance may be required to withdraw on the recommendation by the Department head, to the Dean of Graduate Studies.

Performance in course-work

A minimum grade point average of 3.0 with no grade below C+ must be maintained for continuance in the Master's program. Students who fail to maintain this standing will be required to withdraw unless the Dean of Graduate Studies approves a departmental remedial recommendation (refer to the section: Academic Performance – General).

Performance not related to Course Work

Students are required to demonstrate satisfactory academic performance in areas not related to performance in courses, such as attendance at or participation in course lectures, seminars and in laboratories and progress in research, thesis or practicum. **The specific nature of satisfactory academic performance is outlined in the departmental Supplementary Regulations and must be reported to the Faculty of Graduate Studies on the "Annual Progress Report Form".** Students who fail to maintain satisfactory performance may be required to withdraw on the recommendation of the department head to the Dean of Graduate Studies.

Course or Program Changes

Students are not permitted to change their program of study, including withdrawal from individual courses, without the approval of their advisor and/or advisory committee and Department head. Withdrawal from courses or changes of course category without such approval will result in the student being required to withdraw from the Faculty of Graduate Studies.

Deadlines For Graduation

The final requirements of the degree, in the form of the final report on the thesis/practicum (and the corrected copies of the thesis/practicum); comprehensive examination; or M. Eng. Project, must be submitted to the Faculty of Graduate Studies Office by the appropriate deadline. The deadline for each of the graduation dates is published in the Academic Schedule of the Graduate Calendar. Extensions to these deadlines will be considered in exceptional circumstances only.

Academic Requirement for Graduation

A cumulative grade point average of 3.0 or greater is required in those courses that constitute the program of study for graduation in the Faculty of Graduate Studies.

Comprehensive Examination

The regulations governing comprehensive examinations, where required, are specified in the supplementary regulations of the major department. No student may sit for those examinations more than twice. The results of the comprehensive examinations shall be submitted to the Faculty of Graduate Studies on the appropriate form in the terms 'approved' or 'not approved'

Note: Any student who receives "not approved" on the comprehensive examination twice will be required to withdraw from the Faculty of Graduate Studies.

4.1 Thesis and Practicum Regulations

General

Students must demonstrate their mastery of the field and that they are fully conversant with the relevant literature through their thesis.

Style and format:

The thesis/practicum must be written according to a standard style acknowledged by a particular field of study and recommended by the major department, be lucid and well-written, and be reasonably free from typographical and other errors.

Copies of the thesis/practicum must be submitted in good, clear type. As long as all copies are clearly legible, the thesis/practicum may be reproduced by a method that is presented in the "Thesis Guidelines Booklet" which is available in the Faculty of Graduate Studies and also available on the web: www.umanitoba.ca/graduate_studies. Minimum paper weight is 16 lb. Bond or equivalent; minimum left margin is 3.8 cm (1.5 inches), other margins are 2.5 cm (1 inch). Wherever possible, these margins should be adhered to for illustrative materials. **A thesis guideline booklet is available from the Faculty of Graduate Studies Office for additional information.**

Note: On approval of the Dean of Graduate Studies, part of a thesis may be submitted in electronic format, including CD-ROM. Specific details with regard to the format are given in the Supplementary Regulations of the department. Complete information regarding the software used to produce the electronic portion of the thesis must be included. (Details are provided in the thesis guideline booklet)

Deadlines for submissions of final copies:

The Academic Schedule in the Graduate Calendar should be consulted regarding dates by which theses/practica must be submitted. Following the approval of the thesis/practicum by the examining committee and the completion of any revisions required by that committee, two copies must be submitted to the Faculty of Graduate Studies Office in unbound form, enclosed in an envelope or folder. These copies are required for the University Library and remain the property of The University of Manitoba.

Note: Only one copy need be single-sided.

Practicum versus thesis:

While the practicum differs from the thesis in its emphasis on the application of theory, it is similar in scope, span, and rigor. The weight of work required for the practicum is equal to that required for the Master's thesis. In general, the practicum takes the form of an exercise in the practical application of knowledge and skill. It usually involves the careful definition of a problem, the application of appropriate knowledge and skills to the problem, and a report of the results in a manner suitable for evaluation by an examining committee. The requirements are specified by the departments concerned.

Thesis/Practicum Proposal

Each student is required to develop a thesis/practicum proposal in his or her chosen field of study. Normally, the thesis is developed under the mentorship of the advisor/co-advisor. The advisor/advisory committee/department head/grad chair must formally approve the thesis proposal. (Each department may have specific guidelines regarding the theses proposal). Research involving human or animal subjects requires ethical approval prior to initiation of research. Please refer to the appropriate ethics review committee.

4.2 Thesis/Practicum Examination Procedures

Examining Committee

The student's advisor will recommend a suggested thesis/practicum examining committee to the Department head for approval, which shall then be reported to the Faculty of Graduate Studies Office on the "Master's Thesis/practicum Title and Appointment of Examiners" form. The committee must consist of a minimum of three persons, one of whom must be from outside the major department. At least two examiners must be members of the Faculty of Graduate Studies. The third member must be an individual that the Advisor and Department Head deem qualified for the assignment, is external to the Department, and is willing to serve.

Note: The external member should be considered arm's length to the department. While the definition of "arm's length" is left to the discretion of the department, be advised that justification may be required by the Faculty of Graduate Studies for this selection.

Distribution and Examination

The head of the major department will arrange for the distribution of the thesis/practicum to the examiners and will notify the Faculty of Graduate Studies Office at the time that the thesis/practicum has been distributed for examination. It is the duty of all examiners to read the thesis/practicum and report on its merits according to the following categories:

Acceptable without modification or with minor revision(s)
Acceptable subject to modification and/or revision(s)
Not acceptable

Note:

1. The examining process should be completed within one month of distribution of the thesis/practicum.

2. A student has the right to an examination of the thesis/practicum if he/she believes it is ready for examination.

Oral Examination

Normally, students must pass an oral examination on the subject of the thesis/practicum and matters relating thereto. The form of the oral examination will be as prescribed by the Supplementary Regulations of the major department. The oral examination shall be open to all members of the University of Manitoba community except in exceptional cases. The oral examination may be closed, for example, when the results of the thesis/practicum research must be kept confidential for a period of time. In such cases, the examining committee and Department head shall recommend such action to the Dean of Graduate Studies who shall then approve that the final examination be closed to all but the examining committee and the Dean of Graduate Studies (or designate).

Final Approval/Rejection

Following completion of the examination of the thesis/practicum, examiners will consider the oral examination and the written thesis/practicum to determine the nature of and procedures for approval of any revisions that will be required prior to submission to the Faculty of Graduate Studies. The advisor is normally responsible for ensuring that revisions are completed according to the instructions from the examining committee. The Faculty of Graduate Studies will accept the thesis/practicum only when it is submitted with a signed statement from the advisor that the required revision has been completed.

Note: A student whose Master's thesis or practicum has been rejected twice will be required to withdraw.

Final Report

The judgement of the examiners shall be reported to the Faculty of Graduate Studies in the qualitative terms "approved" or "not approved". Such verdicts must be unanimous, and each examiner must indicate, by his/her signature, concurrence with the verdict. Anything less than unanimity shall be considered a failure. In the case of a failure for the thesis/practicum at the Master's level a detailed written report will be prepared by the Chair and made available to the candidate and also submitted to the Faculty of Graduate Studies.

The candidate will be recommended for the Master's degree upon the receipt by the Faculty of Graduate Studies of favorable results of the thesis or practicum committee and when the corrected copies of the thesis or practicum are submitted to the Faculty of Graduate Studies, assuming all other program requirements have been met.

Publication and Circulation of Thesis/Practicum

Every graduate student registering in a thesis/practicum Master's program at The University of Manitoba shall be advised that, as a condition of being awarded the degree, he/she will be required to grant a license of partial copyright to the University and to the National Library of Canada for any thesis or practicum submitted as part of their degree program.

Note: This license makes the thesis/practicum available for further research only. Publication for commercial purposes remains the sole right of the author.

The forms and conditions pertaining to these license agreements are available at the Faculty of Graduate Studies Office. Note that this and other related regulations may give rise to important questions of law, and students may need additional legal advice on the copyright laws of Canada and/or other countries. Students who wish to obtain legal advice concerning their subsequent rights are advised to do so prior to signing the agreements. Signing of the license agreements is normally done after the contents of the thesis/practicum have been delineated and the importance of copyright and/or patents fully comprehended.

Publication in the above manner does not preclude further publication of the thesis or practicum report or any part of it in a journal or in a book. In such cases, an acknowledgement that the work was originally part of a thesis or practicum at The University of Manitoba should be included.

Note:

Copyright – Copyright in theses and practica is protected in international copyright law. A copyright symbol © or (c) is incorporated on a page containing statements of permission to microfilm and to lend copies of the thesis or practicum. After completion, this page should be inserted in the thesis/practicum immediately following the title page. Blank copies of this page are available from the Faculty of Graduate Studies Office.

Patents –Refer to the section "Policy of Withholding Theses Pending Patent Applications" in this Guide.

Restriction of theses or practica for publication – In exceptional cases, not covered by the regulation concerning patents, where adequate cause can be shown to delay publication, the student may request the Dean of Graduate Studies to restrict access, for a period up to one year after submission, to any copies of a thesis or practicum submitted to The University of Manitoba. The Dean, in consultation with the student's advisor, shall determine for what period, if any, access will be so restricted.

National Library of Canada – A microfiche of the thesis is forwarded to the National Library of Canada and is listed in a monthly and annual national bibliography, 'Canadiana', which is published by the National Library.

SECTION 5: General Regulations: Ph.D.

FOR FACULTY-BASED PH.D PROGRAMS, THE DEAN OR DESIGNATE IS THE DE FACTO DEPARTMENT HEAD.

The degree of Doctor of Philosophy is granted only upon evidence of general proficiency and of distinctive attainment in a special field. In particular, a recognized ability for independent investigation must be demonstrated by the candidate in a thesis which embodies original research or creative scholarship and is presented with a high degree of literary skill. It is a research degree and is never conferred solely as a result of coursework study.

These general regulations apply to all students in all departments. Individual departments may have procedures and regulations that supplement these general regulations. All such procedures and regulations must be consistent with these general regulations, approved as specified by the By-Laws of the Faculty of Graduate Studies, published and available to students, and kept on file in the Faculty of Graduate Studies Office.

Admission

Normally, a Master's degree or equivalent from a recognized university and a cumulative GPA of 3.0 or equivalent in the last two previous years of full time study (60 credit hours) is the minimum requirement for admission to the Ph.D. program. With special recommendation of the department concerned (please see below), applicants with an honours Bachelor's degree may be considered for entry to Ph.D. study.

Direct Admission from the Bachelor's Honours or equivalent

Students to be considered for admission to a Ph.D. program directly from the honours Bachelor's degree or equivalent must be outstanding in their academic background (GPA well above 3.0 in the last two full years of undergraduate study). Once admitted, these students must complete at least 24 credit hours of course work and will be assessed Ph.D. fees for 3 years.

Transfer from the Master's to the Ph.D. program

Students who have not completed a Master's program may transfer to the Ph.D. program within the same department upon recommendation to the Faculty of Graduate Studies by the student's major department. The coursework completed in the Master's program would normally become a part of the Ph.D. program, and the number of years spent in the Master's program would be counted as years in the Ph.D. program. Students must complete at least 24 credit hours of coursework. If the transfer occurs within 12 months of the initial registration in the Master's program, the student will be assessed Ph.D. fees for 3 years. If the transfer occurs after 12 months,

the student will be assessed Ph.D. program fees for 2 years (as they will have already paid fees for the Master's program). Students are cautioned that such transfers may impact on the University of Manitoba Graduate Fellowship duration.

Note: Where a student **with a Master's degree or equivalent** is initially admitted and registered in a Master's program; that student may be transferred to the Ph.D. program within the same department on recommendation from the student's advisor and Department head, provided the recommendation is made at the time of admission to the Master's Program (i.e. "Possible transfer to Ph.D. Program within 12 months") and the follow up transfer recommendation occurs within 12 months of the initial registration in the Master's program. In such a case, fees assessed towards the Master's program will be deducted from the full 2 years of Ph.D. program fees.

Provisional Admission to the Ph.D.

Students nearing completion of the Master's degree may be accepted provisionally to the Ph.D. program for a 12 month period (commencing with the first registration in the Ph.D. program). Further registration in the Ph.D. program is contingent upon completion of all requirements of the Master's degree within the 12 months.

Note: Students must maintain continuous registration in their Master's program until completion. Students will require assistance from the Department or the Faculty of Graduate Studies to complete dual registration in the Master's and Ph.D. program simultaneously.

Selection Committee

Upon receipt of an application, the head of the major department will appoint a selection committee of at least three persons to evaluate the student's qualifications and report on his/her suitability for Ph.D. study. In making admission decisions, departments may also consider such things as the availability of facilities and financial assistance. If acceptance is recommended by the selection committee and approved by the head of the department and the Dean of Graduate Studies, the Faculty of Graduate Studies sends a letter of acceptance to the applicant.

Student's Advisor/Co-Advisor

Every Ph.D. student must have an advisor, appointed by the Department head, whose duties will be to advise the student on a program and courses, direct research, and supervise thesis work. The advisor must be a member of the Faculty of Graduate Studies, be active in research, have expertise in a discipline related to the student's program and hold a Ph.D. or equivalent. In special circumstances, an advisor and co-advisor, upon approval of the department head may advise a student. The co-advisor must be a member of the Faculty of Graduate Studies. It is the responsibility of the Department head to determine whether faculty members meet these criteria, and to report on equivalency as necessary.

The student's advisor also acts as a channel of communication to the student's advisory committee, the major department, and the Faculty of Graduate Studies. Usually the student and the advisor choose to work together by mutual agreement. In departments where the choice of thesis topic advisor are postponed for some time after entry into the program, the Department head or the selection committee shall appoint a faculty member to advise the student as to the rules and regulations and on a program and course requirements in the interim period not to exceed eighteen months before a permanent advisor is chosen.

Program Of Study

As soon as possible after a student has been accepted, the student's program of study, which includes information about the minimum time for completion of the degree, course work to be taken, foreign language requirement, and the research area in which the thesis will be done, should be forwarded to the Faculty of Graduate Studies. The program of study and any changes thereto must be approved by the student's advisor, and the advisory committee and the head of the major department. The approval of the student's advisor and the head of the major department are sufficient for registration.

Advisory Committee

The Head of the major department is responsible for the establishment of an advisory committee for each Ph.D. student. The advisory committee must consist of a minimum of three members of the Faculty of Graduate Studies, one of whom must have a major affiliation with a department other than the major department. Committees may include one guest member who has expertise in a related discipline but is not a member of the Faculty of Graduate Studies. The membership of the committee, including the advisor, as well as any changes to it, must be approved by the Dean of Graduate Studies. The advisor is the Chair of the advisory committee.

Responsibilities of the committee are to approve the program of study and thesis proposal and to exercise general supervision over the student's work throughout the Ph.D. program. The committee should meet with the student periodically (at least once a year) to review the student's progress and to report this progress to the Faculty of Graduate Studies (through the Head of the major department). If there is evidence of unsatisfactory performance, the student may be required to withdraw.

Program Requirements

Where admission to the Ph.D. is directly from a Master's Degree, a minimum of 12 credit hours at the 700 level or higher plus a thesis is required. For those students who hold a Master's degree, a maximum of 24 credit hours of course work is allowed toward the Ph.D. program.*

Where admission to the Ph.D. is directly from an Honours Bachelor Degree or equivalent, a minimum of 24 credit hours plus a thesis is required. The coursework must include a minimum of 18 credit hours at the 700 level or higher with the balance of the coursework at the 300 level or above, or in exceptional circumstances and upon approval of the Dean of Graduate Studies, the 200 level or above. For those students who do not hold a Masters degree, a maximum of 48 credit hours of course work is allowed toward the Ph.D. program. *

*Unless professional accreditation requirements and supplemental regulations indicate otherwise.

NOTE:

The program of study is determined by the major department and may include requirements in addition to those specified above. All departmental supplemental regulations require prior approval of the Faculty of Graduate Studies.

Language Reading Requirements

Some departments specify a language requirement for the Ph.D. degree. Students are advised to check departmental supplemental regulations regarding this requirement.

Advance Credit

Advance credit for courses completed prior to admission to a Ph.D. program will be considered on an individual basis. The student's major department makes the request to the Faculty of Graduate Studies by completion of the "Recommendation for Advance Credit (Transfer of Courses)" form.

Note:

1. Application for advance credit must be made within the first year of the program (see Lapse of Credit of Courses in this section).

2. No more than half of the required course work for the program can be given advance credit from exterior institutions.

3. A course may not be used for credit toward more than one degree, diploma or certificate.

4. The student must register at the University of Manitoba for one academic year as a full-time student and must also complete the thesis at The University of Manitoba.

5. Regardless of the extent of advanced credit received, all students are required to pay the program fee.

Transfer Credit

Courses within a program of study may be taken elsewhere and transferred for credit at The University of Manitoba, but all such courses must be approved for transfer to the program of study by the major department and the Faculty of Graduate Studies before the student may register for them. This permission is granted in the form of a Letter of Permission which may be obtained by making application to the Student Records Office.

Transfer credit (courses taken at other universities while registered in a program at the University of Manitoba) is to be granted as follows: For Ph.D. students transfer credit must not exceed 50% of the minimum credit hours of coursework required.

Note:

Students seeking a Ph.D. degree from The University of Manitoba must complete at least 50% of their required program coursework at The University of Manitoba.

Minimum Time Limit

The minimum time requirement for the program of study for the degree will normally be two years of study beyond the level of the Master's degree, or three years beyond the level of a Bachelor's degree. The student may be permitted to spend one of these years in an approved program of research or study elsewhere. Such permission must be approved by the Dean of Graduate Studies on the recommendation of the student's advisory committee.

Residence Requirement

Two academic terms at the University of Manitoba devoted to full-time postgraduate study, subsequent to admission into the Ph.D. Program, is required of all students.(One academic term is Fall, Winter or Spring/Summer.) The student shall be geographically available to visit the campus regularly during this residence period.

Note: Students may not retain the status of full-time while employed full-time without prior permission of the Dean of the Faculty of Graduate Studies and recommendation from the major department.

Maximum Time Limit

A student's candidature shall lapse if he/she fails to complete the degree within seven years following initial registration in the Ph.D. program. For those students who transfer from the Master's to the Ph.D., years spent in the Master's program are counted as years in the Ph.D. program. Recommendations for extensions of time to complete the degree will be considered on an individual basis and must be approved by the Dean of Graduate Studies.

Note: A student who has not completed the degree requirements within the time limit or within the time limit of the extension (see also sections "Extension of Time to Complete Program of Study" and "Leave of Absence") will be required to withdraw from the Faculty of Graduate Studies and the notation on the student record will be "Required to withdraw: Time to complete program expired".

Lapse Of Credit Of Courses

Courses completed more than eight years prior to the date of awarding of a degree may not normally be used for credit toward that degree.

Academic Performance

Student progress shall be reported annually to the Faculty of Graduate Studies on the "Annual Progress Report Form". Students who fail to maintain satisfactory performance may be required to withdraw on the recommendation by the Department head, upon receiving input from the advisory committee, to the Dean of Graduate Studies.

Performance in course-work

A minimum grade point average of 3.0 with no grade below C+ must be maintained for continuance in the Ph.D. program. Students who fail to maintain this standing will be required to withdraw unless the Dean of Graduate Studies approves a departmental remedial recommendation (refer to the section: Academic Performance – General).

Performance not related to course work

Students may also be required to withdraw from their Ph.D. program for reasons of unsatisfactory performance other than those related to failing grades. These include, but are not restricted to, such things as unsatisfactory attendance and lack of progress in research and/or thesis. The student's advisory committee will make a recommendation for required withdrawal to the Department head. The Department head will then recommend to the Dean of the Faculty of Graduate Studies that the student be required to withdraw for reasons of unsatisfactory academic performance.

Course Or Program Changes

Students are not permitted to change their program of study, including withdrawal from individual courses, without the approval of their advisor and/or advisory committee and Department head. Withdrawal from courses or changes of course category without such approval will result in the student being required to withdraw from the Faculty of Graduate Studies.

Deadlines For Graduation

The final requirements of the degree, in the form of the final report on the thesis (and the corrected copies of the thesis must be submitted to the Faculty of Graduate Studies Office by the appropriate deadline. The deadline for each of the graduation dates is published in the Academic Schedule of the Graduate Calendar. Extensions to these deadlines will be considered in exceptional circumstances only.

Academic Requirement For Graduation

A cumulative grade point average of 3.0 or greater is required in those courses that constitute the program of study for graduation in the Faculty of Graduate Studies.

Candidacy Examination

At the time specified by the advisory committee, normally within the first two years after the Master's degree but in no case later than one year prior to expected graduation, the student must take the formal candidacy examination. The format of the candidacy examination may vary with the department.

1. The examination is conducted according to a procedure established by the major department and approved by the Guidelines and Policy Committee of the Faculty of Graduate Studies.

2. The examination procedure must be made known to the students.

3. The Dean of Graduate Studies must be informed whether the candidate has passed or failed the candidacy examination (on the "Report on Ph.D. Candidacy Examination" form).

4. Students must be provided with feedback on their performance and access to the reasons for the pass/fail.

5. A pass decision of the examiners must be unanimous.

6. A department may choose to include a comprehensive examination as a component of the candidacy examination requirement, and if so, the nature of this component would be set and the examination administered according to the supplementary regulations of the unit concerned: The results of this examination would form part of the final grade (pass/fail) accorded the candidacy examination.

7. Any student who fails the candidacy examination twice will be required to withdraw from the Faculty of Graduate Studies.

8. On successful completion of this examination, the student will be considered a candidate for the Ph.D. degree.

5.1 Thesis Regulations: Ph.D.

General

An essential feature of Ph.D. study is the candidate's demonstration of competence to complete a research project and present the findings. **The thesis must constitute a distinct contribution to knowledge in the major field of study and the material must be of sufficient merit to be, in the judgement of the examiners, acceptable for publication.**

Style and format:

The Thesis must be written according to a standard style acknowledged by the particular field of study and recommended by the major department, be lucid and well-written, and be reasonably free from typographical and other errors.

Copies of the thesis must be submitted in good, clear type. As long as all copies are clearly legible, the thesis may be reproduced by any method acceptable to the Faculty of Graduate Studies. Minimum paper weight is 16 lb. Bond or equivalent; minimum left margin is 3.8 cm (1.5 inches), other margins are 2.5 cm (one inch). Wherever possible, these margins should be adhered to for illustrative materials. A thesis guideline booklet is available from the Graduate Studies for additional information.

Note: On approval of the Dean of Graduate Studies, part of a thesis may be submitted in electronic format, including CD-ROM. Specific details with regard to the format are given in the Supplementary Regulations of the department. Complete information regarding the software used to produce the electronic portion of the thesis must be included. (Details are provided in the thesis guideline booklet)

Deadlines for submission:

The Academic Schedule in the Graduate Calendar should be consulted regarding dates by which theses must be submitted to the Faculty of Graduate Studies to be eligible to graduate for a specific session.

Submission of final copies:

Following the approval of the thesis by the examining committee and the completion of any revisions required by that committee, two copies must be submitted to the Faculty of Graduate Studies Office in unbound form, enclosed in an envelope or folder. These copies are required for the University Library and remain the property of The University of Manitoba.

Note: Only one copy need be single-sided

Thesis Proposal

The proposed thesis research must be approved by the advisory committee and, if appropriate, by the Research Ethics Review Committee before the work has begun on the thesis research or project. The recommendation for the thesis research to proceed shall be reported to the Faculty of Graduate Studies on the "Master's/Ph.D. Annual Progress Report" form.

A thesis proposal must contain the research planned for the program and must be approved by the advisory committee. In order to approve the proposal the whole committee must meet as a committee. Approval must be documented and forwarded to the Faculty of Graduate Studies on the Annual Progress Report Form within 24 months of the student's initial registration in the program. Some departments may have specific procedures in place for approval of thesis proposals and students are advised to consult their departmental office.

Final Examination For The Ph.D. Degree

Once the thesis along with the "Ph.D. Thesis Title and Appointment of Examiners" form is submitted to the Faculty of Graduate Studies, the final examination for the Ph.D. degree proceeds in two stages:

1. Examination of the candidate's thesis.

2. Oral examination of the candidate on the subject of the thesis and any matters relating thereto. Prior to the examination of the thesis, the advisor shall furnish a written statement that, in his/her opinion, the thesis is (or is not) ready to be examined.

Note: A candidate has the right to an examination of the thesis if he/she believes it is ready for examination.

A thesis may not be formally submitted for examination more than twice.

5.2 Thesis Examination Procedures

Formation of the Examining Committee

University of Manitoba (Internal) Examiners:

The advisory committee chair, in consultation with committee members, will recommend to the head of the major department the names of at least three internal thesis examiners, to be forwarded to the Dean of Graduate Studies for approval. These names shall include the student's advisor and two other persons, one of whom shall be from a department other than the major department. All internal examiners must be members of the Faculty of Graduate Studies. In normal circumstances these internal examiners will be members of the student's advisory committee.

External examiner:

A distinguished scholar with particular experience in the field of the thesis research shall be chosen as the external examiner. The student's advisory committee shall make the selection, and the advisor should then make an informal inquiry as to the prospective external examiner's willingness to serve. If so, a nomination is then made by the head of the major department to the Dean of Graduate Studies. The external examiner must be from outside The University of Manitoba and the Dean of Graduate Studies makes the formal invitation to the external examiner.

Note: The external examiner should: hold a Ph.D.; hold an appointment with a recognized university or be a recognized scholar in their field; have no affiliation with the student or the advisor. The external must be considered at arm's length to the department and the University of Manitoba. While the definition of "arm's length" is left to the discretion of the department, be advised that justification may be required by the Faculty of Graduate Studies for this selectionthe Faculty of Graduate Studies for this selection may require justification.

Changes in the examining committee:

The Dean of Graduate Studies must also approve changes in the membership of the examining committee. No changes shall be made in the examining committee after the thesis is distributed by the Faculty of Graduate Studies to the committee for examination.

Note: Should the thesis not be submitted for examination within 12 months after the appointment of the examining committee, the committee appointment will lapse and a new appointment shall be necessary.

Distribution of the Thesis For Examination

Sufficient copies for distribution to each member of the examining committee must be submitted to the Faculty of Graduate Studies Office in unbound form, with each set enclosed in a separate envelope or folder. Each copy must be prefaced by an abstract of the thesis which includes the title, the author's name, and a brief summary of the results. It must be in a form acceptable to the student's advisor.

Note: It is the responsibility of the Faculty of Graduate Studies to distribute the thesis to all of the examiners.

Responsibilities of the Examiners

Internal Examiners:

Each internal examiner (except the candidate's advisor), within one month of the receipt of the thesis, shall submit to the Dean of Graduate Studies a written report (with a copy to the head of the major department) giving an evaluation of the thesis, noting its merits, deficiencies (if any) and, if appropriate, revisions. The report shall contain a statement as to whether or not the student may now proceed to the oral examination. The thesis shall be placed into one of the following categories:

1. The thesis, as a written document, is basically acceptable as it stands, or with minor revisions. (The student may proceed to the oral defense).

2. The thesis, though basically meeting the requirements for a Ph.D. thesis, may require revisions that are more than minor, but the candidate may proceed to the oral examination. (This category should be used in those unusual circumstances where the examiner has reservations that can be dispelled in an oral examination).

3. The thesis needs major revisions before it could be considered acceptable and/or proceeds to an oral examination.

4. The thesis is unacceptable.

Note:

1. The placing of the thesis into category (1) or (2) above does not mean that the thesis has received final approval.

2. The placing of the thesis into either category (3) or (4) constitutes a failure.

External Examiners:

The Dean of the Faculty of Graduate Studies will request the external examiner to give a detailed report on the merits and deficiencies of the thesis as well as an overall evaluation. The external examiner shall be asked to report on his/her findings in the same categories as those used by the internal examiners. The advisor and the student must submit a declaration to the Faculty of Graduate Studies that neither party has performed collaborative research work with the external examiner within the last five years.

The external examiner is requested to present the report to the Dean of Graduate Studies within one month of the receipt of the thesis. Adequate time must be allowed for the transmission of the thesis and the receipt of the report.

The attendance of the external examiner at the candidate's oral examination is encouraged, but is not required. A request for financial assistance (up to a max of $250) may be submitted to the Dean of Graduate Studies prior to the arrangement of the oral defense date.

Note: If the external examiner is not going to be present at the examination, the Dean of the Faculty of Graduate Studies will request him/her to submit questions and the expected answers to the questions to be posed to the candidate at the time of the examination. Normally, the Chair of the Examining Committee will pose the questions to the candidate and the candidate will not receive the questions prior to the examination.

An honorarium is paid to the external examiner for his/her services.

Approval For Advancement to the Oral Examination

The Faculty of Graduate Studies must receive all examiners' reports (internal and external) at least two weeks prior to the intended date of the oral examination.

Guidelines For Advancement to the Oral Examination

When considering the candidate's advancement to the final oral examination, the committee of internal examiners may wish to use the following guidelines:

1. If all the reports place the thesis in category (1) or (2), advancement to the oral examination should be automatic.the Dean of Graduate Studies shall send copies of all category (1) or (2) reports to each of the internal thesis examiners and also to the student

2. If one or more of the reports place the thesis in category (3), the Dean of Graduate Studies shall send copies of all the reports to each of the internal thesis examiners and the Department Head. Two copies of all the reports are sent to the Advisor who shall provide one copy to the student. The(3), the committee of internal examiners should strive to provide the advisor and the candidate with specific advice about the nature and scope of the revisions required and any other pertinent matters (such as the time that should elapse before the thesis will be accepted for reconsideration).

3. In the unlikely event that the internal examiners judge an unfavorable report by an external examiner to be unwarranted, they may recommend, through the head of the major department, that the Dean of Graduate Studies submit the thesis to a second external examiner.

Requirements Prior to Oral Examination

Scheduling

The examination will normally be held at either the University of Manitoba Fort Garry or Bannatyne Campus. Exceptions must have the unanimous agreement of all committee members. Normally, the oral examination shall be open to all members of The University of Manitoba community and shall be held at The University of Manitoba. In exceptional cases the final oral examination may be closed, for example when the results of the thesis research must be kept confidential for a period of time. In such cases, the advisory committee and Department head shall recommend such action to the Dean of Graduate Studies who may then approve that the final oral examination be closed to all but the examining committee and the Dean of Graduate Studies (or designate).

Student Information

At least two weeks prior to the oral examination, the student must submit to the Faculty of Graduate Studies the following information:

Biographical Data – where and when born, outstanding points in career, awards, etc.

List of degrees obtained – where and when

The exact title of the thesis

An abstract of the thesis (not more than 350 words)

List of the student's publications

Note: The above documentation should be submitted in electronic form.

Notice of Examination

Except in the case of a closed examination and provided the information is received in sufficient time to meet publication deadlines, a notice of the student's oral examination will be published in The University of Manitoba Bulletin. In addition, memoranda will be distributed by the Faculty of Graduate Studies Office to all members of the department concerned. Note that students and faculty members who are not members of the examining committee are invited and encouraged to attend oral examinations but are not permitted to participate in the formal questioning.

Oral Examination

A student must pass an oral examination on the subject of the thesis and matters relating thereto before he/she may obtain the Ph.D. degree. An oral examination committee consisting of not fewer than four persons shall conduct the examination. One of these shall be the Dean of Graduate Studies or his/her representative (chosen from among senior scholars at this University) who shall be Chair. The other members shall normally be the thesis examiners.

Format of the Examination

The first part of the oral examination shall consist of an oral presentation by the candidate to include a summary of the salient points of the research within a time span of 25 to 30 minutes. This is followed by the questioning and examination of the candidate by the examination committee, that is normally about one and one-half hours but in no case longer than two hours.

The Chair may exercise discretion in inviting questions from guests.

Procedures For The Conduct Of The Examination

Before the candidate and guests are admitted to the examination room, the Chair should discuss the examination procedures with the examiners.

The Chair will introduce the candidate and request him/her to give a concise (25 to 30 minutes) oral presentation of the thesis to include a summary of the problems studied, the results and the conclusions.

Following the presentation, the Chair will invite questions from each member of the examining committee, taking care to ensure that each examiner has approximately equal time for questions. Normally, the question period should not exceed one and one-half hours.

It is the responsibility of the Chair to pose questions raised by the external examiner (if not in attendance).

The Chair may exercise his/her discretion in allowing questions from guests following completion of the formal examination.

Decision of the committee:

Following completion of the formal examination, the candidate and spectators are required to withdraw from the examination room. The examiners will consider their report and will also determine the nature of and procedures for approval of any revisions that will be required prior to submission of the thesis. The committee may exercise its discretion on such matters as who must approve the required revisions, time limits for completion, the necessity for a second oral examination, and any other such matters. It shall be the responsibility of a designated member of the oral examination committee (normally the advisor) to ensure that all such revisions are completed before the copies of the unbound thesis are submitted to the Faculty of Graduate Studies Office for binding. The candidate will be recommended for the Ph.D. degree when the thesis, accompanied by a signed statement from the advisor that the required revisions are completed, is submitted to the Faculty of Graduate Studies, providing all other degree requirements have been satisfied.

Report of the committee:

The final judgement of the examiners on the thesis and the oral examination shall be reported to the Dean of Graduate Studies in the terms 'approved' or 'not approved'. An approved verdict must be unanimous, and each examiner must indicate, by his/her signature, concurrence with the verdict. In the case of a failure for the thesis at the Ph.D. level a detailed written report will be prepared by the Chair and made available to the candidate and also submitted to the Faculty of Graduate Studies.

Note: A student who receives a failure on either the thesis or the oral examination twice shall be required to withdraw from the Faculty of Graduate Studies.

Submission Of The Thesis

Following approval of the thesis by the thesis examining committee and the completion of any revisions required by that committee, two copies of the thesis must be submitted to the Faculty of Graduate Studies Office in unbound form, enclosed in a separate envelope or folder. These copies are required for the University Library and remain the property of The University of Manitoba.

Note:

Only one copy need be single-sided

The Academic Schedule of the Graduate Calendar should be consulted regarding dates by which theses must be submitted.

Policies and procedures for the inclusion of published papers within the doctoral theses are governed by the supplementary regulations of individual departments. The following are the general policies and procedures of the Faculty of Graduate Studies:

The candidate's specific contribution to each paper (in case of multiple-authored papers) must be clearly indicated.

An abstract, full introduction, and conclusions must be included;

Where more than one manuscript is included, connecting text and common abstracts, introduction, and conclusions must be included.

There must be adherence to all other requirements as outlined in Thesis Guidelines.

Publication And Circulation Of Theses

Every graduate student registering in a Ph.D. program at the University of Manitoba shall be advised that as a condition of being awarded the degree, he/she will be required:

1. To grant a license of partial copyright to the University and to the National Library of Canada for any thesis submitted as part of the degree program.

Note: This license makes the thesis available for further research only. Publication for commercial purposes remains the sole right of the author.

2. To provide a copy of the abstract for Dissertation Abstracts International and to authorize publication of the abstract in that publication. The forms and conditions pertaining to these license agreements are available at the Faculty of Graduate Studies Office. This and other related regulations may give rise to important questions of law and students may need additional legal advice on the copyright laws of Canada and/or other countries. Students who wish to obtain legal advice concerning their subsequent rights are advised to do so prior to signing the agreement. Signing the license agreements is normally done after the contents of the thesis have been delineated and the importance of copyright and/or patents fully comprehended. Publication in the above manner does not preclude further publication of the thesis or any part of it in a journal or in a book. In this case, acknowledgement should be made that the work was originally part of a thesis at The University of Manitoba.

Note:

Copyright - Copyright in theses and practica is protected in international copyright law. A copyright symbol © or (c) is incorporated on a page containing statements of permission to microfilm and to lend copies of the thesis or practicum. After completion, this page should be inserted in the thesis/practicum immediately following the title page. Blank copies of this page are available from the Faculty of Graduate Studies Office.

Patents – Refer to the section "Policy of Withholding Theses Pending Patent Applications" in this Guide.

Restriction of theses or practica for publication - In exceptional cases not covered by the regulation concerning patents, where adequate cause can be shown to delay publication, the student may request the Dean of Graduate Studies to restrict access, for a period up to one year after submission, to any copies of a thesis or practicum submitted to The University of Manitoba. The Dean, in consultation with the student's advisor, shall determine for what period, if any, access will be so restricted.

National Library of Canada – A microfiche of the thesis is forwarded to the National Library of Canada and is listed in a monthly and annual national bibliography, 'Canadiana', which is published by the National Library.

SECTION 6: Policy Of Withholding Theses Pending Patent Applications

In 1970 the Board of Governors and Senate approved a policy on accepting research grants from outside agencies. This policy defined the right of agencies to defer release of information and thus ensure freedom of publications for research findings of University personnel. Occasionally, the University may also wish to restrict the release of a thesis pending patent application. This policy statement parallels the previous one in that it defines the right of the University to defer the release of a thesis and thus ensures freedom of publication for the research findings of a graduate student.

This situation may arise in two circumstances which are defined below and both of which are governed by the same set of regulations.

When a research project is known to contain patentable items as defined in the research contract, then it is the responsibility of the advisor to give written information of the restrictions on publication to the student prior to the start of the thesis research. If the student agrees to carry out the research, then the regulations given below will apply.

Where a patentable item is found during the course of research, then the advisor and the student may make application for patent rights through the University Patent Committee, and the following regulations will apply concerning the release of the thesis.

Regulations Concerning Release Of A Thesis During Application And Negotiation For Patents

The Dean of Graduate Studies will receive the approved thesis and copies of it as required by the Faculty regulations. On written joint request of the advisor and the student, the Dean will keep the thesis and copies of it in his/her office for a period up to one year.

For further information, reference should be made to the thesis copyright license.

SECTION 7: Extension Of Time To Complete Program Of Study

All requests for extensions will normally be dealt with administratively and reported, in summary form, to the Executive Committee of Graduate Studies for information. Normally only one extension will be permitted for a period of up to, but not exceeding, two years. Students granted extensions may be asked to enroll full-time during the period of the extension and may also be required to meet contingencies or carry out remedial work to be associated with the extension. The student must complete the 'request for extension form' and submit it to his/her major department for recommendation to the Faculty of Graduate Studies at least four months prior to the deadline date for completion of program requirements.

SECTION 8: Leave Of Absence

Regular Leave

A Regular Leave is intended to allow students to meet family, travel or employment responsibilities or plans and circumstances not covered by the Parental or Medical/Compassionate leaves. At the request of a graduate student, the Head of the student's department may recommend to the Dean of Graduate Studies that a student be granted a leave of absence for a period of time not to exceed one year. While on leave of absence, a student would not be expected to maintain study and/or thesis research work. Students on Regular Leave of Absences will be required to maintain continuous registration and pay the appropriate Re-Registration Fee. If a student has Program Fees (as opposed to Re-Registration Fees) owing at the time of the granting of the Leave, the Program Fees will be deferred until the student returns from leave, however, the Re-Registration Fee will be levied.* A Regular Leave of Absence status does not extend the time limits as outlined in the Faculty regulations.

***Program Fees:** The Re-Registration Fee in effect at the time of the granting of the leave will be levied. However, if the student returns from leave in January, the normal Program Fee will be levied less the Re-Registration Fee already paid.

Exceptional Leave

In exceptional circumstances for medical or compassionate reasons (e.g. the need to care for an ailing relative), at the request of the graduate student, the Head of the student's department may recommend to the Dean of Graduate Studies that a student be granted an exceptional leave of absence for a period of time not to exceed one year. While on leave of absence for exceptional reasons, a student would not be expected to maintain study and/or thesis research work, would not be required to maintain continuous registration, nor pay the Re-Registration fee. In addition, the leave period would not be included in the time period allowed for the completion of the degree. This leave is not intended to cover circumstances related to travel, employment or other financial concerns.

Fees: Any unpaid Program Fees will be deferred for a year for an exceptional leave of 8-12 months which begins in September. Half Program Fees will be charged for all other exceptional leaves (i.e., 8-12 month leaves beginning in January or shorter leaves beginning in either September or January). No Re-Registration Fees will be assessed during the leave period, but will be payable in full if the student returns from leave before the end of the regular term.

Parental Leave

A graduate student who is bearing a child or who has primary responsibility of the care of an infant or young child immediately following a birth or adoption of a child is eligible for parental leave. The request should be made through the student's department, normally for a leave of four to twelve months. Leaves of other duration will be considered on an individual basis. Where possible, students doing course work should coordinate their requests with the beginning of an academic term. While on leave of absence for parental reasons, a student would not be expected to maintain study and/or thesis research work. The leave period is not included in the time period allowed for completion of the degree.

Fees: Program Fees will be deferred for a year for a parental leave of 8-12 months which begins in September. Half Program Fees will be charged for all other Parental leaves (i.e., 8-12 months leaves beginning in January or shorter leaves beginning in either September or January). No Re-Registration Fees will be assessed during the leave period, but will be payable in full if the student returns from leave before the end of the regular term.

Note: At the time of approval of an application for leave, the procedures for the return of the student to the department at the completion of the leave must be stipulated.

Awards And Leave Of Absence

Students granted exceptional or parental leave would retain the full value of a University of Manitoba Graduate Fellowship or other award whose terms and conditions are established by the Faculty of Graduate Studies. Such an award will be suspended at the onset of the leave and reinstated at the termination of the leave period (4 to 12 months) provided that the student returns to full time study at that time.

Note: Other awards will be paid according to the conditions established by the donor or granting agency.

Graduate Student Vacation Entitlement

Students are entitled to three weeks vacation throughout a 12-month period.

SECTION 9: Appeals – Procedures And Guidelines

General

Students who disagree with a decision have access to the appeal routes as laid out by the various Faculty of Graduate Studies and University of Manitoba appeal processes.

There are several avenues of appeal which are open to graduate students: academic; discipline; admission and administration, (e.g. Fee appeals). Please refer to the "Student Appeals" section of the Faculty of Graduate Studies Academic Guide, the University of Manitoba Policy and Procedure Manual, policy 1202 "Student Discipline By-Law", policy 1301 "Academic Appeals Procedures and Guidelines" and policy 1302 "Admission Appeals Procedures and Guidelines".

The Executive Committee of the Faculty of Graduate Studies, through its Appeal Panel, by delegation from the Faculty Council, is empowered to deal with student appeals from departmental recommendations or Faculty of Graduate Studies actions, provided the departmental appeal process has dealt with the matter. These student appeals should be directed to the Dean of Graduate Studies. A decision of the Appeal Panel is appealable only to the Senate Committee on Appeals.

It should be noted that under section 1.1.1.1. of the **Student Discipline By-Law** (policy 1202 of the University of Manitoba Policy and Procedure Manual) it states that "Matters involving academic dishonesty of a graduate student shall be referred directly to the Dean of the Faculty of Graduate Studies who shall, in turn, inform the budget dean/director prior to any disciplinary action."

Academic Appeals

In terms of qualifying examinations, candidacy examinations, thesis examinations, and any other academic matters, departments make recommendations for action to the Faculty of Graduate Studies. In the first instance, any appeal of a department's recommended action should be handled through the departmental appeal process, which is outlined in the department's Supplementary Regulations. Appeals stemming from departmental actions on academic matters (e.g., failure in a course) will be heard by the Faculty of Graduate Studies Appeal Panel only after they have been dealt with by the appropriate departmental-level appeal process. The Appeal Panel will handle an appeal of Faculty of Graduate Studies actions.

These student appeals should be directed to the Dean of the Faculty of Graduate Studies within the appropriate timelines. A decision of the Appeal Panel is appealable only to the Senate Committee on Appeals (policy 1300 of the U. of M. Policy and Procedure Manual).

Consideration of an Academic Appeal

The hearing panel shall consider an appeal:

Only if grounds for the appeal stem from an examining committee or departmental action and only after an appeal has been heard by the body responsible for appeals in the department concerned (unless the action being appealed is one taken by the Faculty of Graduate Studies). This is understood to include decisions taken by individuals or committees acting in the name of a department of the Faculty of Graduate Studies and also to the supplementary regulations pertinent to a department's operation which have been approved by the Faculty of Graduate Studies;

If there is some evidence that a department or faculty regulation has been unfairly or improperly applied;

There is apparent conflict between Faculty of Graduate Studies' policy and a department regulation; and/or

Other circumstances that warrant special consideration.

Note: It shall be the responsibility of the appellant to indicate clearly and specifically the grounds warranting consideration of the appeal.

When a hearing panel determines that there are insufficient grounds to proceed with an appeal hearing it shall report its reasons to the Dean of Graduate Studies.

Academic Appeal Deadlines

General: An appeal of action taken by any department or administrative unit, committee, administrator or faculty member within the Faculty of Graduate Studies must be sent by the student to the Dean of Graduate Studies within 21 days of the date when the student was informed in writing of the action to be appealed.

Appeal Of Term Work: Students are encouraged to discuss matters relating to grading of term work with their instructor in the first instance. Further appeals of grades on academic term work shall be directed, by the appellant, to the department responsible for the course within 10 working days after the grades for term work have been communicated to students. Following receipt of the appropriate appeal form and evidence of payment of the refundable appeal fee, the department shall consider the appeal and provide a decision within 15 working days.

Appeals To Senate: As per the processes outlined under policy 1300 of the U. of M. Policy and Procedure Manual, "Appeals to the Senate Committee on Appeals shall be filed with the Secretary of Senate within twenty (20) working days after the mailing of the notice of decision from which the appeal is made."

Discipline Appeals

When the appeal is against a disciplinary decision made by the Faculty of Graduate Studies, the appeal routes and procedures as outlined in the Student Discipline by-law (policy 1202 of the U. of M. Policy and Procedure Manual) shall prevail.

If the appeal is from a decision of the Dean of the Faculty of Graduate Studies the appeal statement shall be delivered to the Dean of the Faculty of Graduate Studies on behalf of the Local Discipline Committee (L.D.C.)

If the appeal is from a decision of the L.D.C., the official statement shall be delivered to the Secretary of the University Discipline Committee (U.D.C.) with a copy to the Dean of the Faculty of Graduate Studies.

Discipline Appeal Deadlines:

The timeline for discipline appeals adheres to the procedures outlined in Policy 1202, section 2.3.1 of the U. of M. Policy and Procedure Manual. If a student wishes to appeal a decision to any group or body, the notice of appeal must be delivered in writing to the appropriate person(s) **within five working days** of the student being notified of the decision from which the student intends to appeal.

Appeal Of Violation/Penalty:

As per section 2.3.2 of the Student Discipline by-law (Policy 1202 of the U. of M. Policy and Procedure Manual), "All notices of appeal shall clearly indicate whether the appeal is from the finding of violation of University regulations on the one hand, or from the penalty on the other, or from both".

Limitations On Appeal Rights

Students who disagree with a decision have access to the appeal routes as laid out by the various Faculty of Graduate Studies and University of Manitoba appeal procedures. Student appeals may be limited by the scope of the inquiry available at each level and category of appeal, as well as the time limitations for submission of appeals.

A further limitation is that the Faculty of Graduate Studies rules and regulations, established to uphold the academic rigour of the University of Manitoba, are generally not subject to appeal unless an appeal route is otherwise stipulated. In situations where no appeal route is available, a student may make a written request to the Dean.

Procedures

Academic:

All appeals shall be submitted in written form to the Dean of Graduate Studies. The Dean may, on consideration, attempt first to reach an informal solution. If that is judged by the Dean to be inappropriate or unfeasible, a hearing panel will be formed. Hearings shall be held in closed session unless at least one party requests an open hearing and all parties to the appeal agree to the request.

The Dean shall inform the appropriate Department head of the nature of the appeal, forward a copy of the student's written submission, and request a written response to the appeal within **ten working days**. A hearing panel will be struck and a meeting set by the Dean of Graduate Studies as soon as possible after receipt of the written response from the department.

The appellant shall receive, through the Dean of Graduate Studies, the response of the department at least one week prior to the date set for the hearing of the appeal. Notices of the hearing shall be sent by the Dean of Graduate Studies to the individuals affected, giving the specific time and place for a hearing.

All documentation that the hearing panel will consider shall be made available through the Dean of Graduate Studies Office to both the student and the Department Head in advance of the meeting. No additional materials may be presented at the time of the hearing. In the case where a request is made to submit additional materials, the Chair shall postpone the hearing and allow no more than **ten working days** for the other party to respond to the new materials.

Each petitioner and appropriate Department head (or delegate) shall have the right to appear before the hearing panel and to call witnesses that he/she wishes to appear before the panel. It is the responsibility of the party calling witnesses to ensure that the witnesses are informed of the date and time of the hearing. The Dean of Graduate Studies shall be notified not less than four days prior to the hearing of the names of all witnesses that are to be called.

The student shall be advised by the Dean of Graduate Studies of the right to appear in person or to be represented by the Student Advocate or a fellow student or other full-time member of the University community not receiving payment for appearing, or working for legal aid. In addition, if the student wishes, one member of his/her immediate family, and a lawyer, may be present, but only as observers who do not participate. At least four days prior to the hearing, the Dean of Graduate Studies must be notified of any persons to be accompanying the appellant.

Both appellant (and/or representative) and Department head (and/or representative) are entitled to cross-examination of any and all witnesses.

All members of a hearing panel shall participate in all of the deliberations essential for the determination of the matter in dispute. If, in the course of hearing an appeal, a member is not present at the commencement of the hearing or a member cannot continue, the panel may elect to proceed in the absence of that member. If more than one member is not present at the commencement or cannot continue, the hearing panel must adjourn.

As a first item of business in dealing with any appeal, the hearing panel shall consider (in closed session):

Whether there are sufficient grounds to proceed with the appeal hearing; and, Any request it has received as to holding an open session and determine what, if any parts of the hearing shall be open.

Normally the appellant and the Department head and/or their representatives will be present during the presentation of the other's case. During the hearing, the appellant or the Department head may request a change in the open or closed nature of the hearing, at which time the hearing panel shall determine its procedures.

The hearing panel may request the appellant or any other parties to appear or provide additional information in a particular case before reaching a decision.

All parts of the meeting required to deliberate or determine resolution of the appeal shall be held in camera.

The Dean of Graduate Studies shall inform, in writing, the appellant and the Department head concerned of the disposition of the appeal, the reasons for the decision, and of whatever action may result. The further right of appeal to the Senate committee on appeals should be indicated, along with any appropriate time limits.

Disqualification:

Any member of the Appeal Panel shall be disqualified from hearing an appeal who: Is a faculty member or a student in the Department (School or Faculty) in which the appellant is registered; or Was, as an individual, or as a member of a committee or board, responsible for making the decision being appealed.

Other Appeals

Discipline:

Please refer to the Student Discipline By-law (policy 1202 of the U. of M. Policy and Procedure Manual).

Admission Appeals:

Please refer to policy 1302 of the U. of M. Policy and Procedure Manual, "Admission Appeals Procedures and Guidelines".

Fee Appeals:

Please refer to the Student Records Protocol on Fee Appeals, September 23, 1999. To initiate the Fee Appeal procedure, the student completes a Fee Appeals form, available in the Student Records Office, 4th Floor of University Centre.

Assistance With Appeals

The office of Student Advocacy provides information and assistance to students about all appeal processes.

University of Manitoba
Libraries

General Office

Libraries Administration, 156 Elizabeth Dafoe Library

Telephone: (204) 474 9881
Fax: (204) 474 7583
Taped recording of hours for all Libraries: 474 9770
Website: www.umanitoba.ca/libraries/
Director: Carolynne Presser
E-mail: carolynne_presser@umanitoba.ca

Chapter Contents

SECTION 1: Introduction

The Libraries, as an essential partner in the mission of the University of Manitoba, provides access to knowledge in support of the university's teaching, research, and community service programs. Its vision is to be recognized as an essential resource of information within the University and the Province of Manitoba, providing a learning environment which fosters scholarship, creativity, and skill-based learning.

The Libraries' collections have been intertwined with the history of the university since its beginning. The first gift of 4,958 books to the University of Manitoba came in 1883 from Alexander Kennedy Isbister. Over one hundred years later, the Libraries' system continues to maintain and preserve noteworthy collections. It offers students, faculty, staff, and Manitobans access to more than two million books and bound periodicals, a rapidly expanding system of networked databases and full text electronic resources, and a variety of other materials such as audiotapes, videotapes, phonorecords, slides, product catalogues, sheet maps, and microforms.

The University of Manitoba Libraries consists of eight unit libraries and nine satellite information centres located on the Fort Garry and Bannatyne Campuses and at the Concordia, Grace General, Seven Oaks General, St. Boniface General and Victoria General Hospitals. The Libraries' administration and Libraries' Electronic Technologies and Services offices are located in the Elizabeth Dafoe Library of the Fort Garry Campus. The Acquisitions and Bibliographic Control departments, which acquire and process materials for most of the libraries, are located in the Elizabeth Dafoe Library, as are the Libraries' Collections Management and Archives & Special Collections departments.

Academic Librarians

Director of Libraries
Presser, C., (A.B. (Hunter College), M.L.S. (Pratt).

Associate Director, Collections
Breyfogle, D.H., B.A.(Hons.) (Winnipeg), M.L.S. (Toronto), M.A. (Manitoba).

Associate Director, Information Services and Systems
Miller, S.R., B.Sc.(Hons.) (UBC), M.Sc. (London).

Information Literacy Coordinator
Braaksma, E., B.A.(Hons) (Brock), M.L.S. (Toronto).

Libraries Electronic Technologies and Services (LETS), BISON Coordinator
Nicholls, P., B.A.(Hons.) (Waterloo), M.A., M.L.S. (Western)

Libraries Systems Librarian, LETS
Fawcett, P.J., B.A., B.L.S. (Alberta).

Collections Management, Coordinator
Horner, J.C., B.A.(Hons.), M.A. (Manitoba), M.L.S. (Toronto).

Preservation Librarian
Lewis, G., B.A., M.A. (Manitoba), M.S.L.S. (Syracuse).

Collections Librarian
Richl, P., B.A. (Winnipeg), M.I.St. (Toronto).

Bibliographic Control, Head
Partington, L.E., B.A. (Manitoba), M.L.S. (Toronto).

Cataloguers
Bone, C., B.A. (Manitoba), M.L.I.S. (Dalhousie); **Gray**, M.E., B.A. (Saskatchewan), B.L.S. (UBC), M.L.S. (Toronto), M.A. (Manitoba); **O'Hara**, L., B.A. (Manitoba), M.L.S. (Toronto); **Talbot**, G.O., B.A., M.L.S. (Oklahoma).

SECTION 2: Using the Libraries

Assistance in using the Libraries' resources is available at all libraries and information centres throughout the university. These resources include BISON (the online public catalogue), NETDOC (Networked Databases), the general collections, periodical and bibliographical indexes and abstracts, government publications, microforms, etc. BISON may be accessed from terminals in the Libraries, as well as from computer workstations throughout the university, and from off campus by 24-hour dial-in access via UMnet. Many library services are available electronically through the Libraries' website or UMinfo, the university's campus-wide information system.

Computerized bibliographic search services and CD-ROM databases are available in most library units. Access to equipment and services for students with disabilities is also available.

Distance Education students are provided with document delivery services and other library services primarily through the Elizabeth Dafoe Library, the D.S. Woods Education Library, and the Neil John Maclean Health Sciences Library.

Students are bound by the Libraries' policies, copies of which are available at the circulation desks in all unit libraries.

Library Cards

The Photo ID card issued by Student Records to students is required for library privileges, and the cards are **not** transferable. Students are responsible for all items charged to the Photo ID. Adult residents of Manitoba may become borrowers for an annual fee of $50. The fee for university Alumni is $25.

Library Notices and Fines

Loan periods and the number of items that may be borrowed will vary depending on the library used. Fines are imposed on overdue material and charges are levied for damaged or lost items. Library notices regarding overdue items and holds are sent *only by e-mail*. The Libraries will endeavour to telephone borrowers when an item has been recalled and the due date has been changed.

Library Security and Damage

An electronic security system is in operation at all library exits to detect material that is not properly charged out to a borrower. The turnstile will lock and sound an alarm when it detects material that has not been charged out and will remain so until the reason for the alarm has been determined and remedied. The university reserves the right to examine an individual's personal possessions and record the individual's name and student ID number in such an instance.

The university considers mutilation or theft of library materials to be a serious offence and offenders will be subject to penalties sanctioned by the director of Libraries and the president of the university. Although book return bins are provided for the convenience of borrowers when libraries are closed, the Libraries assumes no responsibility for loss or mutilation of any library material returned through the book bins.

Reciprocal Borrowing Privileges

The Libraries takes part in reciprocal borrowing programs that provide borrowing privileges at other academic libraries for students and faculty. For information, contact the Libraries Administration office at (204) 474 9881.

Document Delivery

The Libraries will attempt to obtain articles or request interlibrary loans for books and scholarly materials not held in its own collections. The service is free, thanks to federal funding through an Indirect Costs of Research grant. Orders by fax, e-mail or Web forms are preferred. Information on these services is available at all circulation desks.

Photocopying

Photocopy machines, which take coins or vendacards, are available in all libraries. Vendacards can be purchased at most libraries.

Laser Printing

At a charge of 10 cents per page, laser printing is available in all libraries on the Fort Garry and Bannatyne campuses, and the library at St. Boniface General Hospital. Colour printing is available at $1.00 per page at the Technology Resource Centre in the Elizabeth Dafoe Library. Word processing and laser printing for theses, resumes, term papers, graphs, and spread sheets are offered from computer labs in the following libraries: Elizabeth Dafoe, D.S. Woods Education, E.K. Williams Law, William R. Newman Agriculture, Neil John Maclean Health Sciences, and Sciences and Technology.

Copyright Warning

• Duplication of copyrighted material is governed by the Copyright Act, (RSC 1985, c.C-42 as amended), and by the terms of a license between the University of Manitoba and the Canadian Copyright Licensing Agency (CANCOPY). Unless prior written permission has been obtained from the copyright owner, the use of photocopy machines to make any copy which contravenes *The Canadian Copyright Act,* or the provisions of the license between the university and CANCOPY, is strictly forbidden.

• CANCOPY has granted the university a license which permits making copies of published works for use by students, and academic and administrative staff, provided:

• the published work is not on the CANCOPY exclusions list (see circulation desk of libraries, general offices of faculties/schools, UMinfo online); and

• the following copying limits are observed:

• Copying shall not exceed 10 per cent of a published work (15 per cent where the copies are made for the purpose of resale) or the following, whichever is greater:

– an entire newspaper article or page;

– an entire single short story, play, poem, essay or article from a book or periodical issue containing the works;

– an entire single item of print music from a book or periodical issue containing other kinds of work;

– an entire entry from an encyclopedia, dictionary, annotated bibliography or similar reference work;

– an entire reproduction of an artistic work (including drawing, sculpture, painting, prints, architectural works or art, or works of artistic craftsmanship) from a book or periodical issue containing other works;

– an entire chapter which is 20 percent or less of a book.

If there is doubt as to the copyright status of the material to be copied, further information is available from the brochure *Copying Right*, available at all circulation desks, or by calling the university's copyright information number at (204) 474 7499. Copyright information is also available online from UMinfo.

SECTION 3: University Libraries Resources and Locations

Albert D. Cohen Library (Management)

208 Drake Centre; telephone: (204) 474 8440

This library consists of materials on accounting and finance, actuarial and management sciences, business administration, and marketing. Its specialized collection includes company annual reports, trade directories, and investment and marketing update services. ABI Power Pages, a full image/text management journal database, is also available from the library. The library's reserve collection is now partially available on the World Wide Web.

Academic Librarians

Head

Felbel, D.T., B.A.(Hons.) (Manitoba), M.L.S. (Western).

Reference

Dakshinamurti, G., B.A., M.A. (Madras), M.L.S. (CUNY), Ph.D. (Manitoba).

Architecture and Fine Arts Library

John A. Russell Building; telephone: (204) 474 9216

This library contains resources on architecture, fine arts, landscape architecture, environmental design, city and regional planning, facility management, interior design, and photography. Library holdings include a vertical file, art reproductions, maps and architectural drawings, selected government publications, and the slide collection of more than 100,000 images. The Product Catalogue Collection, 203 Architecture II Building, is a resource of architectural and interior design manufacturers' brochures, catalogues, and samples.

Academic Librarians

Head

Lochhead, M.E., B.A.(Mount Allison), M.L.S.(Alberta.

Reference

Valmestad, L., B.F.A. (Saskatchewan), M.A. (Queen's), M.L.I.S. (Western).

Archives and Special Collections

331 Dafoe Library; Telephone: (204) 474 6350

This department of the library supports the university's courses, programs and research with a wide-ranging archival collection, including Canadian prairie literary manuscripts, the archives of the agricultural experience, the *Winnipeg Tribune* photographs and clippings, as well as the university's own archives. The department contains rare books and an extensive photography and sound and moving image collection. It also coordinates the application of the Freedom of Information and Protection of Privacy Act for the university. Applications for access are available at the archives office.

Academic Librarians

Archives and Special Collections, University Archivist and Head

Sweeney, S., B.A., M.A. (UBC).

Acquisitions and Access Archivist

Hubner, B., B.A., M.A. (Saskatchewan), M.A. (Manitoba).

Rare Books Cataloguer

Divay, G., B.A., M.A., Ph.D. (Laval), M.L.S. (McGill), M.A. (Manitoba).

Carolyn Sifton-Helene Fuld Library

351 Taché Avenue; telephone (204) 237 2807

The Carolyn Sifton-Helene Fuld Library at the St. Boniface General Hospital is a satellite information centre of the Neil John Maclean Health Sciences Library. It provides health sciences information resources to support patient care, education, management, research, and outreach services to staff and students at the hospital. The collection includes reference material, about 400 current periodical subscriptions, and an extensive monograph collection.

Academic Librarian

Head

Rabnett, M., B.A.(Hons.), M.L.S. (Toronto).

Concordia Hospital Library

Room 308, 1095 Concordia Ave., R2K 3S8; telephone (204) 661 7163

This library at the Concordia Hospital is a satellite information centre of the Neil John Maclean Health Sciences Library. It provides health sciences information resources to support patient care education, management, research and outreach services to staff and students at the hospital.

Academic Librarian

Shaw-Daigle, C., B.A. (Manitoba), M.L.S. (Emporia State, Kansas).

D.S. Woods Education Library

100 Education Building; telephone: (204) 474 9976

This library features special collections, including the instructional materials collection (K-12 textbooks and audiovisual teaching aids), child and adolescent literature collections, the history of education in Manitoba archives, and current education periodicals. General collections in child development, education, and higher education are housed in the Elizabeth Dafoe Library.

Academic Librarian

Head

Aho, V., B.Ed. (Calgary), Pre-M.Ed. (Manitoba), M.L.I.S. (UBC).

Donald W. Craik Engineering Library

351 Engineering Building; telephone: (204) 474 6360

The reference, reserve, engineering standards, and electronic information collections enable this library to serve as the primary source of engineering information of engineering students and practising professionals in the province. Additional engineering resources are held in the Sciences and Technology Library.

Academic Librarians

Godavari, S.N., B.A. (Winnipeg), B.L.S. (UBC); **Ford**, L., B.A. (Adv.), M.A. (Manitoba), M.L.I.S. (Alberta).

Elizabeth Dafoe Library

Telephone: (204) 474 9544

The Elizabeth Dafoe Library is considered the main university library. It serves the faculties of Arts, Education, Human Ecology, Nursing, Physical Education and Recreation Studies, Social Work, and the Natural Resources Institute. Its holdings include books and periodicals as well as government publications, microforms, sheet maps and varied audiovisual materials. The Icelandic and Slavic collections, as well as archival and manuscript materials relating to Western agricultural history and prairie literature, are of special interest. Data Resource and Geographical Information Systems (GIS) services are offered at this library. The library has a computer lab and a Technology Resource Centre with a total of 32 computers for student use.

Academic Librarians

Head

Michaud-Oystryk, N.R., B.A. (CollPge universitaire de Saint-Boniface), M.L.S. (Montreal), M.A. (Manitoba).

Reference Head

Blanchard, J., B.A. (Brandon), M.A. (Manitoba), M.L.I.S. (Western).

Reference Librarians

Andrich, S.E., B.A. (Manitoba), B.A.(Hons.) (Winnipeg), M.L.S. (Western); **Budnick**, C., B.A. (Manitoba), B.L.S. (UBC), M.A. (Manitoba); **Ellis**, R., B.A. (Windsor), B.L.S. (Toronto), M.A. (Oregon); **Johnson**, J., B.A. (UBC), M.L.S. (UBC); **Larimer**, H.C., B.S. (Western Kentucky), M.L.S. (Pittsburgh); **Steer**, C.E., B.A., B.L.S. (Alberta), B.F.A.(Hons.), M.A. (Manitoba); **Strike**, G.W., B.Sc., B.A. (Winnipeg), M.L.I.S. (McGill); **Yoshida**, A., B.A., M.L.S. (Toronto).

Off Campus Librarian, Continuing Education

Matesic, G. , B.A.(Hons) (Dalhousie), M.A. (Carlton), M.L.S. (Western).

Icelandic Collection, Head

Johnson, J.S., B.A. (Manitoba), B.L.S. (Alberta).

Slavic Collection

Kominowski, J., B.A., M.A. (Manitoba), M.L.I.S. (Western).

E.K. Williams Law Library

401 Robson Hall; telephone: (204) 474 9995

This collection is comprised of legal textbooks, case reports, statutes, periodicals, and related government publications from Canada, the United Kingdom, other commonwealth countries, and the United States.

Academic Librarians

Head

Eaton, J., B.A.(Hons.) (Victoria), LL.B. (Toronto), M.L.S. (Maryland).

Reference

St. John, M., B.A. (Prince Edward Island), B.Ed., B.L.S., (Ottawa).

Technical Services

Sirko, A., B.A., M.A. (Carleton), M.L.S. (Western).

Eckhardt-Gramatté Music Library

223/4 Music Building; telephone (204) 474 9567

In addition to books and periodicals, the Music library is home to an extensive collection of music scores, performance music, phonorecords, compact discs, audio tapes, and video cassettes.

Academic Librarian

Simosko, V.N., B.A., M.L.S. (Rutgers).

Father Harold Drake Library

119 St. Paul's College; telephone: (204) 474 8585

The college library gives special attention to philosophy, Catholic theology, English literature, Canadian history, and medieval history. The library supports the Arts and Science courses taught by the college, as well as its Catholic studies and Christian ministries programs.

Academic Librarian

Head

Lewis, G., B.A., M.A. (Manitoba), M.S.L.S. (Syracuse).

Grace General Hospital Library

300 Booth Drive, R3J 3M7; telephone (204) 837 0127

This library at the Grace General Hospital is a satellite information centre of the Neil John Maclean Health Sciences Library. It provides health sciences information resources to support patient care education, management, research and outreach services to staff and students at the hospital.

Academic Librarian

Gottschalk, T., B.A. (Alberta), M.L.S. (Illinois).

Neil John Maclean Health Sciences Library

Brodie Centre, Bannatyne Campus; telephone: (204) 789 3464

This library supports the teaching, research and patient care requirements of Medicine, Dentistry, Dental Hygiene, and Medical Rehabilitation. It also serves health care professionals at the teaching hospitals in Winnipeg and throughout the province. Its holdings include clinical and basic science books and periodicals, audiovisual and electronic media, as well as a small but valuable collection of medical classics in the Ross Mitchell Rare Book

Room. There are also two learning resource centres and approximately 60 computer workstations for student use.

Academic Librarians

Head

Ducas, A.M., B.A.(Hons.) (Montreal), M.L.S. (McGill).

Aboriginal Health Librarian

Linton, J., B.A. (Trent), M.L.I.S. (UBC).

Resources Development Librarian

Cooke, C.A., B.A. (Toronto), M.L.I.S. (Western).

Clinical Programs Librarian

Demczuk, L., B.A. (Guelph), M.A., M.L.S. (Toronto).

Education Services Librarian

Hodgson, A., B.Sc., M.L.I.S. (Western);

Reference/Outreach Librarian

Gottschalk, T., B.A. (Alberta), M.L.S. (Illinois).

MHINET Librarian

Yu, P., B.A., M.L.I.S. (UBC).

Medical Rehabilitation Librarian

Poluha, W.A., B.Sc. (Winnipeg), M.Sc. (McMaster), M.L.I.S. (Western);

Neilson Dental Librarian

Thornton-Trump, A.L., B.A. (Manitoba), M.L.S. (Missouri).

Information Technology Librarian

Tennenhouse, M., B.Sc.(Hons.) (Manitoba), M.L.S. (Alberta).

St. John's College Library

321 St. John's College; telephone: (204) 474 8542

The library supports the college's undergraduate curriculum. Library holdings are strong in Anglican church theology and history, Old and New Testament studies, pastoral theology, and Canadian studies (history, political studies, English and French-Canadian literature).

Academic Librarian

Head

Ellis, R., B.A. (Windsor), B.L.S. (Toronto), M.A. (Oregon).

Sciences and Technology Library

211 Machray Hall; telephone: (204) 474 9281

This multi-disciplinary library serves the faculties of Science, Pharmacy, Agricultural and Food Sciences and Engineering. The library includes materials in the natural and biological sciences, all areas of mathematics and statistics, computer science, pharmacy, agricultural economics, animal science, entomology, food science, plant science, soil science, and all engineering disciplines.

Academic Librarians

Head

Harper, J.A., B.Sc.(Hons.) (Trent), M.L.S. (Western).

Reference

Schultz, R., B.Sc. (Manitoba), M.L.I.S. (Western); **Speare**, M., B.A. (Brandon), B.Sc. (Manitoba), M.L.S. (Dalhousie), **Sutherland**, J., B.Sc., M.Sc. (Saskatechewan), M.L.I.S. (Western).

Seven Oaks General Hospital Library

2300 McPhillips St., R2V 3M3; telephone (204) 632 3107

This library at the Seven Oaks General Hospital is a satellite information centre of the Neil John Maclean Health Sciences Library. It provides health sciences information resources to support patient care education, management, research and outreach services to staff and students at the hospital.

Academic Librarian

Cohen Baker, A., B.A. (Manitoba), M.L.S. (Emporia State)

Victoria General Hospital Library

2340 Pembina Highway, R3T 2E8; telephone (204) 477 3307

This library at the Victoria General Hospital is a satellite information centre of the Neil John Maclean Health Sciences Library. It provides health sciences information resources to support patient care education, management, research and outreach services to staff and students at the hospital.

Academic Librarian

Shaw-Daigle, C., B.A. (Manitoba), M.L.S. (Emporia State, Kansas).

William R. Newman Library (Agriculture)

236 Agriculture Building; telephone (204) 474 8382

This library is an electronic information resource centre with a small physical collection that includes reserve material, reference material, and the latest two years of current agricultural periodicals. The library's computer resources give patrons access to agricultural databases, Internet home pages, and other electronic information resources. Other agriculture resources are held in the Sciences and Technology Library.

Academic Librarian

Gregg, M., B.A. (Michigan), M.L.I.S. (Western).

Graduate Research Units and Facilities

Academic Computing and Networking

Academic Computing and Networking (ACN) provides general purpose computing facilities for all University of Manitoba students. Students may use the computing facilities for assigned coursework, research or for preparing papers and themes.

There are ACN facilities located throughout the university, including Architecture II, Dafoe Library, Engineering, Machray Hall, Human Ecology, St. Paul's College, St. John's College and Continuing Education Complex. Each facility has a different mix of equipment selected to meet the planned course requirements of the requesting faculties. Most include access to networked Unix servers and workstations, and terminals to access the IBM mainframe and electronic library catalogue. Various facilities also offer networked DOS and/or Macintosh microcomputers with wordprocessing and other software, and dot-matrix printers. Most areas are open 24 hours.

Brochures and users guides can be obtained from ACN to introduce students to the facilities. Orientations are also available. Individual professors may provide information tailored to the particular needs of their students.

Some specialized hardware and software aids for disabilities are available in most computer areas. These include image enlargement programs, and optical character scanning with voice synthesis. Most facilities are wheelchair accessible.

All students are eligible for UNIX and IBM mainframe computer accounts at no charge. Instructions on how to set up a computer account are provided in the *Registration Guide*, or from the ACN Account Office, 629 Engineering Building, 204 474 9788. The advisors at the Computer Accounts Office also offer general assistance and advice on microcomputing problems. For further information on access to computer facilities, contact the advisors at 204 474 8600, 629 Engineering Building.

Applied Electromagnetics Facilities
Biomedical Engineering Facilities
Communications and Signal Processing Facilities
Computers and Microelectronics Facilities
Electrical Energy Systems Facilities
Electrical Materials and Devices Facilities
For information on the above facilities, see Section 7.3, Department of Electrical and Computer Engineering.

The Agriculture Canada Research Station

The offices and laboratories of the Winnipeg Research Station of Agriculture Canada are located on the Fort Garry Campus. Agriculture Canada also operates a field station adjacent to the university's own Glenlea Research Station, about 20 km south of the city. Station scientists, many of whom hold the positions of adjunct or honorary research professors, cooperate with various departments, particularly Agricultural Engineering, Animal Science, Botany, Entomology and Plant Science in the conduct of research and in the training of graduate students.

Freshwater Institute of the Fisheries Research Board

The Freshwater Institute, is a major national laboratory of the federal government's Department of Fisheries and Oceans and is located on the Fort Garry campus. Cooperative graduate programs are supervised under the university's Aquatic Biology Research Unit.

Whiteshell Research Establishment Atomic Energy of Canada Limited

An experimental nuclear reactor and major atomic energy research facility is located at Pinawa, some 30 km from Winnipeg. Close cooperation is maintained with the university for joint research programs.

The Glenlea Research Station

Director: K. Wittenberg
The Glenlea Research Station is located approximately 20 km south of the university's Fort Garry Campus and was established in 1964. The station is operated by the Faculty of Agricultural and Food Science with financial support from Manitoba Agriculture and the University of Manitoba. The station provides the Faculty of Agricultural and Food Sciences with facilities and services necessary for its research and teaching programs. There are approximately 500 hectares of land, a dairy unit with 50 milking cows, a swine unit with 140 sows, and feedlot facilities for beef cattle research. The departments of Biosystems Engineering, Animal Science, Entomology, Plant Science and Soil Science are involved in research projects at the Glenlea Research Station. The Station is an official meteorological recording site, providing information to Environment Canada.

The Department of Physics and Astronomy operates an observatory and the Avian Behaviour Laboratory of the Department of Psychology is also located there.

The Department of Geological Sciences, in conjunction with Energy, Mines, and Resources (Canada) and the Geological Survey of Canada, operates a geomagnetic observatory at the Glenlea Research Station. This observatory is one of 12 stations which make up the Canadian Magnetic Observatory Network. Data are available for research and can be obtained in several formats from the Geological Survey of Canada.

Also located at Glenlea is a Wildlife Rehabilitation Centre operated by the Manitoba Wildlife Rehabilitation Organization. This centre provides care, treatment and rehabilitation of injured and orphaned wildlife throughout Manitoba and fosters understanding of wildlife preservation through public education and other programs.

University Field Station (Delta Marsh)

Director: L.G. Goldsborough
The University Field Station, located in the Delta Marsh at the southern end of Lake Manitoba, is available for year-round teaching and research. A variety of habitats, including lake, lakeshore, forested ridge, marsh, marginal prairie, and forested parkland give excellent opportunities for research in biological, physical, social, and natural sciences. Fully-equipped teaching and research laboratories, meeting rooms a reference library, computers, and residence accommodation exist for up to 65 students. Inquiries should be made to the station office: 208 Buller Building. Further information is also posted on the web site: www.umanitoba.ca/faculties/science/delta_marsh.

Taiga Biological Station

The Taiga Biological Station is situated east of Lake Winnipeg and provides facilities for graduate students interested in boreal ecology, mammalogy, and wildlife biology. The field station is supported by the Taiga Biological Research Trust and various research agencies. Contacts should be through Dr. W.O. Pruitt, Department of Zoology.

Delta Waterfowl Research Station, Delta, Manitoba

The Delta Waterfowl Research Station is located at the south end of Lake Manitoba. Scientists and students at the station are investigating the biology of waterfowl. Use of the station is by special arrangement with the director, through the head of the Department of Zoology. The station is administered by the trustees of the North American Wildlife Foundation.

Manitoba Natural Resources

The Manitoba Natural Resources maintains camps throughout Manitoba. Various fieldwork is undertaken at these centres. Use of these facilities is

by arrangement with the regional manager of the department, through the head of the Department of Zoology.

Manitoba Institute of Cell Biology

The Institute of Cell Biology is a basic molecular cell biology research institute. The group consists of 12 senior scientists with research programs in: transcriptional regulation; Signal transduction; programmed cell death; oncogenes and suppressor genes; wound healing and inflammation; chemotherapeutic drug action and resistance; genomic stability and, immune function.

The institute is housed in the Manitoba Cancer Centre adjacent to the Faculty of Medicine. The resident senior scientists represent seven university departments and constitute a unique milieu in which expertise from different research disciplines can interact in the study of molecular and genetic mechanisms. The centre's members also participate in the teaching programs of their departments. Research opportunities exist for postdoctoral and graduate students under the joint auspices of cell biology and participating university departments; programs leading to a M.Sc. or Ph.D. degree are available.

Transport Institute

Director: Barry E. Prentice

The Transport Institute was established in 1984 as the successor organization to the Centre for Transportation Studies, which was itself established in 1966 as the first formal transport research organization on any Canadian university. Its purpose is threefold: to stimulate and coordinate transport research at the university; to meet the needs of the transport industry for education; and to conduct an outreach program of information and analysis for the transport community. This mandate is carried out through research, generally funded by contracts or grants; the development of courses in transport education; and conferences, seminars, and response to community demand for speakers on transport issues. The Transport Institute operates through its own core staff of research associates and tenured members of faculties throughout the university. Graduate student assistants are also used in the research work of the Transport Institute.

Historically, the major area of transport research at the University of Manitoba has been in grain transport and this continues to be a high priority of the Transport Institute. Other major research areas are railway transport, particularly the growing traffic of intermodal containers; highway transport, especially transborder trucking; and the economic impacts of airports. Across all modes, the Institute works on the overall logistics approach to transport; trade, tourism, telecommunications; urban transport and the transportation of disadvantaged groups. In addition to these areas of economic research, attention has also focused on engineering problems in transport and on safety issues.

In 1997-1998, the Transport Institute initiated its *Certificate in Logistics* program. The courses provided through the Institute are recognized by the Canadian Institute of Traffic and Transportation (CITT).

Natural Resources Institute

Director: C. Emdad Haque

The Natural Resources Institute was established in 1968 with a threefold purpose: to teach management skills leading to a graduate degree of Master of Natural Resources Management (M.N.R.M.); to conduct applied research on resource problems; and to provide a forum for examining problems in resource use.

The teaching of the institute is centred on a two-year program leading to the degree of M.N.R.M. Coursework consists of a core of courses within the Institute and additional work in related departments of the university. A total of 30 hours, and the preparation of a thesis is required. Further details are given in Section 12.

The teaching, research and analytical work of the Institute are closely coordinated and designed to provide the students with preparation for immediate engagement in management problems at a high level. There is an active publication program involving the results of student and faculty research. Members of the university outside the Institute as well as colleagues from all levels of government, industry and non-governmental organizations are active in the work of the institute.

Northern Studies Committee

Faculty of Graduate Studies

Associate Chair: R. Riewe, Department of Zoology

The Northern Studies Committee supports pure and applied research projects relating to the theme, the study of people and their environment in the north. Financial support is provided through the Northern Scientific Training Program (NSTP) and the federal Department of Indian and Northern Affairs. Particular emphasis is placed on field work by students. Any university department or school may become involved in the program through submission by a faculty member of an application to the committee chair. Graduate students interested in becoming involved should inquire through an appropriate department.

Solomon Sinclair Farm Management Institute

Director: D.F. Kraft

The Solomon Sinclair Farm Management Institute was established in 1985. Its purpose is to provide the coordination, research and services needed by managers of new agricultural information which is generated by governments, universities and industry. This is accomplished by conducting information seminars and by promoting the transfer of technology through developing and distributing information to farm and agribusiness managers.

The Geological Sciences Field Station (Star Lake)

This field station is located on Star Lake in southeastern Manitoba. It is in the Precambrian Shield just north of the Trans-Canada Highway, near the Manitoba-Ontario boundary. The station is equipped for teaching and has residence accommodation for up to 30 students. For further information, contact the Department of Geological Sciences.

Centre on Aging

Director: L. Strain

The Centre on Aging is a university-wide research unit established in 1982 with a mandate to serve as a focal point for the conduct and integration of research on aging at the university and in the province, to encourage and stimulate those peripherally involved in the area to become more intensely involved, and to attract others into the field of aging. The study of aging has been designated by Senate as a priority area for interdisciplinary research at the University of Manitoba.

The centre has established national and international reputations for research excellence in aging. It brings together researchers from various disciplines to conduct research and to disseminate information on all aspects of aging. The experiences of aging individuals and the dynamics of an aging society are investigated using rigorous scientific standards. Research projects range from social science surveys which measure people's beliefs and behaviours in a variety of areas to increase knowledge, to evaluation research used by government and other organizations to assess their programs. Community representatives contribute to all projects and serve on various committees. In addition to academic presentations and publications, the Centre distributes the findings of its research to administrators, policy makers, practitioners, and seniors to assist them in making decisions.

Although the Centre on Aging is not a teaching unit, gerontological education is, and always has been, an important component of the centre. Graduate students are involved in many of the research projects at the centre; researchers teach within their own departments; and students use our data bases for their theses. A graduate student interest group in aging was established in 1993 to bring together students from a variety of disciplines. The Centre adjudicates three annual scholarships, The Centre on Aging Graduate Fellowship, the Jack MacDonell Scholarship for Research in Aging and the Esther and Samuel Milmot Scholarship.

For more information on the Centre on Aging and its research program, vis-

The Language Centre

Director: M. Nahir

The Language Centre was established in 1996 to help improve the learning and teaching of languages at the university through the application of various proven methodologies and through research in second-language learning. One of the purposes of the centre is to serve the university's language teachers and students as a forum for preparing and evaluating proposals to improve the learning and teaching milieu at the university. It will also serve as a resource centre for language teachers and researchers when they apply for external funding for the improvement of the university's programs and for research in various areas of language learning and teaching. The Centre will maintain a comprehensive and up-to-date list of sources for such funding and will help applicants in the preparation of their proposals.

The centre serves in general as a focus for the encouragement of research and the dissemination of the results of such research in the area of language, learning and teaching. It will also have as one of its specific tasks the overseeing of the language laboratory facilities of the Faculty of Arts.

Centre for Earth Observation Science (CEOS)

Director: D. Barber

CEOS was established as a centre within the Department of Geography in 1994. The centre is a focal point for teaching and research in the application of earth observation technologies (geographic information systems, remote sensing, computer cartography, and others) to the study of earth system science. Student research focuses on specific aspects of the interactions of the atmosphere, biosphere, hydrosphere, and lithosphere, at scales ranging from the micro to the planetary. Its philosophy in both teaching and research is to develop an understanding of the Earth as a system, and in particular the role which humans play in these planetary processes.

CEOS is structured as an interdisciplinary centre through the partnering arrangements with the university departments of Statistics, Botany, Biology, Soil Science, Engineering, Physics and Applied Mathematics. External partners include Manitoba Natural Resources, the Canadian Wheat Board, Parks Canada, Fisheries and Oceans, Hydro, among others, as well as those with national and international affiliations such as the Canadian Ice Services, Environment Canada, Canada Centre for Remote Sensing, Canadian Space Agency, National Air and Space Administration, the Canadian International Development Agency. Three fully equipped computer laboratories and data-sharing agreements with CEOS partners provide the infrastructure support for research at the master's and doctoral levels.

Health, Leisure and Human Performance Research Institute

Director: P. Gardiner

The institute was established in 1992 in the Faculty of Physical Education and Recreation Studies. The objective of the institute is to facilitate, conduct, and disseminate research of the highest quality in the areas of human movement and leisure behaviour in order to contribute to an enhanced understanding of health and human performance.

The institute has a wide network of researchers, many nationally and internationally recognized scholars, who pursue research at the forefront of their inter-related fields of health, leisure, and human performance. The five general areas of research within the Institute are: health and wellness; lifespan and disability; exercise and environmental medicine; leisure and tourism; and sport and human performance.

The institute has collaborative relationships with organizations such as Parks Canada, Manitoba Culture, Heritage and Citizenship, Manitoba Special Olympics, Inc., which provide important financial support for several Institute researchers. Institute researchers also hold grants from many provincial and national research granting bodies (e.g., MRC, NSERC, SSHRC, and NHRDP).

In addition, the institute supports several initiatives to encourage scholarly activity in the areas of health, leisure, and human performance. In particular there is the visiting distinguished scholar program, small research grants, research fellowships and support for graduate students in the form of costs to present at conferences, data sets for secondary analysis, and research assistantships.

Centre for Higher Education Research and Development

Director: D. Kirby

Established in 1987, CHERD is Canada's leading institute dedicated to higher education research and to the continuing professional education of faculty and administrators in post-secondary education. To this end, the centre is committed to an interdisciplinary collaborative program in Canada and around the world of regional, national and international courses, seminars, symposia, research projects, and publications. This work is supported by a national and international network of program associates, and through collaborative partnerships with such bodies as AUCC, CAUBO, CIDA, UNESCO, the World Bank, the Association of African Universities, the Association of Indian Universities, and the Inter-American Organization for Higher Education.

CHERD's training and development activities stimulate research and scholarship within the areas of teaching and learning, and management. The goal of the teaching and learning programs is to help post-secondary teachers understand how they can most effectively assist their students' academic development. Various aspects of higher education instruction, including curriculum design and pedagogy, are examined in relation to students' ability to think and perform competently within their fields of study. Research in the management area has focused on evaluating the immediate and long-term effectiveness of training programs for post-secondary administrators from across the province, nation and world. The research has also led to the development of a database containing quantitative information on higher education managers in a range of different countries and cultures.

CHERD works in close collaboration with the Faculty of Education's Division of Post-secondary Studies, in providing the opportunity for master's and doctoral study in the areas of research associated with the work of the centre.

Within CHERD, University Teaching Services (UTS) and the Instructional Development Program (IDP) provide a wide range of programs to enhance teaching and learning at the University of Manitoba. Of particular interest to graduate students are professional development opportunities such as teaching assistant workshops, the Certification in Higher Education program, and the professional development series for graduate students.

Faculty of Graduate Studies
Awards Information

Awards Officer: Rowena Krentz
500 University Centre
Telephone: (204) 474-9836
Fax: (204) 474-7553
E-mail: rowena_krentz@umanitoba.ca

Graduate students seeking information on scholarships, bursaries, prizes and loans should consult with the Awards Officer in the Faculty of Graduate Studies. A complete listing of awards is on the web:

www.umanitoba.ca/graduate_studies/awards

Award Programs

The following awards are offered through the Faculty of Graduate Studies:

(NSERC) Natural Sciences and Engineering Research Council Doctoral Prize

Value: $10,000 plus a framed citation and a silver medal
Deadline: October 11 -- Agency deadline
Faculty/unit deadlines are normally 2-3 weeks prior to agency deadline

(NSERC) Natural Sciences and Engineering Research Council PGS

Value: $17,300 for a PGSA
$19,100 for a PGSB
Deadline: First week of October – Grad Studies deadline
November 24 – Agency deadline
Consult department for departmental deadline

(SSHRC) Social Sciences and Humanities Research Council

Value: $17,700/year
Deadline: October 20 – Grad Studies deadline
Consult department/unit for their specific deadline

Congress For Social Sciences and Humanities Travelling Scholarship

Value: $600 (approx.)
Deadline: March 1

University of Manitoba Graduate Fellowship

Value: $12,000 for Master's
$16,000 for Ph.D.
Deadline: February 15
Consult department/unit for their specific deadline

Mackenzie King Open Scholarship

Value: $7,500 (subject to change)
Deadline: February 1

Mackenzie King Travelling Scholarship

Value: $10,000
Deadline: February 1

James Gordon Fletcher – PhD Fellowship for research in Aboriginal Issues

Value: $16,000
Deadline: March 1

James Gordon Fletcher – PhD Fellowship in Functional Foods and Nutraceuticals

Value: $14,000
Deadline: March 15

* In the case where there is more than one deadline given, applicants must meet the *earliest* deadline provided.

Graduate Studies Programs

Chapter Contents

SECTION 1: Agribusiness and Agricultural Economics

Head: Daryl F. Kraft
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Academic Staff

Professors

Bjarnason, H.F., B.A. (Manitoba), M.Sc. (South Dakota State), M.A., Ph.D. (Wisconsin); **Boyd**, M.S., B.A. (Seattle Pacific), M.A. (Washington State), Ph.D. (Purdue); **Kraft**, D.F., B.S.A.(Hons.) (Manitoba), Ph.D. (Washington State); **MacMillan**, J.A., B.S.A. (Toronto), M.Sc. (Illinois), Ph.D. (Iowa State); **Oleson**, B.T., B.A., M.A. (Manitoba), Ph.D. (Minnesota).

Associate Professors

Coyle, B.T., B.Sc.(Hons.), M.Sc. (British Columbia), Ph.D. (Maryland); **Johnson**, G.V., B.S., M.S., M.A., Ph.D. (Wisconsin).

Assistant Professors

Brewin, D.G., B.Sc. (Alberta), M.Sc. (Saskatchewan), Ph.D. (Pennsylvania State); **Carlberg**, J.G., B.Comm., B.A. (Hons), M.Sc. (Saskatchewan), Ph.D. (Oklahoma State); **Kim**, B.Y.R., B.Sc., M.Sc., Ph.D. (Alberta); **Rude**, J.I., B.A., M.A. (Saskatchewan), Ph.D. (Guelph).

Adjunct Professors

Cranfield, J.A.L., B.Sc., M.Sc. (Guelph), Ph.D. (Purdue); **Tyrchniewicz**, E.W., B.S.A. (Manitoba), M.Sc., Ph.D. (Purdue).

Program Information

The Department of Agribusiness and Agricultural Economics offers graduate instruction leading to the M.Sc. and Ph.D. degrees. The Ph.D. program now is offered jointly with the Economics Department. The purpose of graduate training in Agribusiness and Agricultural Economics is to develop competence in solving real world problems relating to food production and marketing and the quality of rural life. The discipline of agricultural economics is problem oriented with the focus being on the application or adaptation of economic theory to resource utilization.

Fields of Research

Agricultural economists are concerned with managing labour, land, capital, equipment, and other resources in producing, marketing and distributing food (crops, livestock, etc.). Analysis of the impacts of sustainable development, agricultural trade and other public policies is a major focus of teaching, research and community service activities.

Students undertaking graduate studies in Agribusiness and Agricultural Economics may specialize in one of the following fields: Marketing and Price Analysis; Production; Agribusiness Management; Natural Resources.

Research Facilities

The department has excellent computer facilities, support staff and offices for graduate students.

M.Sc. in Agribusiness and Agricultural Economics

Admission

Applicants must possess the equivalent of the B.Sc. degree in Agribusiness or an honours degree in Economics from the University of Manitoba, or any other degree which provides an equally strong basis for a graduate program in the department. If the applicant has deficiencies of more than 12 credit hours, a requirement may be to successfully complete a pre-Master's program before being admitted to a regular graduate program. Please contact the Department for details.

The following courses, or their equivalents, are basic prerequisites to the graduate program and indicate the scope and level of training required for admission:

1) 136.168M Mathematical Science for Agricultural and Related Sciences
or
136.130M Vector Geometry and Linear Algebra (or 013.129 or 013.146)
and 136.150M Introduction to Calculus (or 013.129 or 013.139)
2) Microeconomic Analysis 1 (018.270 Honours or 018.245 regular))
3) Macroeconomic Analysis 1 (018.280 Honours or 018.247 regular)
4) Introduction to Econometrics (e.g. 061.308)

The following courses are not a requirement, but may be recommended:
Microeconomic Analysis 2 (018.370 Honours or 018.246 regular)
Macroeconomic Analysis 2 (018.380 Honours or 018.248 regular)
Intermediate Econometrics (e.g. 061.412)
018.604 Survey of Mathematical Topics for Economics is highly recommended, and will normally be taken in late summer/ early fall at the beginning of the Graduate program.

Application Deadlines

The Department of Agribusiness and Agricultural Economics allows students to begin their program on either 1 September or 1 January. For admission for each of these start dates, Canadian and U.S. students should send their applications with complete supporting documents to the Department of Agribusiness and Agricultural Economics no less than three (3) months before the intended start date. International students should send their applications with complete supporting documents to the Department of Agribusiness and Agricultural Economics no less than seven (7) months before the intended start date.

Program Requirements

Two programs of study are available:

Program 1:

The thesis option entails a minimum of 18 credit hours consisting of:

Courses	Credit Hours
Microeconomics, normally 018.772, *or* 061.710 *plus* 061.794	3-6
Quantitative Methods, normally from 061.412, 061.739, 061.740 or 018.752	3
*Electives prescribed by major advisor in consultation with the student, at 700 level	9-12
Total Credit Hours	18

*Nine units of electives are required if 061.710 and 061.794 are chosen to meet the Microeconomics requirement (and 12 units of electives are required if 018.772 is chosen).

Every candidate must complete an acceptable thesis and pass an oral examination based primarily on the thesis.

All students in the M.Sc. thesis program are required to present two graduate seminars open to the public. The first presentation shall be on the thesis proposal paper. The second presentation will be on their completed research.

Program 2

The comprehensive option normally entails a minimum of 27 credit hours consisting of:

Courses	Credit Hours
Microeconomics, normally 018.772, *or* 061.710 *plus* 061.794	3-6
Quantitative Methods, normally from 061.412, 061.739, 061.740 or 018.752	3
*Electives prescribed by major advisor in consultation with the student, at 700 level	18-21
Total Credit Hours	27

*Eighteen units of electives are required if 061.710 and 061.794 are chosen to meet the Microeconomics requirement (and 21 units of electives are required if 018.772 is chosen).

In addition to the coursework for the comprehensive option, one research paper will be assigned, supervised, and evaluated by a committee of three, consisting of two members from the Department of Agribusiness and Agricultural Economics and one member from outside the Department, with the student's advisor acting as chair. Upon satisfactory completion of all the coursework and the research paper, the student must pass a comprehensive oral examination. The student will be held responsible in the comprehensive oral examination for knowledge and understanding of the questions relating to the student's program of study and the research paper.

Specialization in business management in agriculture is available under the comprehensive option for a selected number of qualified students. These students are required to take at least 12 units of courses within the Asper School of Business/Faculty of Management at the 600 or 700 level.

Second language reading requirement: none

Expected time to graduation: two years

Ph.D. in Agribusiness and Agricultural Economics*

*A Ph.D. is offered in Economics with a research specialization in Agricultural Economics

Admission

1) Except as provided in 2) below, applicants for admission to the Ph.D. program must have completed the entrance requirements and the program requirements of an M.A. degree in Economics or Agricultural Economics equivalent to that awarded by the University of Manitoba.

2) In exceptional cases, applications may be considered from students who have completed an Honours degree in Economics or Agricultural Economics equivalent to that awarded by the University of Manitoba. In such cases, the applicant will be required to fulfil, in addition to the requirements below, all course work requirements for the M.A. degree by comprehensive examination option.

Application Deadlines

Students intending to begin a Ph.D. in Economics with a Research Specialization in Agricultural Economics will begin their program in September. Please note that the Department of Economics does not normally accept students in the January session, as the required Math and Theory courses start in September. Canadian and U.S. students should send their applications with complete supporting documents to the Department of Agribusiness and Agricultural Economics by May 1. International students should send their applications with complete supporting documents to the Department of Agribusiness and Agricultural Economics by February 1.

Program Requirements

- A minimum of 24 credit hours of course work of which at least 12 credit hours must be at the 700 level in Economics. No more than 6 credit hours may be taken in a department other than Economics as part of this minimum course work requirement.

- Economics courses include courses cross-listed with the Department of Agribusiness and Agricultural Economics. Cross-listed courses include advanced agricultural marketing (061.710, 018.790), production economics (061.794, 018.794), resource economics (018.743-5, 061.743-5) and international trade (018.763, 061.763).

- A minimum of 36 credit hours of 700 level courses in Economics or Agricultural Economics in their M.A. and Ph.D. programs.

- A minimum of 12 credit hours in economic theory. The theory requirement will normally be 018.765, 018.766, 018.772, and 018.773. Upon recommendation of a student's advisory committee, the Graduate Studies Committee may permit a student to substitute two of the following for 018.766 and 018.773: 018.767, 018.768, 018.774, and 018.755.

- Candidates must also include 6 credit hours of History of Economic Thought and either 6 credit hours in Economic History or an acceptable research paper in Economic History. These requirements may be waived if, in the judgement of the Graduate Studies Committee, equivalent courses have been taken by the candidate at the undergraduate level or as part of the M.A. program. If the research paper option is selected to fulfil the Economic History requirement, then a committee will be appointed by the Department of Economics Graduate Studies Committee (GSC) to evaluate the paper.

Fields of Concentration and Candidacy Examination

Students must present themselves for candidacy examinations in Macroeconomic Theory, Microeconomic Theory, and two fields. Fields from which a student may select are:

Agricultural Economics	Monetary Economics
Economic Development	Public Finance
Econometrics	Industrial Organization
History of Economic Thought	Economic History
Labour Economics	Resource Economics
International Economics	Marxian Economics
Comparative Systems	

With the approval of the Graduate Studies Committee, one field may be based on work taken in a department other than economics or agricultural economics. The candidacy exams are divided into two parts: theory and fields.

Candidates must complete their theory course requirements within their first year in the Ph.D. program, and sit for the candidacy examinations in theory in the following May or October.

Candidates must pass their theory exams before they sit for the fields. However, candidates may attempt their theory and fields simultaneously with the approval of the Graduate Studies Committee. Students must attempt their field exams not more than one calendar year after passing their theory examinations. Students are required to withdraw from the program after two failures.

Candidacy examinations normally consist of both a written and an oral component. With the unanimous consent of the examiners that the student has passed, the oral exam can be waived.

Examinations will be held two times a year. The examination periods are: late May or early June, or late September or early October.

Field in Agricultural Economics

Students electing a research specialization in Agricultural Economics are required to complete the Agricultural Economics field examination. Other students in Economics may also take this exam.

The following courses are recommended in preparing for this exam: Advanced Agricultural Marketing (061.710) and Production Economics (061.794). Students are also advised to complete a graduate course in econometrics. In addition a set of extra readings (on seminal applications of marketing and production theory in agriculture) will be made available by the Department Graduate Advisory Committee (DGAC) of Agricultural Economics to students intending to write this field.

If either of the recommended courses has not been offered during the student's Ph.D. program, then a brief directed studies course under Agricultural Economics (AE) supervision will be arranged to assist the student in the subject area. DGAC will choose members of AE to grade the examinations (both written and oral).

Second language reading requirement: none

Expected time to graduation: four years

Course Descriptions

061.710 Advanced Agricultural Marketing (3) Critical evaluation of micro-theory vis-a-vis technical and economic structure of plants; theory of location in relation to time, form, and space. Also offered as 018.790 by the Department of Economics.

061.711 Attributes of Market Organization (3) Analysis of agricultural market structure, conduct, and performance of processing industries.

061.714 Resource Efficiency and Allocation in Agriculture (3) Seminar on research issues in production economics related to technological change, risk and uncertainty, management and firm growth.

061.723 Agricultural Market Regulation (3) A review of economic theories of regulation and their application in agricultural marketing. Analysis of specific regulation in agricultural markets.

061.724 Research in Agricultural Marketing (3) Advanced economic theory and quantitative techniques relevant to agricultural marketing. Topics include model building, market demand and supply, market regulation, and review of literature on marketing research.

061.725 Econometric Models and Methods (3) Logical foundation of econometrics, model building, econometric methods and problems encountered in specification, estimation, verification, and prediction.

061.727 Research Methodology (3) Critical discussion of scientific methodology and the scientific status of agricultural economics. Discussion of methodological issues as they relate to the research process in agricultural economics.

061.730 Topics in Agricultural Economics (3) Application of economic analysis to contemporary problems in agriculture.

061.731 Agricultural Economic Development (3) Theory and policy of agricultural development in underdeveloped countries: problems of stimulating growth in agriculture and evaluation of alternative approaches to economic development of agriculture. *Prerequisite:* consent of instructor.

061.733 Transportation Economics and Research (3) Rate determination and cost analysis for different modes of transportation; transportation issues in Canadian agriculture; and research techniques in transportation problems. *Prerequisite:* consent of instructor.

061.735 Regional Development (3) Review policy, goals, theories, methods and ap-

plications relevant to analyzing Canadian and developing country rural development, regional economic growth and project evaluation.

061.736 Current Issues in Policies Relating to Agriculture (3) Seminar dealing with current issues in policies relating to agriculture.

061.737 Concepts of Agribusiness (3) Analysis of interrelationships within agricultural sector and between agricultural and non-agricultural sectors.

061.738 Agricultural Policy (3) Bearing of economic theory on agricultural policy: relevance of allocative efficiency, distributive equity and other criteria, and economic evaluation of alternative policies.

061.739 Applied Optimization (3) Application of linear and non-linear programming techniques to Agricultural Economics research. Emphasis on interpretation of conditions which ensure optimality for programming techniques. *Prerequisite:* 061.252 or 027.215. Students may not hold credit for both 061.252 and the former 061.414.

061.740 Forecasting and Simulation Models (3) Application of simulation modelling to characterizing and predicting the behaviour of complex systems (ecological, engineering and economic). Foundations of simulation and statistical approaches to analysis are emphasized.

061.741 Agricultural Finance (3) Analysis of financial structure of agricultural firms, analysis of financial markets and institutions, investment analysis, financial analysis, and risk management methods including futures and options.

061.742 Advanced Seminar in Agricultural Trade and Economic Development (3) Critical examination of current issues in agricultural trade and economic development. *Prerequisite:* 061.728, 061.731 or 061.763.

061.743 Advanced Theory of Resource Economics (3) Economic theory of the development and management of natural resources. Application of capital theory, investment theory, the theory of externalities and decision-making theories to resource utilization and management. A strong background in microeconomics is required. Also offered as 018.743 by the Department of Economics.

061.744 Renewable Resource Economics (3) A research seminar in applied economic analysis of the development and management of renewable natural resources, concentrating on specific topics and policy issues in water resources, agriculture, environmental quality, forestry, fisheries, game, outdoor recreation and other renewable resources. Also offered as 018.744 by the Department of Economics.

061.745 Non-Renewable Resource Economics (3) A research seminar in applied economic analysis of the development and management of non-renewable resources, concentrating on specific topics and policy issues in energy and mineral resources. Also offered as 018.745 by the Department of Economics.

061.746 Research Management (3) Application of research management concepts in agriculture and the resource sectors. Research definitions and methodology; the macro environment in relation to research (social and grantor priorities, economic and institutional constraints, institution and project (micro) level (priorities, objectives, budgeting, time and personnel management, performance assessment): proposal and report writing; project evaluation.

061.763 Theory of International Trade (3) Theories of trade flow; trade and income distribution; economic growth and changes in trade flows; instruments of trade intervention; international labour and capital movements; and economic integration. Also offered as 018.763 by the Department of Economics. Students may not hold credit for both 061.763 and the former 061.728.

061.794 Production Economics (3) Development of static microeconomic theories of the firm, functional forms, aggregation issues, productivity analysis, risk and uncertainty, and an introduction to dynamics. The following are emphasized; a rigorous treatment of the models using duality; a critical understanding of the limitations and possibilities for generalizing the models; and relevance of the models for empirical research, especially in agriculture. Also offered as 018.794 by the Department of Economics. Students may not hold credit for both 018.794 and 061.794 or the former 018.793 or 061.713.

SECTION 2: Animal Science

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Academic Staff

Dean Emeritus

Elliot, J.I., B.S.A. (Toronto), M.Sc., Ph.D. (Alberta), F.A.I.C.

Professors Emeriti

Kondra, P.A., B.S.A., M.Sc. (Manitoba), Ph.D. (Minnesota); **Marquardt**, R.R., B.S.A. (Saskatchewan), M.Sc. (Alberta), Ph.D. (Washington State); **Parker**, R.J., B.Sc. (Glasgow), M.S.A. (Toronto), Ph.D. (Michigan State), Dip. Agr. (Reading); **Seale**, M.E., B.Sc. (Alberta), M.Sc., Ph.D. (Minnesota), F.A.I.C.; **Stringam**, E.W., B.Sc., M.Sc. (Alberta), Ph.D. (Minnesota), F.A.I.C.

Professors

Campbell, L.D., B.S.A.(Hons.), M.Sc. (Manitoba), Ph.D. (Wisconsin); **Connor**, M.L., B.Sc.(Agr.) (Guelph), M.Sc., Ph.D. (Manitoba); **Guenter**, W., B.S.A., M.Sc. (Manitoba), Ph.D. (North Dakota State); **Wittenberg**, K.M., B.S.A., M.Sc., Ph.D. (Manitoba).

Associate Professors

Crow, G.H., B.Sc.(Agr.), M.Sc. (Guelph), Ph.D. (Saskatchewan); **Kennedy**, A.D., B.S.A., M.Sc. (Manitoba), Ph.D. (Alberta); **Lewis**, N.J., B.Sc., M.Sc., Ph.D., D.V.M. (Guelph).

Assistant Professors

House, J.D., B.Sc., Ph.D. (Guelph); **Nyachoti**, C.M., B.Sc. Agric.(Kenya), M.Sc. Ph.D. (Guelph); **Plaizier**, J.C.B., B.Sc., M.Sc. (Wageningen), Ph.D. (Guelph); **Ominski**, K.H., B.Sc., Ph.D. (Manitoba).

Adjunct Professors

McCaughey, W.P., B.Sc. (Guelph), M.Sc., Ph.D. (Saskatchewan); **Shrestha**, J.N.B., B.V.Sc. and A.H. (India), M.Sc., Ph.D. (Minnesota); **Slominski**, B.A., M.Sc., Ph.D. (Glasztyn); **Small**, J.A., B.Sc. (Guelph), M.Sc. (Manitoba), Ph.D. (British Columbia).

Program Information

The department offers graduate programs leading to the M.Sc. and Ph.D. degrees in behaviour, genetics, nutrition or physiology of farm animals. Research programs serve the animal industries by the application of basic sciences to current problems in the industry. Advanced training in the Department of Animal Science prepares M.Sc. and Ph.D. graduates for positions in animal industry organizations, government and academic institutions.

Graduate programs in the Department of Animal Science may encompass a range of activities, and students should expect to receive experience in laboratory analysis, experimental design and analysis, and work with animals, depending on the research project. Research programs will frequently involve collaborative work with other Departments at the University of Manitoba, or with industry or government partners. The Department also participates in the Inter-departmental Ph.D. program in Food and Nutritional Sciences. There is a strong international orientation to graduate studies in the Department of Animal Science since many students are from outside Canada.

Fields of Research

Researchers in the Department of Animal Science conduct research with farm animals in a variety of subject areas, including behaviour, genetics, nutrition and physiology. Experimental species include cattle (beef and dairy), poultry (chickens, turkeys, ducks, geese), sheep, swine, laboratory animals (mice, rats, rabbits, quail) and wildlife animals. Studies may also involve feed and food safety, toxicology or more general fields of livestock and poultry production. This research is supported with funds from a variety of organizations including the Natural Sciences and Engineering Research Council (NSERC), various provincial organizations including Agri-Food Research and Development Initiative (ARDI), as well as industry organizations such as the Canola Council, Manitoba Chicken Producer Board, Manitoba Milk Producers, Manitoba Pork and many others.

Research Facilities

Extensive facilities for all animal and poultry research are available. The Animal Science Building contains spacious and well-equipped laboratories, classrooms and graduate student offices. New animal research facilities are available on campus for all species. Research programs in dairy cattle, beef cattle and swine also utilize facilities at the 525 hectare Glenlea Research station, located 23 km from campus.

M.Sc. in Animal Science

Admission

Applicants normally require a Bachelor of Science in Agriculture degree with a major in Animal Science: however students with other degrees (e.g., B.Sc. Honours or General) may be accepted. In these latter instances students, depending on their academic background, may be required to complete a pre-Master's program or to register for courses additional to those normally required in the Master's program. Please contact the Department for details.

Application Deadlines

Students may begin their program on either September 1, January 1, May 1 or July 1. For admission on each of these start dates, Canadian and U.S. students should send their applications with complete supporting documentation to the Department of Animal Science no less than four (4) months before the intended start date. International students should send their applications with complete supporting documentation to the Department of Animal Science for screening so that the department may receive the application no less than seven (7) months before the intended start date.

Program Requirements

There are two types of Master's programs:

Program A:

Coursework and Thesis Requirements

- A minimum of 12 credit hours of coursework in addition to 035.714.
- A minimum of 6 credit hours at 700 level in the major subject.
- A minimum of 3 credit hours in an ancillary subject.
- Thesis and oral examination.

Program B:

Coursework and Comprehensive Examination Requirements

- A minimum of 30 credit hours in coursework, in addition to 035.714.
- 12-18 credit hours in the major subject at the 700 level.
- 6-12 credit hours in an ancillary subject(s).
- Comprehensive examination.

Second language requirement: none

Expected time to graduation: two years

Ph.D. in Animal Science

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this Calendar.

Application Deadlines

Students may begin their program on either September 1, January 1, May 1 or July 1. For admission on each of these start dates, Canadian and U.S. students should send their applications with complete supporting documentation to the Department of Animal Science no less than four (4) months before the intended start date. International students should send their applications with complete supporting documentation to the Department of Animal Science for screening so that the department may receive the application no less than seven (7) months before the intended start date.

Program Requirements

Minimum Program requirements are outlined in the Graduate Studies Regulations Section of this Calendar.

In addition, Ph.D. students must take 035.739 "Advanced Animal Science Seminar".

Interdepartmental Ph.D. Program

Requirements for the Interdepartmental Ph.D. program in Food and Nutritional Sciences are given in the section entitled "Interdisciplinary Programs and Courses" (Section 34.2).

Second language reading requirement: none

Expected time to graduation: three years if continuing from an M.Sc. program

Course Descriptions

035.714 Animal Science Seminar (1-0:1-0) 3 Reports and discussions on current problems and investigations with mammals and poultry.

035.722 Genetic Principles of Animal Improvement (3-0:0-0) 3 Designed for the development of a framework of theory for the study of the genetics of populations. Changing gene frequency. Genetic and environmental subdivision of the phenotypic variance. Principles of selection. *Prerequisite:* 035.350 or the former 035.310 or equivalent.

035.736 Advanced Reproductive Physiology, Male (0-0:3-0) 3 A lecture-seminar course on sexual function and testicular physiology in males of livestock species; environmental factors influencing reproductive efficiency: recent developments in semen preservation and artificial insemination. Offered in 2004-2005 and alternate years thereafter.

035.737 Advanced Reproductive Physiology, Female (0-0:3-0) 3 A lecture-seminar on current topics related to female reproduction in the livestock species. Offered in 2003-2004 and alternate years thereafter.

035.738 Endocrine Control of Animal Metabolism (3-0:0-0) 3 A lecture-seminar course on current topics concerning the control of physiological processes of importance in domestic animal species. Offered in 2003-2004 and alternate years thereafter.

035.739 Advanced Animal Science Seminar (1-0:1-0) 3 Ph.D. candidates are expected to complete a grant application form, review and critique current literature, and present a seminar on current research topic.

035.740 Quantitative Genetics in Animal Science (3) A study of advanced techniques used in animal breeding research, their theoretical basis, analysis and interpretation. Case studies in the student's area of interest will be examined. *Prerequisite*: 035.722 or its equivalent.

035.744 Protein Nutrition and Metabolism (0-0:1.5-0) 1.5 Lectures and critical reviews will be used to discuss recent/significant research advances in the fields of protein nutrition and metabolism, pertinent to mammalian physiology. Also offered as 030.744 by the Department of Human Nutritional Sciences. Not to be held with the former 035.735. Offered in 2003-2004 and alternate years thereafter.

035.745 Energy and Carbohydrate Nutrition and Metabolism (0-0:1.5-0) 1.5 Lectures and critical reviews will be used to discuss recent/significant research advances in the field of energy/carbohydrate nutrition and metabolism, pertinent to mammalian physiology. Also offered as 030.745 by the Department of Human Nutritional Sciences. Not to be held with the former 035.717. Offered in 2003-2004 and alternate years thereafter.

035.746 Lipid Nutrition and Metabolism (0-0:1.5-0) 1.5 Lectures and critical reviews will be used to discuss recent/significant research advances in the field of lipid nutrition and metabolism, pertinent to mammalian physiology. Also offered as 030.746 by the Department of Human Nutritional Sciences. Offered in 2004-2005 and alternate years thereafter.

035.747 Vitamin Nutrition and Metabolism (1.5-0:0-0) 1.5 Lectures and critical reviews will be used to discuss recent/significant research advances in the field of vitamin nutrition and metabolism, pertinent to mammalian physiology. Also offered as 030.747 by the Department of Human Nutritional Sciences. Not to be held with the former 035.734. Offered in 2004-2005 and alternate years thereafter.

035.748 Mineral and Trace Element Nutrition and Metabolism (0-0:1.5-0) 1.5 Lectures and critical reviews will be used to discuss recent/ significant research advances in the field of mineral nutrition and metabolism, pertinent to mammalian physiology Also offered as 030.748 by the Department of Human Nutritional Sciences. Not to be held with the former 035.734. Offered in 2004-2005 and alternate years thereafter.

035.749 Phytochemical Nutrition and Metabolism (1.5-0:0-0) 1.5 Lectures and critical reviews will be used to discuss recent/ significant research advances in the field of phytochemical nutrition and metabolism, pertinent to mammalian physiology. Also offered as 030.749 by the Department of Human Nutritional Sciences. Offered in 2003-2004 and alternate years thereafter.

035.750 Methodology in Agricultural and Food Sciences (3-0:0-0) 3 The application of experimental techniques and procedures to agricultural and food sciences research. Recording, processing, interpretation, and critical appraisal of experimental data. Not to be held with the former 035.726.

035.751 Special Topics in Animal Nutrition (3) Students will be required to investigate and report on a nutrition problem in a species other than that of their thesis research. Projects may be avian, bovine, ovine, swine or laboratory animal species.

035.752 Special Topics in Animal Improvement (3) Assigned readings, papers and discussions specific problems in animal genetics. Analysis of original data may be required.

035.753 Special Topics in Animal Physiology (3) Students will investigate a minor research problem in an area of physiology other than that in which the major is being taken. Problems areas may include: digestion, environment, renal function or reproduction.

035.754 Advanced Applied Animal Nutrition (3-3:0-0) 3 An advanced study of the theoretical and applied aspects of monogastric and ruminant nutrition. A laboratory component will provide training in current techniques in feed analyses and computer modeling. Offered in 2003-2004 and alternate years thereafter.

035.755 Special Topics in Animal Behaviour and Welfare (3) Assigned readings, papers and discussions on specific issues in animal behaviour. A short behavioural experiment may be required.

SECTION 3: Anthropology

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E-mail: um-anthro@cc.umanitoba.ca
Website: www.umanitoba.ca/arts/anthropology/

Academic Staff

Professor Emeritus

Townsend, J.B., B.A., Ph.D. (UCLA)

Senior Scholars

Burchard, R.E., B.S. (Minnesota), M.A., Ph.D. (Indiana); **Koolage**, W.W., Jr., A.B. (Dartmouth), M.A., Ph.D. (North Carolina); **Shay**, C.T., B.A., M.A., Ph.D. (Minnesota).

Professors

Greenfield, H.J., B.A., M.A., Ph.D. (CUNY); **Judd**, E.R., B.A.(Hons.) (Queen's), M.A., Ph.D. (UBC), Diploma (Beijing Language Institute and Fudan U, Shanghai); **Rubenstein**, H., B.A., M.A., Ph.D. (Toronto); **Szathmáry**, E.J.E., B.A. (Hons), Ph.D., LL.D. (Toronto); **Wiest**, R.E., B.A. (Tabor College), M.A., Ph.D. (Oregon).

Associate Professors

Allaire, L., B.A. (Collège-de St. Laurent), B.Sc., M.A. (Montreal), M.Phil., Ph.D. (Yale); **Burke**, A.M., B.A. (Ottawa), M.Sc. (Southampton), M.Phil., Ph.D. (NYU); **Chodkiewicz**, J-L., L.-ès-L. (Sorbonne), Ph.D. (Columbia); **Hoppa**, R.D., B.Sc. (Toronto), M.Sc. (Sheffield/Bradford), Ph.D. (McMaster); **Monks**, G.G., B.A., M.A. (Victoria), Ph.D. (UBC); **Pentland**, D.H., B.A. (Hons) (Manitoba), M.A., Ph.D. (Toronto); **Rokala**, D.A., B.A., M.A. (Colorado), Ph.D. (Minnesota); **Schwimmer**, B.E., B.A. (St. John's, MD), M.A. (SUNY Binghamton), Ph.D. (Stanford); **Stymeist**, D.H., B.A. (Wayne State), M.A., Ph.D. (Toronto).

Assistant Professors

Buddle-Crowe, K.A., B.A. (Concordia), M.A. (Western Ontario), Ph.D. (McMaster); **Frohlick**, S.E., B.A., M.A. (Simon Fraser), Ph.D. (York).

Adjunct Professors

Berkes, F., B.Sc., Ph.D. (McGill); **Bridgman**, L., B.A., B.M. (Toronto), M.A., Ph.D. (York); **Brown,** J.S.H., B.A. (Brown U), M.A. (Harvard), Ph.D. (Chicago); **Bruce**, S.G., B.N., M.A., Ph.D. (Manitoba); **Clarkson,** P.B., B.A. (Colgate), M.A., Ph.D. (Calgary); **Fulford**, G., B.A. (Trent), B.A.A. (Ryerson), M.A. (Western), Ph.D. (McMaster); **Hamilton**, J.S., B.A. (Brandon), M.A. (Alberta), Ph.D. (Simon Fraser); **Kaufert**, J.M., B.A. (Minnesota), M.A., Ph.D. (Northwestern); **Malainey,** M.E., B.A. (Alberta), M.A. (Saskatchewan), Ph. D. (Manitoba); **Meiklejohn**, C., B.Sc. (Carleton), Phil.M., Ph.D. (Toronto); **Oakes**, J.E., B.H.Ecol., M.Sc., Ph.D. (Manitoba); **O'Neil**, J.D., B.A., M.A. (Saskatchewan), Ph.D. (Berkeley); **Petch**, V.P., B.A., B.Ed. (Lakehead), M.A., Ph.D. (Manitoba); **Pettipas**, K., B.A., M.A., Ph.D., (Manitoba); **Syms**, E.L., B.A., M.A. (Manitoba), Ph.D. (Alberta); **Trott**, C.G., B.A. (Toronto), B.Th.(McGill), Ph.D. (Toronto).

Program Information

The department offers programs leading to the Master of Arts and the Doctor of Philosophy degrees. There are 50-60 graduate students in the department.

Graduates work in universities and colleges as professors or specialists, in the Foreign Service, in health related institutions, in museums, in education, in government heritage positions, for the International Development Research Centre, and in counselling for Native municipal boards. Others have chosen to be free lance anthropologists; some have incorporated their own successful companies.

Fields of Research

The department's research focus, and consequent graduate training and undergraduate teaching emphasis, lies in the following:

Sociocultural Anthropology: Social theory, development theory, political economy and culture, symbolic anthropology, industrial and market economy impacts, migration and displacement, gender. Aboriginal Canada, Canada, Bangladesh, China, Mexico, Nepal, St. Vincent.

Archaeology: Theory and methods, zooarchaeology, environmental archaeology, settlement patterns, domestication, fur trade, historic and prehistoric archaeology. Western Canada, the Caribbean, the Balkans, South Africa, Ukraine, Near East.

Biological Anthropology: Population biology, biomedical anthropology, demographic anthropology of contemporary and past populations, bioarchaeology, forensic anthropology, ageing and longevity, diabetes in Aboriginal North America.

Research Facilities

The Department of Anthropology is located in the Arts Faculty Complex. Laboratory facilities for archaeology and physical anthropology, the C. Thomas Shay Archaeobotanical Collection and the Bioanthropology Digital Image Analysis Laboratory, housed in the Duff Roblin Building, permit advanced study and research. Computer facilities are housed in the department and the Anthropology Laboratory. The University Library system has a collection of anthropological material, including the Human Relations Area Files. The department has a specialized publication series (UMAP). Faculty and students also use the Provincial Archives, the Hudson's Bay Company Archives, and the Manitoba Museum.

M.A. in Anthropology

Admission

In addition to the minimum admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, an advanced (four year) degree in Anthropology is the normal preparation for the M.A. program. Students with a different background will normally take a year of pre-M.A. studies consisting of up to 24 hours of courses from the undergraduate, and especially the Advanced, curriculum. These courses are to be assigned by the department head, who is advisor for all pre-M.A. students, upon recommendation of the Graduate Programs Committee. Consult the Anthropology Department for further details.

Admission Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 6 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 9 months prior to their intended start date.

Program Requirements

In addition to the minimum course requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*, students must complete a minimum number of 24 credit hours of graduate coursework. In addition, within the first six months of residence in the M.A. program, submit a program of study and research to the Graduate Programs Committee. Finally students must submit an acceptable thesis and pass a thesis oral examination.

Second Language Reading Requirement: None
Expected Time to Graduate: 2 - 3 Years

Ph.D. in Anthropology

Admission

All requirements for the M.A. degree must be completed. Preference will be given to applicants who have demonstrated independent research competence at the Master of Arts level.

Admission Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 6 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 9 months prior to their intended start date.

Program Requirements

In addition to the minimum course requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, students must complete 18 credit hours above the M.A. level, including at least 15 credit hours of Anthropology courses at the 700 level.

Second language requirement: yes
Expected time to graduation: 5-6 years

Course Descriptions

General

076.763 History of Anthropological Theory (3) A broad overview of the history of anthropological theory and method from the 18th century to World War II. Focus on British and American developments in the context of the rise of industrialization and imperialism.

076.764 Contemporary Anthropological Theory (3) Investigation, comparison and evaluation of contemporary approaches to culture theory in the areas of symbolism, social organization and ecology.

076.765 Applied Anthropology (3) Investigation of major case studies, research methodologies, intervention strategies, and substantive areas of application in applied anthropology. Topical emphases such as economic development, health care delivery, resettlement schemes, will reflect the interests of the instructor.

076.794 Graduate Reading and Research 1 (3)

076.795 Graduate Reading and Research 2 (3)

Cultural Anthropology

076.704 Seminar in Ethnography of Power Systems (3) Comparative study of a particular theme or problem in political anthropology.

076.705 Seminar in the Anthropology of Religion (3) An intensive analysis of religion as a cultural subsystem, dealing comparatively with ideologies, rituals, and ceremonies and the various anthropological theories put forward to explain religious behaviour.

076.707 Seminar in the Anthropology of Illness (3) Selected topics in the study of cultural factors involved in health/illness, with emphasis upon a particular cultural system.

076.713 Cultural Ecology (3) An examination of the systematic nature of culture and its interrelationships with natural environmental factors.

076.714 Ethnographic Research Methods (3) Approaches and techniques in field research.

076.780 Seminar in Ethnohistory (3) A critical examination of methods and theories appropriate for ethnohistorical analysis of socio-cultural phenomena, with selected case studies.

076.781 Seminar in Culture Change (3) Focuses on theoretical investigation of social and cultural changes in cross cultural perspective. Includes treatment of evolutionist, ecological, acculturation and Marxist approaches.

076.782 Ethnology of a Selected Area (3) Comparative and theoretical investigation of the social and cultural institutions of a particular cultural region. The area selected will depend upon the interests of the instructor.

076.783 Social Organization (3) Selected theories of social organization in cross cultural perspective. Subject matter may include kinship, age grading, territorial groupings, social stratification or ethnicity.

076.790 Problems in Ethnological Research (3)

Archaeology

076.735 Prehistoric Human Ecology (3) Data and techniques involved in the reconstruction of past environments, with special emphasis on the influences of environment on prehistoric cultural development.

076.738 Archaeological Laboratory Techniques (3) Laboratory techniques for analysis and presentation of archaeological data.

076.740 Seminar in the Archaeology of a Selected Area (3) An intensive survey of the archaeology of a major region or culture area of the world. Content will vary according to the interests of the instructor.

076.741 Seminar in Selected Topics in Archaeology (3) The seminars will consist of an intensive examination of major methodological, analytical and interpretive issues in current archaeological research. Content will vary according to the interests of the instructor.

076.743 Archaeological Interpretive Methods (3) This course is an intensive seminar on major methodological issues in archaeological analysis and interpretation. Students may not hold credit for both 076.743 and the former 076.742.

076.744 Archaeological Theory (3) Archaeological theory as seen from historical and contemporary perspectives. Students may not hold credit for both 076.744 and the former 076.742.

076.745 Cultural Resource Management (3) An intensive examination of archaeological cultural resource management. Emphasis will be placed on current Canadian CRM issues and on practical applications of concepts and methods.

076.746 Advanced Faunal Analysis in Archaeology (3) The course will cover the major theoretical, methodological and practical issues in the analysis of archaeological faunal remains. Topics are addressed through lectures, demonstrations and laboratory exercises. Prerequisite: 076.399 or written consent of instructor.

Physical Anthropology

076.772 Seminar in Human Adaptability (3) An intensive study of human population biology in diverse environments inhabited by human populations. Emphasis on selected examples of cultural adaptability as a specifically human mechanism for dissipating stress on the biological system.

076.774 Medical Anthropology 1 (3) An examination of the interrelationships between human ecology, human biology, and public health. Genetic and environmental factors in human disease. Design and implementation of field studies in the investigation of human disease. Methods of detection, ascertainment, and analysis of human population pathology.

076.775 Medical Anthropology 2 (3) Population structure and environment in human genetic disease. Comparative consideration of genetic pathology of New and Old World populations.

076.777 Human Population Structure 1 (3) Demographic-genetic structure of human populations. Population growth, technology, and demographic structure. Comparative demographic structures of human population.

076.778 Human Population Structure 2 (3) Demographic-genetic structure of human populations. Major emphasis upon comparative analysis of the genetic structures of human populations. Cultural factors in the genetic structure of human populations.

076.779 Advanced Topics in Human Skeletal Biology (3) Analysis of metric and nonmetric morphological skeletal variation in human populations, with emphasis on the cultural and physical environment. Exemplary problems are drawn from the literature as well as from current research.

076.793 Special Problems in Human Biology (3)

SECTION 4: Architecture

Head and Graduate Chair: R.I. Macdonald
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Academic Staff

Professors Emeriti

Graham, J., B.Arch. (Manitoba); **Sellors**, R. J., B.Arch. M.Arch. (M.I.T.), F.R.A.I.C., M.A.I.A., A.R.I.B.A., F.R.S.A.

Professors

Enns, H., Dip.Arch.Tech. (RRCC), B.E.S., M.Arch. (Manitoba); **Macdonald**, R.I., Dip.Arch.Tech. (Ryerson), B.Arch. (Manitoba), M.R.A.I.C.

Associate Professors

Epp, E., B.E.S., M.Land.Arch. (Manitoba), M.Arch. (McGill), M.R.A.I.C.; **Subotincic**, N., B.Arch. (Carleton), M.Arch. (McGill).

Assistant Professor

Aquino, E., B.Arch. (San Paulo), M.F.A. (Concordia), C.R.E.A.; **Fuglem**, T., B.Arch. (Carleton), M.Arch. (McGill); **Harrop**, P., Dip.Des. (Ottawa), B.Arch. (Carleton), M.Arch. (McGill), M.A.A.; **West**, M., B.Arch. (Cooper Union), M.Arch. (Carleton).

Adjunct Professors

Chon, J-S, B.Sc. (Seoul), Dip. Hons. (McGill), M.Arch. (Manitoba); **Kramer-Wolfart**, C., B.A. (Calvin), B.Arch. (Michigan), M.Arch. (Princeton); **Minuk**, N., B.A. (Manitoba), M.Arch. (Manitoba); **Monteyne**, T., B.E.S. (Manitoba), B.Arch (Waterloo), M.A.A.; **Syverson**, D., B.A. (Alberta), M.Arch. (Manitoba), M.A.A.

Program Information

The Department of Architecture offers a course of studies directed towards a professional Master of Architecture degree. The program examines social, technological, and historical paradigms, where architects act as interpreters of and participators in cultural endeavour and ambition. Primarily, the coursework focuses on transforming the lessons of history, culture, region (place), and social aspiration into a program for architecture. Students are offered latitude to experiment with ideas and methods as they develop an awareness of how they, as socially responsible individuals, approach architectural designs. A core syllabus of sequential design studios covers a wide spectrum of investigations, ranging in scale from different building types to urban design. The Department of Architecture provides an excellent platform for discussing issues of sustainability and urban rehabilitation, assuring relevance within a global context, and placing emphasis on basic human needs.

The Master of Architecture program is Accredited by the Canadian Architectural Certification Board (CACB), with most graduates proceeding to professional registration and careers as practising architects. The majority of graduates pursue their careers in cities across Canada and abroad. The alumni of this design school are actively engaged in the design professions working and contributing to the built environment in all continents. They add to the rich and diverse cultural heritage and continue to share with the many diverse communities they will eventually serve in their chosen field.

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

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

Master of Architecture (M.Arch.)

Admission

In addition to the minimum admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, admission to the M.Arch. program is competitive and normally limited to 25 new positions per year. The applicant pool normally includes representation from the following streams; graduates of the Faculty of Architecture's undergraduate programs of Environmental Design (formerly Environmental Studies); as well as applicants with pre-professional design degrees from other academic institutions, both in Canada and abroad; and applicants with non-design degrees for the Department of Architecture Pre-Master's Qualifying program. Students with other degrees or backgrounds may be eligible for admission to a pre-Master's program to the satisfaction of the department. Students must complete a number of required courses in the pre-Master's year to qualify to apply to the Master of Architecture program. Contact the Department of Architecture for further information.

Applicants with Design Degrees (B.E.D., or equivalent)

Environmental Design graduates require a minimum of "C+" in courses 079.256/267, 079.356, 079.357, 079.359/368, 079.360/369.

Contact the Department of Architecture for additional application requirements.

Application Deadlines:

Students should submit their application and supporting documentation to the Department by the dates indicated.

Start Date	Canadian/US	Non-Canadian/Non-US
Regular - September 1st	15 April	01 December
Winter - January 1st	01 September	01 March

Program Requirements

Required courses

050.734	Professional Practice	3
050.735	Legal Aspects of Architectural Practice	3
050.736	Program Preparation	3
050.755	Studio Five	6
050.756	Studio Six	6
050.757	Studio Seven	6
050.758	Contemporary Theory and Criticism in Architecture (and Urban Design)	3
050.759	Urbanism	3
050.760	New Building	3
050.761	Structural Concepts in Architecture 2	3
	700 level electives required by department	9
69.700	Thesis	
	or	
69.701	Comprehensive Examination (prerequisite 050.736)	

Second language reading requirement: none
Expected time to graduation: two years

Ph.D.

The Department of Architecture does not offer a Ph.D. program.

Course Descriptions

050.632 General History of Architecture (3) provides a chronological survey of architectural history from the origins of Western civilization until the present. Issues of technology, social role of architects, the development of the profession, and the key practitioners and their achievements are highlighted.

050.637 Computer-Aided Design (3) provides an introduction to the theory, techniques, and application of computers throughout all phases of the design process, and requires a basic familiarity with computer programming.

050.638 Studio One (6) An exploration of elements of composition and three-dimensional order. Design is seen as a process of concept formation as well as structuring of space within and outside an object; with exercises to develop necessary knowledge base and skills (drawing, drafting, and model building). Input lectures and seminars on: orientation to architecture; basic design principles; building construction; and theory of structures.

050.639 Studio Two (6) An examination of the various phases of the total design process; complexity is introduced in exercises with simultaneous manipulation of several interacting scales to more complex variables of architectural ideas and building technology. Input lectures and seminars on: design theory, light and colour theory; graphic presentation techniques; building materials and systems; and more advanced structures in architecture.

050.640 Studio Three (6) An exploration of a variety of problem-solving exercises for single-and multi-function buildings in urban and rural settings. The physical context and increasing number of determinants introduces diverse methods of approach and develops architectural vocabulary. Input lectures, seminars and site visits on: site and climatic factors; communication techniques, economic and technological limitations; and construction documents.

050.641 Studio Four (6) An examination of projects in a selected urban environment with distinctive social, cultural, political, economic and environmental constraints. Input is provided in the form of lectures, seminars, site visits and forums by professionals familiar with these factors in the selected urban environment. Prerequisite: 079.360.

050.642 Behaviour in Design (3-0:0-0) 3 An exploration of human behaviour and its interrelationship with the design and shaping of the built environment; the relationship of language, culture and environmental cues to human behaviour. May not be held for credit with the former 079.313 or 051.313.

050.643 Tectonic Precedents (0-0:3-0) 3 An examination of built works of environmental design from the 19th and 20th centuries, with emphasis on examples that are representative of diverse positions on key issues in design practice. May not be held for credit with the former 079.214 or 051.240 for credit.

050.644 Cultural Theory in Architecture (3-0:0-0) 3 A study of theoretical critiques of architecture from both within and without the discipline in their historical, political and cultural context. May not be held for credit with the former 079.347.

050.645 Inquiry by Design (3-0:0-0) 3 An exploration of design/research, to contrasting design and research via dialectical and practical inquiry. Research design and research methods instruction, in support of applied research to critique design theory and to build new design knowledge.

050.646 History of Modern Architecture (3-0:0-0) 3 An examination of key architectural treatises of the 19th and 20th centuries that are representative of the predominant ideals of their time and the influence they have had in the construction of the built environment.

050.647 Canadian Architecture (3) An examination of the reverse chronological order beginning with the present and concluding with the arrival of European settlers in the seventeenth century. Prerequisite: 079.269 or consent of the instructor. Not to be held for credit with 050.613.

050.648 Structural Concepts in Architecture 1 (3) An orientation of the principles and applications associated with manufacture of construction materials and assemblies used in environmental design with an emphasis on resource impact. Study of loading conditions, systems of forces and conditions of equilibrium for two and three dimensional structures. May not be held for credit with the former 079.155 or 051.155.

050.649 Building Science 1 (3) Examination of structural and construction systems applied in a variety of building and site conditions and the principles associated with foundation system selection and design. Masonry, timber framing structural systems and basic principles of building enclosure are review through lectures, laboratory assignments and design studio projects. May not be held for credit with the former 079.255 or 051.244

050.650 Building Science 2 (3-0:0-0) 3 Examination of principles and methodologies associated with structural and construction decisions in architecture. Aspects of life safety including evacuation design and fire protection to Canadian standards are explored. Economic factors in building decisions are reviewed within the context of the architectural design process. May not be held for credit with the former 079.356.

050.651 Integrated Environmental Systems (0-0:3-0) 3 Principles, environmental parameters and methodologies associated with the design of plumbing, electrical and mechanical systems in buildings. The potential of utility systems as integrated architectonic elements is examined within a combination of case studies and related studio projects. May not be held for credit with the former 079.357.

050.652 Lighting and Acoustics (3) Principles and methodologies associated with acoustics, natural and artificial lighting in environmental design are examined within the context of appropriate case studies, laboratory assignments and studio projects.

May not be held for credit with the former 079.259 or 051.246.

050.734 Professional Practice (3) is concerned with the duties and responsibilities of an architectural practice; its divisions, office organization and administration. The lectures relate in scope and standard to current practice and its requirements, specifically to Manitoba and Canada.

050.735 Legal Aspects of Architectural Practice (3) discusses the importance of the knowledge of law as it relates to professional practice of architecture, including a discussion of the historical development of legal responsibilities of a practicing professional generally and of architects specifically. There is also discussion of trends in the development of professional responsibility and liability.

050.736 Program Preparation (3) provides instruction and direction in preparing detailed functional programs for an architectural project. It encompasses statement of objectives, all design determinants, information gathering systems, survey, statistics, and user requirements. Approval of the program prepared in this course is a prerequisite of the Thesis or Comprehensive Exam.

050.755 Studio Five (6) An exploration of the regional context for the purpose of analyzing the impact and form stimulating qualities of site and specific climatic determinants on built and natural environments. Input lectures, seminars and site descriptions cover: site analysis, principles of landscape architecture and design, energy conservation; environment.

050.756 Studio Six (6) Study of the constraints in the analysis of mixed-use projects on urban sites. Explores diverse concepts beyond program, and deals with factors reflecting social and technological change. Input lectures and seminars identify directions determining program and implementation including: the development process, user group objectives; refit to respond to changing conditions, building by-laws and codes.

050.757 Studio Seven (6) The study of urban design. as a process of inquiry, with an analysis of social, economic and political attitudes and a synthesis of form-generating aspects of these factors of the urban scene. Input lectures, seminars and visits cover principles and objectives of urban design; joint venture with multi-disciplinary teams; city planning; and work with private and public sector.

050.758 Contemporary Theory and Criticism in Architecture (and Urban Design) (3) The development of a theoretically informed base for design activity responding to a variety of studio themes. Strategic positions are examined within the context of history, theory, structures, construction, environmental behaviour and design technique.

050.759 Urbanism (3) An examination of past and current notions of the North American city through a historiographic/theoretical reading of the city - applied to the development of human settlement - from Greek antiquity to the present day. Speculative ideas about the future form of the city will also be examined.

050.760 New Building (3) Syntheses of conceptual and technical aspects of architecture - site manipulation and landscape, systems of fabrication, weathering, climatic constraints, sequences of construction, interior fittings - in the consideration of contemporary precedent, 20th century technical innovation, and advanced building construction methods.

050.761 Structural Concepts in Architecture 2 (3) A study of contemporary structural concepts and systems, their characteristics and behaviour. Examination of how structures resist and respond to external influences, loads and forces.

Elective Courses

Students in the program have access to a wide array of elective opportunities within the department, within the Faculty of Architecture graduate programs - Landscape Architecture, City Planning, and Interior Design and within the broader university. This access to an extensive array of electives supports great flexibility in establishing an independent course of studies for graduate students in the program. A listing of electives offered by the Faculty of Architecture is published prior to registration.

Thesis or Comprehensive Examination

069.700 Thesis should show in general, that the student has mastery of the field and is fully conversant with relevant literature. Thesis students must pass an oral examination on the subject of the thesis and matters relating thereto as prescribed by the department.

069.701 Comprehensive Examination takes the form of an exercise in the practical application of knowledge and skills, involving the careful definition of a problem and a report on the results in a manner suitable for evaluation by an examining committee. The comprehensive examination is an independent work, for an architectural project selected to demonstrate professional knowledge and skills, culminating in a public presentation. A faculty member serves as an advisor. Consultation, advice, and criticism will be provided by other members of the Faculty and specialized professionals in various technical and related fields.

SECTION 5: Biochemistry and Medical Genetics

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Academic Staff

Distinguished Professor Emeritus

Hamerton, J.L., B.Sc., D.Sc.(London), F.C.C.M.G.

Professor Emeritus

Blanchaer, M.C., B.A.(Hons.), M.D., C.M.(Queen's); **Dakshinamurti**, K., B.Sc. (Madras), M.Sc., Ph.D. (Rajputna), F.R.I.C.; **Stevens**, F.C., Licentiate (Ghent), Ph.D. (California), D.Sc.(Belgium).**Yamada**, E.W., B.Sc., M.Sc., Ph.D.

Senior Scholar

Haworth, J., M.D. (Birmingham), D.C.H., F.R.C.P. (London), F.R.C.P.C.

Professors

Arthur, G., B.Sc.(Hons.) (Ghana), Ph.D. (Leeds); **Choy**, P., BSc. (McGill), M.Sc., Ph.D. (North Dakota); **Chudley**, A.E., M.D. (Manitoba), F.R.C.P.C., F.C.C.M.G.; **Davie**, J.R., B.Sc.(Hons.), Ph.D. (UBC); **Evans**, J.A., B.Sc., Ph.D. (Leicester), F.C.C.M.G.; **Greenberg**, C.R., B.Sc., M.D., C.M. (McGill), F.R.C.P.C., F.C.C.M.G.; **Mowat**, M.R.A., B.Sc., Ph.D. (Manitoba); **Murphy**, L.C., B.Sc.(Hons.), Ph.D. (Sydney); **Orr**, W., M.D., F.R.C.P.C.; **Szathmáry**, E.J.E., B.A. (Hons), Ph.D., LL.D. (Toronto); **Wilkins**, J.A., B.Sc., (Waterloo), Ph.D. (Manitoba); **Woods**, R., B.A., M.A., D.Phil. (Oxford.); **Wright**, J.A., B.Sc., M.Sc., Ph.D.; **Wrogemann**, K., Dr. med. (Marburg), Ph.D. (Manitoba); **Zelinski**, T., B.Sc., M.Sc., Ph.D. (Manitoba).

Associate Professors

Bhullar, R.R., B.Sc.(Hons.) (McMaster), Ph.D.; **Chodirker**, B.N., M.D. (Manitoba), M.Sc., F.R.C.P.C., F.C.C.M.G.; **Dawson**, A.J., B.Sc.(Hons.), M.Sc., Ph.D. (Western Ontario), F.C.C.M.G.; **Dembinski**, T.C., B.Sc. (St.Andrews), M.Sc. (Leeds), Ph.D. (Wales); **Hatch**, G.M., B.Sc. (Winnipeg), M.Sc. (Saskatchewan), Ph.D.; **Hicks**, G.G., Ph.D. (Manitoba); **Gietz**, R.D., B.Sc., Ph.D. (Alberta); **Mai**, S., B.Sc., M.Sc., MA (Cologne), Ph.D. (Karlsruhe); **Seargeant**, L., B.Sc.(Hons.) (Western Ontario), Ph.D. (Alberta); **Triggs-Raine**, B., B.Sc.(Hons.) (Manitoba), Ph.D. (Manitoba); **Williams**, G., B.Sc., D.Phil. (Sussex), M.D. (Manitoba), F.R.C.P.C.

Assistant Professors

Amara, F., B.Sc.(Hons.), Ph.D. (Ulster); **Dalton**, J., B.Sc.(Hons.), M.Sc., Ph.D.; **Gibson**, S.B., B.Sc.; Ph.D. (Toronto); **Kupriyanov**, V., B.Sc., Ph.D. (Moscow), D.Sci. (U.S.S.R.); **Leygue**, E., M.Sc.;DEA; Ph.D. (France); **Marles**, S., B.Med.Sc., M.D. (Alberta), F.R.C.P.C., F.C.C.M.G.; **McGowan**, R.A., B.Sc. (Brock), Ph.D. (SONY/AB); **Merz**, D., B.Sc.(Hons), Ph.D. (McGill); **Mesaeli**, N., B.Sc., M.Sc. (Kuwait), Ph.D. (Manitoba); **Parry**, D., Ph.D. (Memorial); **Pind**, S.N., B.Sc.(Hons.) (Queen's), Ph.D. (Toronto); **Prasad**, C., M.D. (Ludhiana, India), F.C.C.M.G., F.A.C.M.G.; **Spriggs**, E., B.Sc.(Hons.) (Manitoba), M.Sc., Ph.D. (Calgary); **Valdimarsson**, G., Ph.D. (Western Ontario); **Wigle**, J., B.Sc.(Hons.) (Queen's), Ph.D. (Ottawa); **Ye**, J., M.Sc., M.D. (PRC).

Adjunct Professors

Beavis, R.C., B.Sc., Ph.D. (Manitoba); **Civetta**, A., Licenciado (Bueanos Aires), Ph.D. (McMaster); **Coulthart**, M.B., Ph.D. (McMaster); **Craig**, D.B., B.Sc. (Mt. Allison), Ph.D. (Dalhousie); **Gong**, Y., M.B. (PRC), M.Sc., Ph.D. (Manitoba); **Vanderwel**, D., B.Sc.(Hons.) (Victoria), Ph.D. (Simon Fraser); **Watson**, P.H., B.A., M.A., B.Chir., M.B.(Cambridge), F.R.C.P.C.

Program Information

The Department of Biochemistry and Medical Genetics is the result of a merger in June 1999 of the Department of Human Genetics and the Department of Biochemistry and Molecular Biology.

Fields of Research

Faculty members are involved in a wide range of research projects in biochemistry and genetics. Supervised research is available in the following areas: apoptosis; lipoproteins and lipidoses; chromatin structure and function; membranes; clinical genetics; metabolic disease; dysmorphology; molecular cytogenetics; functional genomics; molecular basis of cancer and genetic diseases; gene expression; molecular genetics; gene mapping and recombinant DNA; phospholipid metabolism; genetic and molecular epidemiology; protein structure, function, and targeting; genetics of spe-

cial populations; signal transduction; hormone and growth factor action / receptors; and spectroscopy in biodiagnostics.

These areas of study are related specifically to certain diseases including atherosclerosis, androgen resistance syndrome, heart failure, cancer, muscular dystrophy, inborn errors of metabolism, diabetes, hypertension, Alzheimer's disease, cystic fibrosis and congenital malformations.

Research Facilities

Faculty members of the department are housed in several locations on the Bannatyne and Fort Garry campuses, and in affiliated research institutes. The department is well-equipped for studies in both biochemistry and genetics. State of the art computer, transgenic, imaging, and cytogenetic analysis facilities are available in the department or its affiliated centres.

M.Sc. in Biochemistry and Medical Genetics

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. Courses leading to Master of Science degree in Biochemistry and Medical Genetics are open to graduates in Honours or major Science, Medicine or Dentistry. Students with general B.Sc. degrees may be admitted into a pre-Master's program; contact the department for information.

Extensive undergraduate preparation in biochemistry and/or genetics is desired, but students from other disciplines will be considered. An introductory course in biochemistry or genetics and consent of the course director are prerequisites for the courses listed below unless otherwise indicated.

Program Requirements

Program Requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Second language reading requirement: none
Expected time to graduate: 2 – 3 years

Ph.D. in Biochemistry and Medical Genetics

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Program Requirements

Program requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Second language requirement: none
Expected time to graduation: 4 – 5 years

Course Descriptions

All courses listed are NOT offered each year and a minimum enrolment is required for some courses to be offered.

165.709 Cell Biology (6) Comprehensive introduction to the structure and function of cells. *Prerequisite:* consent of instructor.

165.713 Graduate Student Seminar I - (3) (M.Sc. Students)

165.714 Graduate Student Seminar II - (3) (Ph.D. Students)

165.720 Cancer Biology (3) One hour per week on the basic (cellular and molecular) and clinical (diagnostic and treatment) aspects of cancer. Students will give one seminar and submit an essay on an assigned topic. *Prerequisite:* consent of instructor.

165.724 Nucleic Acids: Manipulation, Structure and Function Three hours per week, one term. DNA technology; nucleic acid metabolism, including DNA replication, DNA repair, transcription, and RNA processing; gene/chromosome structure and rearrangement; mutation detection; gene therapy; positional cloning; transgenic animals.

165.729 Developmental Biology (3) Emphasize current principles of organ system development and its application to transgenic approaches to gene function in the context of a whole, developing organism. *Prerequisite*: 165.709 or 022.215 and/or 022.307 or consent of instructor.

082.702 Proteins (3) Three hours per week, one term. Publication, bioinformatics, characterization, expression, structure, folding, and engineering of proteins

082.703 Enzymology (3) Two hours per week, one term. Kinetics and mechanism of action of enzymes.

082.720 Topics in Biochemistry I (3) Advanced study and reading on two topics chosen by the course director in consultation with the student's supervisor. Topics include but are not limited to Neurochemistry, Lipids, Carbohydrates, Biomembranes, Inborn Errors, Cystoskeleton Proteins

082.721 Topics in Biochemistry II (3) Advanced study and reading on two topics chosen by the course director in consultation with the student's supervisor. Topics include but are not limited to Neurochemistry, Lipids, Carbohydrates, Biomembranes, Inborn Errors, Cystoskeleton Proteins

082.725 Gene Expression (3) Three hours per week, one term. Chromatin structure. Structure and function of sequence-specific. DNA binding proteins. Control of transcription.

082.726 Cellular and Molecular Biochemistry (3) Three hours per week, one term. Recent research advances on the study of cellular components, assembly and organization of plasma membrane components, cell signaling, and cell cycle.

125.302 Introduction to Human Genetics (6) Principles necessary to understand and study genetically controlled malformations and diseases and variation in individuals and in populations. Two terms. Lectures, tutorials and assignments. Not to be held with the former 80.301 or 125.301. (Held at Fort Garry Campus. Graduate students wishing to take this course should consult with Dr. J. Evans)

125.704 Seminars in Human Genetics (3) Current research topics in human genetics. A term paper and oral presentation will be required of each student.

125.707 Special Topics in Human Genetics (3) An assignment, tutorial and discussions course taken only through consultation with the head of the department. The topics will vary depending upon students' needs and interests, and may include specialized topics not available in regular course offerings.

125.709 Principles and Practice of Human Genetics (3) Lectures, tutorials and assignments designed to review major topics in human genetics and give practical experience in the analysis and interpretation of human genetics data and critical review of published work.

125.712 Laboratory Methods in Human and Medical Genetics (3) A seminar and assignment course covering and outline of the methods currently in use in human and medical genetic diagnostic and research laboratories. The principles of cell culture, cytogenetic, molecular and biochemical genetic techniques that are used in the diagnosis of human genetic disease and the study of human variation will be reviewed. Students will undertake a practical assignment and write a report. *Prerequisite:* 125.709 or consent of instructor

125.713 Genetic Epidemiology of Human Populations (3) Lectures, tutorials and assignments to evaluate the etiology, distribution and control of disease in groups of relatives and inherited causes of disease in population. *Prerequisite:* 125.709 or consent of instructor.

125.714 Clinical Genetics (3) Focus is on clinical applications and principles of single gene, multifactorial and teratogenic causes of disease. Students will learn by use of reading assignments, tutorials, computer-assisted diagnostic tools and first hand experience in genetics clinics. Major term paper required. One term. *Prerequisite:* 125.709 or consent of instructor.

125.716 Theory and Practice of Genetic Counselling (3) Review of general theoretical and practical aspects of genetic counselling. Students will be instructed in interviewing techniques.

Case presentations will be reviewed and opportunities to observe and partake in genetic counselling will be provided. Term paper. *Prerequisite:* 125.709 or consent of instructor.

125.718 Clinical and Molecular Cytogenetics (3) Cytogenetic methodology; chromosome architecture; karyotype interpretation; indications for referral; chromosome syndromes and anomalies, prenatal diagnosis; chromosomal basis of oncogenesis; flow cytometry; immunogenetics; fluorescent *in situ* hybridization; the application of molecular technology to chromosome analysis. *Prerequisite:* 125.709 or consent of instructor.

137.722 Research Seminar (1) A one-credit pass/fail course. Consists of presentations of the student's current research.

SECTION 6: Biosystems Engineering

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Academic Staff

Dean Emeritus

Laliberte, G.E., B.E., M.Sc. (Manitoba), Ph.D. (Colorado State), PEng.

Professor Emeritus

Muir, W.E., B.E. (Saskatchewan), M.S. (Illinois), Ph.D. (Saskatchewan), PEng.

Professors

Britton, M.G., B.E. (Saskatchewan), M.Sc. (Manitoba), Ph.D. (Texas A&M), PEng; **Cenkowski**, S., B.Sc., M.Sc. (Technical Univ., PL), Ph.D. (Agric. Univ., PL), Sc.D. (Agric. Univ.), PEng; **Jayas**, D.S., B.Sc. (G.B.Pant), M.Sc. (Manitoba), Ph.D. (Saskatchewan), P.Ag., PEng; **Zhang**, Q., B.Sc. (Hefei Polytechnical), M.S., Ph.D. (Pennsylvania State), PEng.

Associate Professors

Sri Ranjan, R., B.Sc. (Peradeniya), M.Sc., Ph.D. (Colorado State), PEng.

Assistant Professors

Chen, Y., B.Sc., M.Sc. (China), Ph.D. (McGill), PEng.; **Cicek**, N., B.Sc. (Turkey), M.Sc., Ph.D. (Cincinnati), EIT; **Mann**, D.D., B.Sc., M.Sc., Ph.D. (Manitoba), PEng; **Paliwal**, J., B.Sc. (G.B.Pant), M.Sc., Ph.D. (Manitoba), P.Eng.

Adjunct Professors

Dick, K.J., B.Sc., M.Sc., Ph.D. (Manitoba), PEng; **Hoemsen**, R.P., B.Sc., M.Sc. (Manitoba), PEng; **Parsons** R.V., B.Sc. (Calgary), M.Sc. (Calgary), MBA (York), PEng; **Petkau** D.S., B.Sc., MBA (Manitoba), PEng; **Symons**, S.J., B.Sc., Ph.D. (University of London); **White**, N.D.G., B.Sc., M.Sc. (Guelph), Ph.D. (Manitoba).

Program Information

The Department of Biosystems Engineering offers graduate programs leading to M.Sc., M.Eng., and Ph.D. degrees. The graduate-studies programs in the department focus on applications of engineering in biological systems. Strong emphasis is placed on assisting graduate students to gain a broad range of skills and experience in conducting interdisciplinary research, in understanding the interrelationships among physical and biological factors, and in written and oral communication.

Fields of Research

Environmental Engineering: Environmental impact assessments of agricultural and food production; biological reduction of wastewater; membrane bioreactor technology; management and utilization of agricultural and food processing wastes; land application of manure; biofiltration; management of environmental odours; protection and remediation of contaminated soil and groundwater; site preparation and selection.

Bio-Processing: Infrared processing of food; superheated steam drying; extraction technologies for complex oil/juice crops; modified atmosphere storage of meat, fruits, and vegetables; fast freezing of fruits; mathematical modelling of food systems; physical, thermal, and rheological properties of foods; water activities of foods; flow of bulk solids; bulk properties of grains and powders.

Post-harvest Preservation of Grains: Grain storing and drying systems; computer simulation of stored-grain ecosystems; physical methods of controlling insects and microorganisms; machine vision for automated handling and classification of grain; properties of grains and oilseeds; expert systems for managing stored products.

Instrumentation: Computer analysis of images for grading, orientation, and automation; near-infrared (NIR) spectroscopy; development and application of neural networks; electronic nose technology; sensors and data acquisition for biological systems.

Power and Machinery: Harvesting and processing of new crops such as hemp and sea buckthorn; precision agriculture; guidance systems for agricultural machinery; tillage and seeding; soil-machine interaction; equipment for manure handling.

Soil and Water Engineering: Irrigation and drainage systems; flow and contaminant transport in porous media; soil-plant-water relations.

Light-Frame Structures: Structural aspects of light-frame buildings; use of wood and other structural materials; bulk solids storage structures (bins and silos).

Bio-environment: Animal production environment; plant growth environment; environments in buildings designed for biological processes.

Research Facilities

Departmental research facilities include: infrared treatment equipment; differential scanning colorimeter; texture analyser; superheated-steam drier; soil bin; tractor cab simulator; universal test machines; loading frames for structural testing of wood beams, columns, and trusses; facilities for studying flow through porous-media; electronic nose; olfactometer; and access to a university farm for research on both animal and crop production.

The Department has a 1400-m^2 state-of-the-art laboratory for research on stored-grain ecosystems. The facility includes: machine vision equipment; a soft x-ray unit; near-ambient, high temperature, infrared and microwave driers; a fan-testing unit; instrumentation for measuring loads in grain storage structures; equipment to measure physical, thermal, biological, and quality characteristics of grains and oilseeds; thermal disinfestation systems; environmental chambers; grain handling and cleaning equipment; and several grain bins.

M.Sc. in Biosystems Engineering

Admission

For admission into the Master of Science program, applicants are normally required to hold a Bachelor's degree in Biosystems Engineering or equivalent from a recognized university. Candidates with degrees in related areas will be accepted at the discretion of the department head.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. A minimum of 18 credit hours of coursework is required, which should include: 034.729; other courses in the 700 series of Biosystems Engineering of not less than three hours of credit; and approved ancillary courses. In addition, a thesis must be submitted based on original research conducted by the student.

Master of Science students are required to spend at least one academic session in full-time resident graduate study. On recommendation of the department head, the residence requirement may be waived in special cases.

Second language reading requirement: none
Expected time to graduate: 18-24 months

M.Eng. in Biosystems Engineering

Admission

For admission into the M.Eng. program, applicants are normally required to hold a B.Sc.(Eng.) degree. Candidates with degrees in related areas will be accepted at the discretion of the department head.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. A minimum of 30 credit hours of coursework is required, which should include: a seminar course of Biosystems Engineering, six hours assigned to an approved project and report; and at least 12 credit hours of 700 level courses offered by the Faculty of Engineering. An oral presentation of the project to a department examining committee is required.

Second language requirement: none
Expected time to graduate: 12-18 months

Ph.D. in Biosystems Engineering

Admission

Admission to the Ph.D. program is normally from the Master of Science. Students making exceptional progress while enrolled in the M.Sc. program may be transferred to the Ph.D. program upon the consent of the department head and based on a recommendation from the student's advisor and an appointed selection committee which investigates the student's qualifications and suitability for Ph.D. study. In such cases, the program credit hour requirements shall be decided at the time of the transfer.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students are normally required to take a seminar course of Biosystems Engineering and expected to meet a requirement of teaching and learning in post-secondary education. The teaching and learning requirement may be met by: completing the CHET program; or completing the teaching workshops in Teaching Techniques, and Course Construction and Organization (15 h each) plus other teaching workshops of at least 15 h duration; or completing teaching workshops of 45 h duration. Teaching workshops are offered each year by the University of Manitoba. The advisory committee for the student must approve the process which will be followed by the student to meet the teaching and learning requirement.

Second language requirement: none
Expected time to graduate: 3 - 4 years

Course Descriptions

All courses require the consent of the instructor

034.704 Fluid Mechanics of Unsaturated Porous Solids (3-0:0-0) or (0-0:3-0) 3 Statics and dynamics of two immiscible fluid phases occupying the voids of porous solids. Concepts include capillary pressure, bubbling pressure, saturation, intrinsic and relative permeability, pore-size distribution indices.

034.711 Grain Storage (3-0:0-0) or (0-0:3-0) 3 A synthesis of major aspects of the storage of grain including: abiotic and biotic characteristics of stored grain bulks, regional variables, grain pressure theories, methods of controlling deterioration, and health hazards.

034.714 Advanced Irrigation and Drainage (3-0:0-0) or (0-0:3-0) 3 Selected advanced problems and new developments in irrigation and drainage. Interrelationships between irrigation and drainage and the environment.

034.716 Instrumentation and Controls (3-0:0-0) or (0-0:3-0) 3 For the non-engineering students. Transducers, circuits and instruments for measuring and recording physical quantities such as temperature, humidity, force, pressure, strain, sound, flow and nuclear radiation. Presentation and interpretation of data.

034.720 Bulk Solids Storage and Handling (3-2:0-0) or (0-0:3-2) 3 Fundamental characteristics of bulk solids, bulk solids flow during storage and handling, loads in bulk solids storage and handling systems, mechanical, pneumatic and hydraulic conveying of bulk solids, safety in storage and handling of bulk solids.

034.721 Numerical Modelling of Biosystems (3-0:0-0) or (0-0:3-0) 3 Applications of numerical methods to the solution of problems dealing with biological systems: structural analysis, mechanical behaviour of biological materials, moisture sorption and desorption, cooling and heating of biological materials, and flow through saturated and unsaturated porous media. Solution of transient and non-linear problems. Use of commercial finite element packages for problem solving.

034.722 Advanced Machine Design Analysis for Biosystems (3-0:0-0) or (0-0:3-0) 3 Analysis of machines for use in biosystems with respect to design and functional performance, in-field traction, operator safety and comfort, and energy source, transmission and application. Engineering analyses will be used to study biosystems machinery problems of current and future interest.

034.723 Advanced Topics on Light-Frame Buildings (3-0:0-0) or (0-0:3-0) 3 Structural and environmental design and analysis of light-frame buildings. Topics include: loads in light-frame buildings; frame design; construction management; environmental control in light-frame buildings; and structure-environment interactions.

034.724 Special Problems in Biosystems Engineering (3-0:0-0) or (0-0:3-0) 3 Advanced work in a specialized field involving engineering applications to biological systems.

034.725 Mechanical Behaviour of Biological Materials (3-0:0-0) or (0-0:3-0) 3 Elastic and inelastic behaviour of biological materials under applied load. Emphasis on unprocessed and semi-processed food products. Use of mechanical behaviour properties in the design of handling, storage, processing and sensing systems for food products.

034.726 Research Methods for Biosystems Engineers (3-0:0-0) or (0-0:3-0) 3 Introduction to various research methods, including data acquisition and transmission, control systems, dimensional analysis, random signal analysis, experimental design, error analysis, stochastic modelling, fuzzy mathematics and expert systems.

034.727 Advanced Seminar in Biosystems Engineering (1 1/2:0 - 1 1/2:0) 3 A series of seminars to be given by Ph.D. candidates on research topics of current interest in Biosystems Engineering.

034.728 Advanced Topics in Biosystems Engineering (3-0:0-0) or (0-0:3-0) 3 An opportunity to extend, update or acquire specialized knowledge in particular area of interest.

034.729 Biosystems Engineering Seminar 1 (1 1/2:0 - 1 1/2:0) 3 Oral and written presentation of engineering research is discussed. Students are expected to actively participate in weekly seminars and to present two seminars both orally and written.

034.730 Food Process Engineering (3-0:0-0) or (0-0:3-0) 3 Food engineering concepts are presented using quantitative relationships that define the process. Various advanced methods of heating and processing foods are discussed and their mathematical and physical relationships described. Descriptive information of typical equipment assists students in utilizing engineering principles in design.

SECTION 7: Botany

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Academic Staff

Professor Emerita

Shay, J.M., O.C., B.Sc. (Hons.) (London), M.Sc., Ph.D. (Manitoba)

Professors

Booth, J.T., B.A. (Eastern College), M.S. (Ohio), Ph.D. (UBC); **Kenkel**, N.C., B.Sc. (Hons.), M.Sc. (UBC), Ph.D. (Western); **Punter**, D., M.A., Ph.D. (Cambridge); **Robinson**, G.G.C., B.Sc. (Hons.) (St. Andrew's), Ph.D. (UBC).

Senior Scholars

Reid, J., B.Sc.(Hons.), M.Sc. (McMaster), Ph.D. (Toronto); **Stewart**, J.M., B.Sc.(Hons.), M.Sc., Ph.D. (McMaster); **Van Caeseele**, L. B.Sc., M.Sc., Ph.D. (Manitoba).

Associate Professors

Ford, B.A., B.Sc.(Hons.) (Trent), Ph.D. (Toronto); **Goldsborough**, L.G., B.Sc., Ph.D. (Manitoba); **Sumner**, M.J., B.Sc.(Hons.), M.Sc. (Alberta), Ph.D. (Manitoba).

Assistant Professors

Hausner, G., B.Sc. (Winnipeg), M.Sc., Ph.D. (Manitoba); **Markham**, J.H., B.Sc.(Hons.) (Guelph), B.Ed. (Dalhousie), Ph.D. (UBC); **McLachlan**, S.M., B.Sc.(Hons.) (McMaster), M.Sc. (Guelph), Ph.D. (York); **Piercey-Normore**, M., B.Sc. (Gen.), B.Sc. (Hons.), M.Sc., Ph.D. (Memorial); **Renault**, S., B.Sc., M.Sc., Ph.D. (Poitiers); **Schroeder,** D. B.Sc. (Simon Fraser), Ph.D. (Calgary); **Worley**, A.C., B.Sc. (Victoria), M.Sc. (Calgary), Ph.D. (Toronto).

Adjunct Professors

Gilbert, J.A., B.Sc.(Hons.), M.Sc., Ph.D. (Manitoba); **Jordan**, M., B.Sc. (Guelph), M.Sc. (Manitoba), Ph.D. (Saskatchewan); **Malley**, D.F., B.Sc., M.Sc. (UBC), Ph.D. (Michigan); **Marles**, R.J., B.Sc. (Victoria), M.Sc. (Saskatchewan), Ph.D. (Illinois); **McCallum**, B., B.S.A., M.Sc. (Manitoba), Ph.D. (Minnesota); **Murkin**, H., B.Sc. (Manitoba), M.Sc., (McGill), Ph.D. (Utah State); **Rampitsch**, C., B.Sc.(Hons.), M.Sc. (Witwatersrand), Ph.D. (UBC); **Tardif**, J., B.Sc., Ph.D. (Quebec); **Turner**, M.A., B.Sc. (Carl.), M.Sc., Ph.D. (Manitoba); **Wang**, G., B.Sc., M.Sc. (Nanjing), Ph.D. (UBC); **Westwood**, A.R., B.Sc., M.Sc. (Manitoba), Ph.D. (Guelph).

Program Information

The department offers programs of study in a number of aspects of botanical science leading to the degrees of Master of Science and Doctor of Philosophy. This is one of the few uniquely botanical programs in Canadian universities. The program encompasses various aspects of plant ecology, particularly those relevant to the grassland and boreal forest ecosystems that dominate the Canadian prairie provinces. Plant anatomy, mycology, plant pathology, physiology, systematics and conservation also feature prominently.

Graduates of these programs will be equipped to embark on a career in botany or related fields, such as environmental science, natural resources management, agriculture or forestry. They will be eligible for positions in research, teaching or consulting in an academic, industrial or governmental setting. Recent graduates have gone on to Ph.D. and post-doctoral studies at such universities as Oxford, Michigan State, Minnesota, Ohio,

Pennsylvania State, Stanford, Alberta, Toronto, Waterloo. Former students have held research and administrative positions with the governments of Canada, Iceland, New Zealand, Alberta, British Columbia, Manitoba, Ontario, Yukon; faculty positions at such universities as Alberta, Basrah, Calgary, Florida, Guelph, McGill, Manitoba, New Brunswick, Queen's, Rutgers, Saskatchewan and Strathclyde; and various other positions with companies involved in consulting, natural resources management and agriculture.

Because of its small size, the department is able to foster an informal atmosphere with free interaction between faculty and graduate students. Students have had good success in Commonwealth, NSERC and University of Manitoba Graduate Fellowship and Scholarship competitions.

Fields of Research

- Applied and theoretical population and community ecology of forest and grassland ecosystems; mathematical and statistical ecology; ecological modelling.
- Conservation ecology; fragmentation; dispersal; effects of disturbance on biodiversity; local ecological knowledge and ecosystem management; restoration of plant communities and landscape units.
- Stress physiology and resistance in forest ecosystems; plant adaptation to salts, pollutants and anthropogenic disturbance (mining, forestry).
- Ecosystem structure and function in freshwater wetlands; ecophysiology and ecotoxicology of benthic and planktonic algae, and aquatic macrophytes; paleolimnology.
- Vascular plant, fungal, and lichen systematics (particularly the genera *Carex and Cladonia*) using micro- and macro-morphology, isozyme and nucleic acid analysis, ecological studies, and phytogeography.
- Evolutionary biology of plants.
- Fungal ecology in aquatic and terrestrial ecosystems; fungal symbioses in forest ecosystems.
- Plant and forest pathology; ecological and epidemiological aspects of plant disease relationships; dwarf mistletoes of conifers; diseases of wild rice; foliar and head diseases of cereals.
- Developmental anatomy and cytology, especially of plant reproductive systems.
- Native plant products and special (non-timber) forest products.
- Slow onset disasters, environmental degradation and hazard impact assessment.

Research facilities

These include an extensive herbarium (WIN), greenhouses and growth chambers; spectrophotometers; centrifuges; isotope equipment; electrophoresis and chromatography room; fungal culture facilities; computers; interference, fluorescence and transmission electron microscopes; image analysis equipment; all located in the Buller Biological Laboratories.

The University Field Station (Delta Marsh) provides year-round research facilities and accommodation for biological research in the 17,000 hectare Delta Marsh on the southern shore of Lake Manitoba. Field station facilities are also available to faculty members and their graduate students at Star Lake (Whiteshell), Taiga Biological Station (Wallace Lake), the Experimental Lakes Area (NW Ontario) and the Churchill Northern Studies Centre.

A pamphlet giving details of graduate studies in botany and a *Graduate Students' Information Booklet* containing supplementary regulations and other information are available from the Department of Botany general office.

M.Sc. in Botany

Admission

The normal requirement for admission is an Honours B.Sc. degree in Botany, or its equivalent. Students with other degrees or backgrounds may be required to complete a pre-Master's program to the satisfaction of the department. Courses will be prescribed on an individual basis to help the student qualify for graduate work in botany. Contact the Botany department for information.

The Department of Botany allows students to begin their program on either 1 September, 1 January or 1 May. For admission for each of these start dates, Canadian/U.S. students should send their applications with complete supporting documentation to the Department of Botany no less than four (4) months before the intended start date. Non-Canadian students should send their applications with complete supporting documentation to Department of Botany to arrive no later than seven months (7) before the intended start date.

Program Requirements

Minimum course requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. All graduate students are expected to participate in the departmental seminar program and demonstrate in undergraduate laboratories. For additional requirements contact the Botany department.

Second language requirement: none
Expected time to graduation: two years

Ph.D. in Botany

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

The Department of Botany allows students to begin their program on either 1 September, 1 January or 1 May. For admission for each of these start dates, Canadian/U.S. students should send their applications with complete supporting documentation to the Department of Botany no less than four (4) months before the intended start date. Non-Canadian students should send their applications with complete supporting documentation to the Department of Botany to arrive no later than seven months (7) before the intended start date.

Program Requirements

Minimum course requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. All graduate students are expected to participate in the departmental seminar program and demonstrate in undergraduate laboratories. For requirements contact the Botany department.

Second language requirement: none
Expected time to graduation: three years

Course Descriptions

001.713 Advanced Plant Ecology (3-0:3-0) 6 Seminars, investigations, and readings in advanced topics such as paleoecology, energetics, and community ecology.

001.724 Wetland Ecology (3-3:3-3) 6 A study of marsh, bog, and fen communities, with emphasis on their history, soil-plant relationships, and species distribution. Field work at the University Field Station (Delta Marsh) and nearby bog and fen sites will be an integral part of the course.

001.731 Fungal Genetics in Relation to Host-Parasite Interactions (6) Lectures, seminars, and assigned reading discussing variability in fungal plant pathogens and types, sources, and inheritance of resistance thereto in plants.

001.737 Special Topics in Algal Ecology (6) Directed study and project(s) in selected aspects of the ecology of freshwater phytoplankton, periphyton and metaphyton.

001.738 Topics in Plant Pathology (3-L:0-0) 3 Current and specialized aspects of plant pathology studied through lectures, seminars, prescribed readings and laboratory projects. Offered in 1999-2000 and alternate years thereafter. *Prerequisite:* 001.421 or equivalent, or consent of department head.

001.739 Pathology of Trees and Shrubs (3-0:0-0) 3 Lectures, seminars and readings focussing on special problems relating to the pathology of woody plants. Emphasis on ornamental shrub, shade tree, and forest tree species of local importance. Offered in 2001-2002 and alternate years thereafter. *Prerequisite:* 001.421 or equivalent, or consent of department head.

001.740 Problems in Plant Physiology (3) Lectures on recent advances in selected areas of plant physiology and laboratory work based on current research conducted in the department.

001.741 Special Topics in Botany (3) An assignment and conference course. Detailed study of specialized topics in Botany.

001.742 Data Collection and Microtechniques – Part I (3) Techniques for the collection, preparation, culturing and preservation of botanical specimens. Extraction, cloning, and sequencing of nucleic acids. Bioinformatics; sources, analysis and interpretation of molecular data. Offered in 2003-2004 and alternate years thereafter.

001.743 Data Collection and Microtechniques – Part II (3) Techniques for the preparation and microscopic examination of components of plant tissues and cells. Offered in 2003-2004 and alternate years thereafter.

001.744 Methods and Approaches to the Analysis of Biological Data Part I (3) Methods for handling biological data arising from field surveys; planning and undertaking biological studies. Theory of experimental design, vegetation sampling, multivariate analysis, techniques of remote sensing, spatial analysis and modeling. Offered in 2002-2003 and alternate years thereafter.

001.745 Methods and Approaches to the Analysis of Biological Data Part II (3) Analysis of complex biological data sets arising from field surveys, vegetation sampling and remote sensing using techniques from Part I (001.7xx). Offered in 2002-2003 and alternate years thereafter.

001.788 Ecology Project Course (3) This course provides experience in the organization and execution of team research into current ecological issues. Teams consist of a graduate student team leader, 3-6 undergraduates, and a faculty advisor. Each project team identifies a specific research question, creates a proposal for answering it, and presents their results in a public forum. This course is also given in the Department of Zoology as 022.788.

SECTION 8: Chemistry

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Website: www.umanitoba.ca/chemistry

Academic Staff

Distinguished Professor Emeritus

Schaefer, T., B.Sc. (Hons.), M.Sc. (Manitoba), D.Phil. (Oxford), F.R.S.C.

Professor Emeritus

Gesser, H.D., B.Sc. (Loyola), Ph.D. (McGill).

Senior Scholars

Charlton, J.L., B.Sc. (Hons.), Ph.D. (Western); **Chow**, A., B.Sc., M.A., Ph.D. (Toronto); **Queen**, A., B.Sc.(Hons.), M.Sc., Ph.D. (Durham); **Westmore**, J.B., B.Sc.(Hons.), Ph.D. (London).

Professors

Baldwin, W.G., B.Sc.(Hons.), M.Sc. (Manitoba), Ph.D. (Melbourne); **Duckworth**, H.W., B.Sc.(Hons.) (McMaster), Ph.D. (Yale); **Gough**, K.M., B.Sc.(Hons.) (Loyola), M.Sc., Ph.D. (Manitoba); **Hruska**, F.E., B.Sc.(Hons.), M.Sc., Ph.D. (Manitoba); **Hunter**, N.R., B.Sc., M.Sc. (Carleton), Ph.D. (New Brunswick); **Jamieson**, J.C., B.Sc. (Heriot Watt), Ph.D. (Aberdeen); **Janzen**, A.F., B.Sc.(Hons.) (McMaster), Ph.D. (Western); **O'Neil**, J.O.J., B.Sc., Ph.D. (Toronto); **Secco**, A.S., B.Sc.(Hons.) (St. Francis Xavier), Ph.D. (UBC); **Wallace**, R., B.Sc., Ph.D. (Glasgow).

Associate Professors

Cullen, J.M., B.Sc., M.Sc. (Windsor), M.Sc., Ph.D. (Guelph); **Hultin**, P.G., A.B. (Dartmouth), M.Sc., Ph.D. (Toronto); **Perreault**, H., B.Sc., M.Sc. (Montreal), Ph.D. (Dalhousie); NSERC Canada Research Chair in Bioanalytical Mass Spectrometry.

Assistant Professors

Bieringer, M., Dipl.-Chem. (Duisburg), Ph.D. (McMaster); **Freund**, M.S., B.S. (Florida Atlantic), Ph.D. (Florida); **Kroeker,** S., B.Sc. (Winnipeg), M.Sc. (Manitoba), Ph.D. (Dalhousie); **Schweizer**, F., Dipl.-Chem. (Freiburg), Ph.D. (Alberta); **Wang**, F., B.S. (Wuhan), Ph.D. (Peking).

Adjunct Professors

Abd-El Aziz, A.S., B.Sc., M.Sc. (Ain Shams, Cairo), Ph.D. (Saskatchewan); **Ata**, A. B.Sc. (Karachi), M.Sc. (U. Agriculture, Fiasalabad) Ph.D. (Karachi); **Friesen**, K.J., B.Sc. (Winnipeg), M.Sc., Ph.D. (Manitoba); **Golz**, D. B.Sc. (Laurentian), M.Sc., Ph.D. (Carleton); **Tomy**, G., B.Sc. (Manitoba), Ph.D. (Manitoba).

Program Information

An M.Sc. or Ph.D. in the chemical sciences provides a gateway to an exciting, challenging and frequently high-paying career. M.Sc. and Ph.D. chemists work in areas such as industrial research and development (particularly the pharmaceutical, energy, advanced materials and biotechnology sectors), medical research, environmental and pollution monitoring, and technical consulting. Ph.D. chemists and biochemists in academia have the opportunity both to teach and to pursue independent basic and applied research.

Graduate students work in close cooperation with faculty as they pursue their own thesis research projects. There are fascinating project opportunities available in several research groups within the department. Graduate courses are typically informal, and encourage small groups of students to discuss topics of current interest, in a supportive environment. The Department of Chemistry also hosts seminars throughout the year, bringing researchers from university and industrial laboratories in Winnipeg, across Canada, and abroad, to share their latest discoveries with students and faculty. The Armes Lectureship and Betts Lectureship programs provide for extended lecture series by world-renowned chemists, who are able to interact with faculty and graduate students during their visit to the department.

Graduates of the Chemistry M.Sc. and Ph.D. programs are currently employed in chemical companies, research institutes, government laboratories and agencies, and tenured academic positions. Some have even founded their own chemical companies! Alumni of the department's graduate program now work for companies such as Apotex Fermentation, Medicure, Novopharm Biotech, Philips Paints and Border Chemicals in Winnipeg, Biovail (Steinbach), Anormed (Richmond, BC), Allelix (Mississauga), Uniroyal (Guelph), and Genzyme (Cambridge MA). Several have undertaken additional training with prominent scientists at such places as the Scripps Institute, MIT, the Howard Hughes Medical Institute, the universities of Alberta, British Columbia, Calgary, Montréal, Sherbrooke, and Toronto. Some have gone on to academic careers, at such universities as Alberta, Calgary, Dalhousie, Northern British Columbia, as well as Manitoba.

Fields of Research

Analytical Chemistry, Asymmetric Organic Synthesis, Biochemistry, Cell Biology, Chromatography, Inorganic Chemistry, Mass Spectrometry, Macromolecular Chemistry, Materials Science, Natural Products Chemistry, NMR Spectroscopy, Organometallic Chemistry, Protein Structure and Dynamics, Synthetic Carbohydrate Chemistry, Theoretical Chemistry, X-Ray Biocrystallography

Research Facilities

The department has modern instrumentation and technical support for research and teaching with good library support, including on-line connections to medical libraries and major journals. The computer services have a central core of UNIX and NOVELL servers with Internet access, as well as a high-performance computing installation. Department NMR facilities consist of a Bruker Avance300 system and the Prairie Regional Bruker AMX 500 MHz instrument. Both NMR spectrometers can perform modern gradient-enhanced experiments, and the AMX 500 is also equipped for solid-state work. A state-of-the-art Varian 600 MHz instrument will be installed in early 2003, equipped for both solid-state and solution spectroscopy. Mass spectrometric facilities consist of a two-sector high-resolution instrument with electron impact, chemical ionization and FAB sources, operational in positive and negative ion modes, a Quattro-LC triple quadrupole instrument equipped for electrospray ionization (ESI), and a Bruker Biflex IV MALDI-TOF instrument for the analysis of large biological molecules. Through the Physics department, Chemistry researchers also have access to experimental time-of-flight instruments. Crystallography facilities are comprised of a precession camera and a computer controlled single-crystal diffractometer, equipped for structural analysis via PC and SGI computers. Other major instrumentation consists of a 15W argon laser with a 14018 double monochromator for Raman spectroscopy, and with a coherent dye laser for intracavity photoacoustic spectroscopy, plus a Nicolet FT-IR system. The department also has a STAR HPLC system, as well as routine HPLC, FT-IR, CD and stopped flow equipment. There is a full-time glassblower in the department who can produce specialized glassware as required.

M.Sc. in Chemistry

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

Potential M.Sc. students should complete the online pre-application form, found on the Chemistry Department website, prior to making formal application to the department of Chemistry. The following deadlines for receipt of complete application materials apply to potential students holding bachelors' degrees from Canadian and Non-Canadian universities.

Start Date		Canadian/U.S.	Non-Canadian
Regular	(September)	June 1	March 1
Winter	(January)	October 1	July 1
Spring	(May)	February 1	November 1
Summer	(July)	April 1	January 1

Program Requirements

Program requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Colloquium: A weekly colloquium is given by members of staff, post-doctoral fellows, or invited lecturers. All graduate students and fourth-year Honours students are expected to attend the colloquia.

Second language reading requirement: none
Expected time to graduate: 2.75 years

Ph.D. in Chemistry

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. *Only students holding M.Sc. degrees from Canadian universities will be admitted directly into the Ph.D. program. Other students will be admitted as M.Sc. candidates, with the option to transfer into the Ph.D. program after 1 year of satisfactory studies.*

Application Deadlines

Potential Ph.D. students should complete the online pre-application form, found on the Chemistry Department website, prior to making formal application to the department of Chemistry. The following deadlines for receipt of complete application materials apply to potential students holding bachelors' degrees from Canadian and Non-Canadian universities.

Start Date		Canadian	Non-Canadian
Regular	(September)	June 1	March 1
Winter	(January)	October 1	July 1
Spring	(May)	February 1	November 1
Summer	(July)	April 1	January 1

Program Requirements

In addition to the minimum course requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*, a minimum of three years (including the year spent in M.Sc. work) is required for the Ph.D. degree. Actual time spent is usually somewhat longer.

Colloquium: A weekly colloquium is given by members of staff, post-doctoral fellows, or invited lecturers. All graduate students and fourth-year Honours students are expected to attend the colloquia.

Second language requirement: none
Expected time to graduation: 5.5 years (from 4 year B.Sc.); 3.5 years (from M.Sc.)

Course Descriptions

Ancillary Courses

The following undergraduate courses may be taken as ancillary subjects:

002.460 Advanced Chemical Techniques (3)

Physical Chemistry

002.228 Physical Chemistry: Microscopic Descriptions of Matter (3)
002.229 Chemical Energetics and Dynamics: Macroscopic Descriptions (3)
002.336 Elementary Quantum Chemistry and Molecular Bonding (3)
002.337 Symmetry, Spectroscopy and Structure (3)
002.349 Introduction to Polymers (3)
002.464 Spectroscopy, Relaxation and Structure (3)
002.465 Molecular States and Processes (3)

Biochemistry

002.236 Biochemistry I: Biomolecular and an Introduction to Metabolic Energy (3)
002.237 Biochemistry II: Catabolism, Synthesis and Information Pathways (3)
002.449 Advanced Biochemistry (6)
002.462 Biochemistry of Nucleic Acids (3)
002.463 Biochemistry of Proteins (3)

Inorganic and Analytical Chemistry

002.238 Chemistry of the Main Group Elements (3)
002.247 Introductory Analytical Chemistry (3)
002.338 Inorganic Chemistry (3)
002.347 Instrumental Methods of Analysis (3)
002.457 Topics in Inorganic Chemistry (3)
002.468 Organometallic Chemistry (3)

Organic Chemistry

002.221 Introductory Organic Chemistry 1: Structure and Function
002.222 Introductory Organic Chemistry 2: Reactivity and Synthesis
002.339 Structural Transformations in Organic Chemistry (3)
002.358 Methods in Physical Organic Chemistry (3)
002.458 Topics in Organic Chemistry (3)
002.469 Specific Methods in Organic Synthesis (3)

Graduate Courses

A graduate course schedule may be obtained from the Chemistry office.

002.740 Topics in Biochemistry (3) A lecture and seminar course dealing with selected topics of current interest in biochemistry and molecular biology.

002.741 Spectroscopy and Molecular Structure (3) Applications of spectroscopic methods to chemical problems with emphasis on mass spectrometry and related techniques.

002.745 Topics in Organic Chemistry (3) A discussion of current and general topics related to interesting areas of organic chemistry appearing in the current literature.

002.746 Topics in Synthetic Organic Chemistry (3) A course designed to acquaint students with specific methods of synthesis.

002.752 Topics in Physical Chemistry (3) The topics will vary, depending on student needs and interests; they may include, but will not be limited to the following: electrochemistry, surface chemistry, electrochemical kinetics, or other specialized topics not available in regular course offerings.

002.755 Design of Organic Synthesis (3) Conceptual methodology in the design of synthesis will be discussed with inclusion of computer-aided approaches. Examples from the current literature will be used to emphasize the conceptual aspects.

002.756 Organometallic Chemistry (3) Recent advances in synthetic and structural organometallic chemistry.

002.757 Recent Advances in Molecular Biochemistry (3) Selected topics from the recent literature on the structure and function of proteins and nucleic acids and their interactions.

002.758 Chemical Crystallography (3) Theory and practice of crystal structure analysis with emphasis on single crystal x-ray diffractometry; structure-activity relationships in small organic and inorganic compounds; introduction to protein and nucleic acid crystal structure analysis.

002.760 Topics in Inorganic Chemistry (3) Topics of current research interest in the area of inorganic chemistry including, but not limited to synthesis, structures, catalysis and reaction mechanisms.

002.770 Topics in Analytical Chemistry (3) Topics of current research interest in analytical chemistry including, but not limited to mass spectrometry of large molecules, separation techniques, analysis of metals, surface analytical techniques, analysis of environmental samples, analysis of 'real' samples, and sampling techniques. *Prerequisites:* 002.347 or permission of instructor.

002.780 Topics in Theoretical Chemistry (3) Topics of current research interest in theoretical and computational chemistry from such areas as *ab initio* quantum chemistry, molecular simulations, nonlinear reaction dynamics, spectroscopy and statictical mechanics.

SECTION 9: City Planning

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Website: www.umanitoba.ca/architecture/cp/

Academic Staff

Professor Emeritus

Carvalho, M., B.Arch. (Howard), M.C.P. (Pennsylvania), Ph.D. (Edinburgh), F.C.I.P.

Senior Scholar

Rotoff, B., B.Sc. (C.E.), M.C.P. (Manitoba).

Professor

Witty, D., B.A. (Hons.), M.A. Urban & Reg. Plan. (Waterloo), Ph.D. (British Columbia), M.R.A.I.C., F.C.I.P.

Associate Professor

Bridgman, R., B.A., B.Music (Toronto), M.A., Ph.D. (York), M.C.I.P.; **Skelton**, I., B.A., M.U.P., (McGill), Ph.D. (York), M.C.I.P.; **Wight**, J. B., M.A. (Aberdeen), M.Sc. (Alberta), Ph.D. (Aberdeen), M.C.I.P.

Assistant Professors

Blake S., B.E.S. (Waterloo), M.Eng., D.Eng. (Tokyo), M.C.I.P.; **van Vliet**, D., B.A. (Fine Arts) (Saskatchewan), M.E.Des. (Calgary), Ph.D. (UBC), M.C.I.P.

Adjunct Professors

Carter, T., B.A. (Manitoba), M.A. (Saskatchewan), Ph.D. (Alberta); **Clayton**, A., B.Sc. (C.E.), M.Sc. (Saskatchewan), PEng; **Diamant**, P., B.A. (Queen's), M.Arch. (Manitoba), M.Sc. (Western), M.C.I.P.; **Leo** C., B.A. (Iowa), M.A., Ph.D. (Toronto); **Sweatman**, E., B.A., M.C.P. (Manitoba), M.C.I.P.; **Yauk** T., B.A., M.C.P. (Manitoba).

Introduction

The Department of City Planning is the oldest continuing planning school in Canada offering a program of studies leading to the Master of City Planning degree. The Program provides opportunities to develop and enhance skills, often in service learning situations involving local clients. Students come from varied academic backgrounds and the curriculum is structured to satisfy the requirements of professional accreditation and to foster expertise in selected fields of study. In collaboration with the Manitoba Professional Planners Institute, the program includes an internship of planning work. An optional mentoring program links the student with a volunteer from MPPI for discussions on career strategies or other matters.

The program is directed by four principles. The first, and the focus of the program, is the enhancement of the built and natural environments of cities and regions. The second principle, professionalism, is based on the understanding that students enter the program with the expectation of finding professional employment and of making their careers in planning or closely related fields. It leads to a focus on professional practice and responsibilities, and on the skills necessary to translate knowledge into effective action. The third principle is that planning is a multidimensional and multidisciplinary activity requiring highly transactive and collaborative outlooks and practices to advance strategies that are socially just and environmentally sustainable. The fourth principle is that scholarship constitutes a fundamental and lasting value for a planning career, and consequently there is emphasis on historical and theoretical aspects of development, research methods, clarity of critical thought and expression, and the relationships between planning thought and practice.

Fields of Research

Community development; community design and participatory methods
Gender issues in planning and design
Housing studies; homelessness; low-cost housing strategies
Planning practice; planning methods
Planning with Aboriginal communities
Regional planning; city-regions; bioregionalism
Transportation planning
Urban ecology; sustainable planning; case studies of ecological innovation

Research Facilities

The Computer Aided Design Laboratory (CADLAB) is a major centre of research and hands on training offering cutting edge digital resources and an experienced complement of teaching and support staff. Extensive data bases provided by governmental and non-governmental sources are linked to GIS applications. The Architecture and Fine Arts Library, housed in the Russell Building, holds some 61,000 volumes dedicated to the planning, art and design disciplines represented in the University, including over 400 current periodicals. Over 100,000 35mm slides are available and electronic resources include networked bibliographic and full text resources. The Universal Design Institute is internationally recognised for its active program of research and education on the design of products and environments that can be used and experienced by people of all ages and abilities. Studio space is provided in the Russell Building and occasionally on or near a study site.

Master of City Planning (M.C.P.)

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this Calendar. For additional application procedures see the website.

The Department of City Planning allows students to begin their MCP program on either September 1st or January 1st. However, the program is organized to favour a September start date, especially for Canadian/US students (but it is recognized that, in some cases, some international students may particularly benefit from a January start date).

For admission on these start dates, applications - with complete supporting documentation, should be sent to the Department of City Planning (Attention: Chair, Department Admissions Committee) by the following deadlines:

Start Date	Canadian/US	International
Regular - September	February 15th	December 1st
Winter - January	September 15th	March 1st

N.B. Earlier applications are encouraged, for September entry especially. Approximately half of the available spaces each year are allocated during a first round review of fully complete applications in late February; the remaining available spaces are allocated during a second round review in late April. Late applications may be considered if spaces become available after the main allocations.

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar. In addition, students are required to take:

Year 1

073.703 Planning Theory 1 (3) The principal ideas and ideals influencing planning thought and practice, ranging from rational comprehensive planning to theories of societal guidance, ethics and the human-environment interface.

073.707 Housing and Urban Revitalisation (3) Housing and urban revitalisation in the Canadian context. Housing demand and supply, structure of the housing market, Canadian housing policy, affordability and other selected housing issues; processes and strategies related to urban decline and revitalisation.

073.735 Thesis/Practicum Preparation (0) A preparatory course for students registered in thesis or practicum. Methods of constructing problems, formulating hypotheses, methods of investigation, sources of information, and appropriate form and content of thesis and/or practicum.

073.741 Planning Design 1 (6) Studio/workshop developing problem solving techniques and design skills in an area subject to environmental, social and economic change. Preparation of a planning report comprising of research and analysis, evaluation of feasible alternative strategies and designs, synthesis and recommendations for implementation. Case studies from planning journals and planning practice in cities and regions.

073.742 Planning Design 2 (6) Studio/workshop building upon 073.741 as applied to an area of greater complexity, requiring the evaluation and integration of contributions from several planning-related disciplines. Selected projects emphasise both the multidisciplinary and interdisciplinary nature of planning, and the resolution of the problems posed. Case studies from planning journals and planning practice in cities and regions.

073.746 Urban Ecology and Environmental Management (3) Theoretical frameworks and theories in urban ecology and environmental management as they apply to municipal institutional frameworks and the role of environmental planning in urban and regional government.

Total: 21 credit hours

Year 2

073.731 Law and Local Government (3) Topics of common law, torts, real property, land use planning and control, expropriation, and local government, including some recent cases.

073.734 Urban Development (3) The mechanics of urban development and its socio-economic implications and underlying political forces. Practical field experience is involved in the form of an internship.

073.747 Professional Planning Practice (3) An examination of the professional practice and praxis of planning, presented in collaboration with the Manitoba Professional Planners Institute, emphasising the practice aspects of planning processes, and the political, institutional and legal systems that direct and/or inform planning.

EITHER

073.743 Planning Design 3 (Urban Design) (6) The application of urban design theories and techniques to a large scale urban area of complex land uses and community development issues. The studio is also open to advanced students in architecture, landscape architecture and interior design and develops a broad approach to multidisciplinary problem solving design solutions.

OR

073.744 Planning Design 4 (6) Advanced planning design studio/workshop, experimental and innovative in approach and content, involving special techniques and skills. Studio may also be off-campus and/or focussed on a special topic centred around a distinguished guest expert.

069.700 Thesis (0)

069.703 Practicum (0)

Total: 15 credit hours

Elective Course Offerings: 9 credit hours required

Interdepartmental Architecture courses

073.748 Urbanization and Shelter in Developing Countries (3) Explores a variety of issues relative to urbanization, planning and shelter design in developing countries.

073.749 Planning and Design in Developing Countries (3) A workshop/studio seminar course dealing with small and/or large scale interventions in urban/rural planning and shelter design. Testing and evaluating alternative plans and programs using real work situations and case studies.

See website for elective courses currently offered by the department. City Planning students detail their particular plans of study by choosing from the departmental offerings, from graduate courses within the Faculty in Architecture, Interior Design and Landscape Architecture, as well as from courses offered throughout the university.

Degree requirements: 45 credit hours total
Second language reading requirement: none
Expected time to graduation: two years

Ph.D.

There is no Ph.D. Program offered in the Department of City Planning

SECTION 10: Civil Engineering

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Academic Staff

Professors Emeriti

Baracos, A., M.Sc.(C.E.) (Alberta), M.E.I.C., P.Eng.; **Morris**, G.A., M.Sc. (Manitoba), Ph.D. (Illinois), M.E.I.C., P.Eng.

Professors

Britton, M.G., B.E. (Saskatchewan), M.Sc. (Manitoba), Ph.D. (Texas A. & M.), P.Eng.; **Clayton**, A., B.Sc.(C.E.), M.Sc. (Saskatchewan), P.Eng; **Mufti**, A.A., B.Eng. (Karachi), M.Eng., Ph.D. (McGill) P.Eng.; **Oleszkiewicz**, J.A., M.Sc. (Wroclaw), M.Sc., Ph.D. (Vanderbilt), P.Eng.; **Polyzois**, D., B.A.Sc., M.A.Sc., Ph.D.(C.E.) (Toronto), P.Eng.; **Shah**, A.H., B.E. (Poona), M.Sc. (Stanford), Ph.D. (Berkeley), P.Eng.; **Stimpson**, B., B.Sc., M.Sc., D.I.C., Ph.D. (London), P.Eng.; **Woodbury**, A.D., B.Sc.(Geophys.), M.Sc.(Geol.), Ph.D. (UBC), P.Eng.

Associate Professors

Doering, J.C., B.Sc.(Hons.) (Queen's), Ph.D. (Dalhousie), P.Eng.; **Rasmussen**, P.F., M.Sc., Ph.D. (Denmark).

Assistant Professors

Alfaro, M., B.Sc. (Philippines), M.Eng. (Thailand), Ph.D. (Saga, Japan) P.Eng.; **Blatz**, J.A., B.Sc.(C.E.), Ph.D. (Manitoba) P.Eng.; **Gorczyca**, B., M.Sc. (Poland), M.Sc., Ph.D. (Toronto) P.Eng.; **Rattanawangcharoen**, N., B.Eng. (Chiang Mai), M.Sc. (Asian Inst. of Tech.), Ph.D. (Manitoba); **Shalaby**, A., B.Sc.(C.E.), M.Sc. (Cairo), Ph.D. (Carleton) P.Eng.; **Snelgrove**, K., B.Eng. (Memorial), M.A.Sc., Ph.D. (Waterloo) P.Eng.; **Svecova**, D., M.Sc. (Slovakia) M.Sc., Ph.D. (Carleton).

Adjunct Professors

Bakht, B., B.Sc. (India), M.Sc. (England), D.I.C. (Imperial Coll.), D.Sc. (London Coll.) P.Eng.; **Burn**, D.H., B.A.Sc., M.A.Sc., Ph.D. (Waterloo) P.Eng.; **Campbell**, K., B.S., M.S., Ph.D. (Wisconsin) P.Eng.; **Carson**, R., B.Sc, M.Sc. (Manitoba) P.Eng.; **Chandler**, N.A., B.Sc., M.Sc., Ph.D. (Manitoba) P.Eng.; **Domaschuk**, L., B.Sc., M.Sc. (Manitoba), Ph.D. (Georgia), P.Eng.; **Danesh**, S., B.Sc. (Pahlavill, Iran), M.Sc. (Cornell), Ph.D. (Manitoba), P.Eng.; **Dunbar**, W.S., B.Sc.(Hons.) (UBC), M.Sc. (Toronto), Ph.D. (Stanford) P.Eng.; **Dzik**, E., B.Sc. (Comp.Sc.) (Windsor), M.Sc. (Waterloo), Ph.D. (Manitoba) P.Eng.; **Frye**, M.J., B.Sc., M.Sc., Ph.D. (Manitoba) P.Eng.; **Kenyon**, R.M., B.Sc., Ph.D. (Manitoba) P.Eng.; **McCartney**, D.M., B.Sc.(G.E.), M.Sc., Ph.D. (Manitoba), P.Eng.; **McLeod**, S., B.Sc., M.Sc. (Manitoba), P.Eng.; **Middleton**, D., B.Sc., M.S. (Tennessee), Ph.D. (Texas A and M) P.E.; **Mirza**, A.S., B.E. (Karachi), M.S., Ph.D. (Texas) P.Eng.; **Onofrei**, M., B.Sc. (Bucharest), M.Sc. (Rutgers), Ph.D. (Sherbrooke); **Panu**, U.S., B.Sc. (India), M.Sc. (Guelph), Ph.D. (Waterloo); Ph.D. (Ohio) P.Eng.; **Rajapakse**, R.K.N.D., B.Sc.(Eng.) (Sri Lanka), M.Eng., D.Eng. (Thailand), P.Eng.; **Rizkalla**, S.H., B.Sc. (Alexandria), M.Sc., Ph.D. (North Carolina), P.Eng.; **Shehata**, E., B.Sc. (Ain Shams), M.Sc. (Cairo), Ph.D. (Manitoba) P.Eng.; **Simonovic**, S., B.Sc., M.Sc. (Belgrade), Ph.D. (California) P.Eng.; **Tuhtar**, D., B.Sc., M.Sc. (Sarajevo), Ph.D. (Ohio) P.Eng.; **Valeo**, C., B.Sc.(Physics), B.A.Sc.(C.E.) (Toronto), M.Eng. Ph.D. (McMaster) P.Eng.; **Woodrooffe**, J., Dip.Tech. (Algonquin), B.Sc., M.Sc. (Ottawa) P.Eng.; **Yue**, B. B.Sc. (New Brunswick), M.A.Sc. (Toronto) P.Eng.

Program Information

The Department of Civil Engineering offers programs of coursework and research leading to the Master of Science, Master of Engineering and Doctor of Philosophy in: environmental engineering; geotechnical engineering; structural engineering; theoretical and applied mechanics; transportation engineering and water resources engineering.

Research Facilities

Environmental Engineering Equipment and Facilities: The environmental engineering program and laboratory offer the latest in instruction and facilities for studying the physico-chemical and biological transformation of pollutants in water, wastewater and solid waste. In particular, the program aims at developing the principles of reactor and process engineering for the treatment of water, industrial and municipal wastewater and solid waste. State-of-the-art analytical equipment includes high performance liquid chromatographs with a variety of detectors, gas chromatographs, automated ion analysers, atomic absorption spectrophotometer, carbon analyser, microbial toxicity analyser and others. Spacious laboratories allow for bench scale testing of various process conditions in four controlled temperature environmental chambers. Present research interests include biological nutrient removal, volatile acids fermentation, solid stream processing through aerobic and anaerobic digestion, co-digestion and co-composting of municipal and industrial solid waste, biodegradation of hazardous pollutants, treatment in cold climates, pesticide waste treatment; surface and groundwater treatment processes, and upgrading of municipal and industrial treatment plants.

Geotechnical, Hydrogeology and Geoenvironmental Engineering Equipment and Facilities: Equipment in the geotechnical laboratories reflects the research interests of the department's staff in the engineering behaviour of a wide range of naturally occurring materials. In addition to the normal range of consolidation, direct shear and triaxial shear test facilities, specialized facilities have been provided for studies on swelling clays, at high pressures and temperatures, granular soils, and hard crystalline rocks.

The clay testing program involves stress-controlled tests to investigate the distinction between yielding and rupture in carefully sampled natural clays, and the effects of load duration and temperature on soil behaviour. Applications include estimating settlements of foundations, embankments, and tanks and the stability of slopes and excavation. Additional work involves the development of appropriate constitutive models for soil behaviour, and the measurement of hydraulic conductivities for retention structures.

An environmental chamber permits testing of soil samples under freezing conditions. A well-equipped geotechnical computing laboratory provides support for numerical analysis in soil mechanics, rock mechanics and hydrogeology. It also supports data presentation and report preparation in experimental programs. In rock mechanics, equipment is available for performing tests for Brazilian tension, flexure, uniaxial compression, triaxial compression, static fatigue, creep in both tension and compression, and the double torsion test used in fracture mechanics. Present research interests concentrate on the relationship between crack growth, stress level and time, with special emphasis on microstructural processes in the rock.

The geoenvironmental engineering laboratory has the equipment to characterize landfill construction materials, leachates, and hazardous wastes. Current research focuses on hazardous waste containment, soil bioremediation, and aerobic composting.

The focus of the hydrogeology research efforts is directed towards modelling and simulation of groundwater and contaminant transport. Resources are also directed at sustainable aquifer development within the Manitoba environs.

With current developments in computer technology and its associated impacts on geotechnical engineering, the University of Manitoba has kept up by providing graduate students in geotechnical engineering with state-of-the-art computer facilities. The geotechnology computer facility at the University of Manitoba has 8 personal computers, 3 SPARC workstations, all connected on a local area network with T1 Internet access 24 hours a day.

Structural Engineering Equipment and Facilities: The research facilities include concrete, structural, and materials laboratories covering approximately 7500 sq. ft. A Structural Engineering and Construction Research and Development Facility adds 2500 sq. ft. and includes a 23-ton overhead crane, as well as a 1,200,000-lb.-capacity MTS servo-controlled loading system. The new facilities enable the testing of full-scale specimens. Also in the structural laboratory are a 600,000-lb. Baldwin testing machine, a 60,000-lb. Riehle testing machine and a 30,000-lb. Baldwin testing machine. A number of jacks and loading frames are also available which can be attached to two strong floors and allow a wide range of loading assemblages to be set up easily. The laboratory also houses an MTS servo-controlled loading system, with a 220,000-lb. test frame and one fixed and one portable actuator, which can be used for programmed cyclic and fatigue testing. The materials laboratory contains an environmental cabinet and a freeze/thaw cabinet which are used to study the behaviour of materials under a wide range of temperatures and humidity. Three high-speed computer-controlled data acquisition systems are available for both laboratory and field testing.

Theoretical and Applied Mechanics Equipment and Facilities: Research Facilities in Theoretical and Applied Mechanics include several workstations and a variety of engineering analysis software. Current research is directed toward investigation of non-destructive evaluation of flaws in plate and shell structures, dynamics of electrical transmission lines and communication towers; finite and boundary element analysis, and mechanics of piezo ceramics, shape memory alloys and smart structures.

Water Resources Engineering Equipment and Facilities: The Hydraulics Research and Testing Facility (HRTF) has an area of 780 sq m and supports both physical and numerical modelling in hydraulics. The physical modelling laboratory houses a constant-head tank (500 l/s capacity), a 15 m variable slope flume, a 14 m hydraulic model flume, and a 34 m random wave flume. Floor space is available for the study of hydraulic structures and river models. The facility is also equipped with a range of modern instrumentation including acoustic Doppler velocimeters (3 component), hot-wire probes, servo-motor positioning systems, electronic discharge monitoring with inline volumetric tanks for calibration, and high speed data acquisition equipment. All of the computers in the physical modelling laboratory are networked to the facility's computer lab. A counter-rotating flume and cold room (to -30 C) are used to study hydraulics of frazil and anchor ice. A digital image acquisition and processing system complement the facility's ice research equipment. The HRTF computer laboratory has a number of high-end Pentium based PCs for numerical modelling. Software is available for 2D finite-element modelling of rivers and lakes, sediment transport modelling, and 2D modelling of wind generated wave fields.

The Hydrologic Processes Laboratory (HPL) supports research dealing with the management and analysis of spatially distributed in situ and remotely sensed data, for solving complex, large-scale problems of hydrology. The facility has several PC machines linked to a main UNIX workstation. A wide variety of software is available within HPL, including ARC/INFO, Arcview and other GIS, as well as ENVI software for processing remotely sensed data. The emphasis of research carried out in the facility is in distributed hydrological modelling, operational hydrology, and environmental monitoring using remotely sensed data.

M.Sc. in Civil Engineering

Admission

For admission into the Master of Science program, applicants are required to hold a bachelor's degree in Civil Engineering from a recognized university. Applicants with other engineering degrees or with honours degrees in related areas may also be accepted at the discretion of the department head and the dean of the Faculty of Graduate Studies. In certain cases acceptance may initially be limited to pre-Master's study. Please contact the Department for details.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department of Civil Engineering at least 4 months prior to their intended start date. International students should submit their application and supporting documentation to the Department of Civil Engineering at least 7 months prior to their intended start date.

Program Requirements

The Master of Science degree is attainable only through coursework and thesis. Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar. M.Sc. students are required to spend at least one academic session in full-time resident graduate study. On recommendation of the department and the Faculty Graduate Committee, the residence requirement may be waived in special cases.

A minimum of 18 credit hours of coursework is required with at least 12 credit hours at the 700 level. The coursework program would normally include 6 credit hours of ancillary courses from other than the candidate's discipline. These ancillary courses could include courses from the department or courses from another department, normally at the 400 level. Depending upon the student's background, the student's advisor may require the student to take 300 level or additional 400 level (and in exceptional circumstances, 200 level) courses in major or ancillary fields of study which would not count towards the minimum 18-credit hour requirement. The candidate is required to make an oral presentation on the completed M.Sc. thesis to the Examining Committee, and to pass an oral examination.

The maximum time allowed for the completion of the Master's degree is 5 years.

Second language reading requirement: none

Expected time to graduate: two years

M.Eng. in Civil Engineering

The Master of Engineering (M.Eng.) program provides an industrially oriented program for practising engineers who wish to continue their studies on a broad base. The program also facilitates continuing education for credit.

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department of Civil Engineering at least 4 months prior to their intended start date. International students should submit their application and supporting documentation to the Department of Civil Engineering at least 7 months prior to their intended start date.

Program Requirements

It is desirable that full-time students have one or two years of engineering experience. The minimum requirement for the award of the Master of Engineering degree is 30 credit hours. The degree can be obtained through two different options:

Option 1

Coursework Alone/Comprehensive Examination

The minimum requirement of 30 credit hours can be met by coursework alone with at least 18 credit hours at the 700 level. The program should include 6 credit hours of ancillary coursework from other than the candidate's discipline. These ancillary courses could include courses from the department or courses from another department, normally at the 400 level. Depending upon the student's background, the student's advisor may require the student to take 300-level or additional 400-level (and in exceptional circumstances, 200-level) courses in his/her major or ancillary field of study which would not count towards the minimum 30-credit-hour requirement.

Students must pass a Comprehensive Examination (069.701).

Option 2

Coursework and Project and Report

The minimum requirement of 30 credit hours can be met by a combination of coursework and an engineering report, with at least 12 credit hours at the 700 level. Of the 30 credit hours, 6 credit hours will be assigned to an approved project and report. The program should include 6 credit hours of ancillary coursework from other than the candidate's discipline.

These ancillary courses could include courses at the 400 level from the Department of Civil Engineering or from another department, normally at the 400 level. Depending upon the student's background, the student's advisor may require the student to take 300-level or additional 400-level (and in exceptional circumstances, 200-level) courses in the major or ancillary field of study which would not count towards the minimum 30- credit-hour course requirement.

The candidate is required to give an oral presentation on the project at about the time the report is submitted.

Second language requirement: none

Expected time to graduation: Two years

Ph.D. in Civil Engineering

Admission

Admission to the Ph.D. program is normally from the Master's degree level, i.e., M.Eng. or M.Sc. Students making exceptional progress while enrolled in either the M.Eng. or M.Sc. program may be transferred to the Ph.D. program by the dean of the Faculty of Graduate Studies upon the recommendation of the department head based on recommendations from the student's advisor and an appointed Selection Committee. In such cases, the program credit-hour requirements shall be decided in conjunction with the transfer.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department of Civil Engineering at least 4 months prior to their intended start date. International students should submit their application and supporting documentation to the Department of Civil Engineering at least 7 months prior to their intended start date.

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar. The Ph.D. program consists of coursework, original research and thesis. Normally, 12 credit hours of coursework (all at the 700 level) are required beyond the Master's degree or its equivalent. The minimum time requirement is two calendar years of full-time study and research, of which at least one academic year must be spent on campus. For research projects conducted off-campus, the student must be geographically proximate to the campus and visit it regularly.

Second language requirement: none

Expected time to graduation: Four years

Course Descriptions

Architecture

023.602 Structural Design in Architecture (4) Is concerned with structural form and design methods, theories, codes and safety. Structural masonry, concrete, steel and timber. Structural planning. Foundations. Building envelopes.

023.604 Mechanics and Properties of Materials (3) Introduces structural materials and their properties. Statics; forces; equilibrium; two- and three-dimensional force systems. Centroid; moment of inertia; axial, bending and shear stresses: Elementary Bending Equation.

023.605 Structural Systems of Architecture (3) Introduces concepts of structure in architectural applications. Understanding of properties, characteristics and limitations of structural systems. Comparative analysis of selected structural systems. Mechanisms and principles underlying the development of new structural systems.

Environmental Engineering

023.720 Topics in Environmental Engineering (3) Includes topics such as energy and the environment, solid waste management, and environmental problems in transport. Topics are studied through case histories of contemporary issues.

023.721 Solid Waste Composting and Disposal (3) Advanced engineering principles related to resource recovery and solid waste disposal. Biological conversion technologies and the disposal of solid wastes are discussed in detail.

023.791 Sanitary Chemistry (3) Physical, inorganic, and organic chemistry topics as related to water and waste handling and treating.

023.792 Theory of Water Treatment (3) Physical and chemical characteristics of water; water treatment processes including coagulation/flocculation, sedimentation, filtration, softening, adsorption, ion exchange, disinfection, and membrane processes.

023.793 Theory of Waste Treatment (3) Characteristics of waste - specific and generic determinations; unit operations and unit process for physical, chemical and biological treatment and transformation of particulate and dissolved contaminants. Biochemical transformations and degradation of hazardous pollutants; unit processes for enhanced nutrient removal and hazardous waste treatment. Full treatment trains for industrial and municipal waste treatment, including solids handling. *Prerequisites*: 023.370 and 23.369 or permission of instructor.

023.795 Environmental Engineering Laboratory (3) Laboratory work in water and wastewater analysis and treatment processes related to water quality management. *Prerequisites*: 023.793 and 023.792.

023.796 Environmental Engineering Design (3) Design of unit operations. Planning, cost effectiveness analysis, and conceptual design of a whole wastewater treatment plant. *Prerequisites*: 023.793 and permission of instructor.

Geotechnical and Geoenvironmental Engineering

The graduate program for M.Sc. students in the geotechnical group should consist of one core course in each of the following areas: Soils Engineering (023.748), Rock Engineering (023.749), Groundwater Engineering (023.773) and Soil Chemistry and Mineralogy (040.413). To this core would be added, for each student, 2-3 other courses for the specific area of specialization, e.g. soil mechanics, numerical analysis, hydrogeology and so on.

For the Ph.D. degree, program courses vary depending on the student needs and advisory committee recommendations.

023.715 Deformation and Fracture of Rocks (3) Physical properties of rock and rock masses. Mechanism of deformation and fracture at the microscopic, laboratory and field scales of investigation. The measurements of strength and deformation in the laboratory and the field. Time dependent deformation: creep and static fatigue.

023.716 Geotechnical Aspects of Environmental Impact Assessment (3) A review of various aspects of Environmental Impact Assessments associated with hazardous waste disposal sites and resource development projects. The basic methodologies of conducting environmental impact studies are discussed. Emphasis will be placed on terrain analysis, site geology, hydrogeology, waste management and long-term decommissioning. Several Environmental Impact statements are reviewed. *Prerequisites*: 023.492 or permission of instructor.

023.732 Topics in Groundwater Hydrology (3) A review of pertinent literature; current issues in groundwater hydrology.

023.736 Landslides and Slope Failures: Identification, Causes, and Control (3) Slope movement types and processes in soil and rock masses; recognition and identification: factors influencing stability; field investigation and instrumentation; strength properties and their measurement; stability analysis; assessment of hazard and risk analysis; stability in open pit mining; remedial measures including stabilization, protection, and warning.

023.737 Rock and Soft Ground Tunnelling (3) Geological aspects of tunnelling: investigations and influence on design and construction; tunnelling hazards; method of tunnelling; shields and trenchless technologies, drill and blast, roadheaders and tunnel boring machines; stability of openings; support and reinforcement; principal support types; design of support system; ground treatment; instrumentation.

023.738 Case Studies in Soils Engineering (3) Geomorphic regions and soil types in Canada related to engineering performance; case studies of foundations, excavations, tunnels, earth and rockfill dams; retaining structures, and geoenvironmental projects using a seminar approach; cold regions engineering geosynthetics. Examples will be taken from published records of the performance of construction projects in Canada.

023.743 Special Topics in Geotechnical Engineering (3) A tutorial approach to the study of topics in soil, rock and ice engineering not covered in the formal coursework.

023.745 Soil Properties and Behaviour (3) Testing methods for strength, compressibility and hydraulic conductivity of engineering soils; traditional models for soil characterization; introduction to hypoelastic and elastic plastic modelling; extension of models to account for strain-rate, temperature, and unsaturation; influence of soil chemistry; relationship between laboratory results and computational needs.

023.748 Soils Engineering (3) Analysis and design for construction in engineering soils: review of soil strength and compressibility, site characterization, stability and settlements of shallow foundations, deep foundations, earth retaining structures, slope design and remediation, earth dams. Emphasis will be placed on published records comparing predictions with field performance.

023.749 Rock Engineering (3) Review of strength of intact and discontinuous rock masses; energy changes due to excavation; weathering and residual materials; site investigations; rock mass classifications; blasting; rock slopes, surface subsidence due to underground excavation or natural phenomena; rock cuts and support; structural foundations on rock; field instrumentation.

023.772 Groundwater and Solute Transport Modelling (3) The physics and numerical solution of mathematical models of steady-state and transient groundwater flow and mass transport in the saturated and unsaturated zones; introduction to the finite difference and finite element methods; popular software; other modelling techniques, including random-walk particle methods; modelling groundwater contamination; non-linear problems; applications to regional groundwater flow and groundwater recharge, aquifer resource evaluations, contamination prediction.

023.773 Groundwater Engineering (3) The role of geology and hydrogeology in the siting, design of engineering structures; synthesis of groundwater mechanics in various geologic environments; case studies in construction dewatering, groundwater resource evaluation, subsidence, seepage in dams and foundations and slope stability;

basic review of analytic solutions and numerical methods.

Structural Engineering

023.710 Prestressed Concrete (3) A study of the analysis and design of prestressed concrete structures; pre-tensioning; post-tensioning; importance of material properties; modern design specifications.

023.714 Structural Masonry (3) Masonry materials, properties and behaviour. Plain and reinforced masonry, axial load, flexure, combined loading. Design methods, building code developments, building design.

023.726 Behaviour of Reinforced Concrete Members (3) Study of the actual behaviour and strength of reinforced concrete members; examination of recent significant publications, correlation to research with current design specifications and codes.

023.735 Topics in Advanced Structural Engineering (3) Lectures and seminars on selected advanced topics in structural engineering; current problems; implications on current research.

023.742 Advanced Methods of Structural Analysis (3) Review of matrix algebra; efficient solution of large sets of equations; vector and matrix transformations; force-displacement relationships; the direct stiffness method; the flexibility method; non-linear structural analysis; special topics.

023.778 Advanced Behaviour and Design of Steel Structures (3) Behaviour and design of welded thin-walled members; plate girders, composite construction, beam-columns, and connections. Special topics such as stability of metal structures and bracing requirements are also covered.

023.780 Design of Light Industrial Steel Buildings (3) Design criteria for metal building systems; behaviour and design of tapered and prismatic built-up columns and girders; design of gable frames; behaviour and design of cold-formed members; bracing requirements for metal buildings and design of connections.

023.786 Structural Stability (3) Elastic and inelastic stability of columns and frames; equilibrium, energy and dynamic methods of analysis, approximate solutions; beam-columns; torsional instability of thin plates.

Theoretical and Applied Mechanics

023.719 Solid Mechanics (3) Cartesian Tensors, analysis of stress and strain, constitutive relations, formulation and solution of problems in 2-D and 3-D elasticity, Hankel integral transforms, plasticity; yield surface and criteria, flow rule, plastic potential, hardening, viscoelasticity; creep, relaxation, basic viscoelastic models, stress-strain relations, correspondence principle.

023.727 Boundary Element Method (3) Review of approximate methods, direct boundary element formulations, fundamental solutions, computer implementation of fictitious stress and displacement discontinuity methods, applications in stress analysis, geomechanics, fracture mechanics and fluid mechanics.

023.740 Finite Element Method in Engineering Mechanics (3) Review of flexibility and stiffness methods; concept of finite elements and energy formulations; various shape functions; solutions of planar and three-dimensional elasticity problems; beams, plates and shells; special problems, e.g. seepage, non-linear material.

023.761 Special Topics in Theoretical and Applied Mechanics (3) Lectures and seminar on selected advanced topics in the field of mechanics; current problems and research.

023.787 Advanced Engineering Analysis (3) Analytical techniques used in engineering, including such topics as the application of complex variables, partial differential equations, generated Fourier series, integral transforms, and special functions, to advanced problems in civil engineering.

023.788 Continuum Mechanics (3) Selected topics in non-linear mechanics (e.g., generalized tensors, viscoelastic constitutive equation, strain gradient, micropolar theories of elasticity; coupled mechanical and thermal or electromagnetic phenomena, continuum thermodynamics, waves, surfaces of discontinuities.

Additional courses in Theoretical and Applied Mechanics Engineering are offered by the Department of Mechanical and Industrial Engineering.

Transportation Engineering

023.701 Modern Railway Engineering (3) A course in aspects of the design, construction, and operation of modern railways, examining main lines, branch lines, and terminals.

023.704 Analysis and Design of Freight Transport Systems (3) Overview of the structure and organization of Canada's freight transport system; measurement, analysis and forecasting of freight movements; transportation system performance; operating, service and cost characteristics of freight transport systems; design considerations for freight handling facilities; case studies in analysis and design of freight transport systems. *Prerequisite*: 023.484 or permission of the instructor for non-engineering students specializing in transport studies.

023.705 Transportation Engineering in Developing Regions (3) Aspects of transportation in developing regions that differ significantly from those of conventional North American practice. Factors and assumptions in developing region context; analysis and design of surface transportation systems and components in developing regions; special aspects of professional practice; case studies from Third World and northern Canada.

023.706 Analysis and Design of Passenger Transport Systems (3) Passenger travel forecasting principles and techniques; demand models; passenger transportation system performance; vehicle cycles; cost functions; congestion; evaluation; examination of case studies.

023.779 Pavement Evaluation and Performance (3) Pavement classification, pavement management, performance measures, condition surveys, sensor technology, material sampling, test methods on asphalt binders and unbound layers, non-destructive testing, sources of variability, pavement maintenance, rehabilitation, long-term performance.

023.784 Traffic Systems Analysis (3) Mathematical theories of traffic flow, introductory queueing theory with application to traffic performance at intersections; travel forecasting principles and techniques; the use of simulation in traffic engineering design.

023.799 Special Topics in Transportation (3) Lectures and seminars on selected topics in transportation not covered in the formal coursework.

Water Resources Engineering

023.709 Water Resources Systems (3) The application of operations research/systems analysis techniques to water resources and urban and environmental systems. *Prerequisite*: permission of instructor.

023.717 Modelling of Surface Water Quality Development (3) Application of water quality models for lakes, rivers, estuaries and reservoirs. Derivation of differential equations of pollutant transport; kinetic relationships for physical and chemical transformation of substances; numerical and analytical solutions to transport equations; and calibration and verification of models.

023.728 Intelligent Decision Support in Water Resources (3) Decision support systems; basic concepts of artificial intelligence and expert systems in water resources; theory, software and testing examples for intelligent decision support systems in water resources. *Prerequisite*: 023.278, 023.709 and/or permission of instructor.

023.732 Topics in Groundwater Hydrology (3) A review of pertinent literature; current issues in groundwater hydrology.

023.760 Water Quality Management (3) Water quality modelling: management options for water quality planning; treatment options and management schemes.

023.765 Selected Topics in Water-Resources Development (3) Lectures and seminars on selected advanced topics in water-resources engineering.

023.766 River Engineering (3) Classification of rivers; regime of river channels; channel patterns, sediment transport; design of stable channels; engineering interference (diversions, dams, dredging); river training works; hydraulic-model studies of rivers.

023.770 Water Resources Planning (3) Principles and methodologies of planning water resources development projects. An evaluation of a major multi-purpose project from inter-disciplinary viewpoints, incorporating those of designers, planners, critics and political decision makers. Offered in alternate years.

023.771 Coastal Hydraulics (3) Mechanics of wave motion; wave and water level predictions; types and design of coastal protection; littoral processes.

023.774 Special Topics in Hydrology (3) Selected topics examining the statistical aspects of hydrology. Time series analysis; disaggregation processes; flood frequency analysis; analysis of extremes.

023.775 Advanced Civil Engineering Systems (3) Optimization of Civil Engineering Systems. Use of linear and dynamic programming and network theory in all aspects of civil engineering. Introduction to the use of stochastic processes in operations research. Particular emphasis is given to water resources and environmental and transportation engineering.

023.777 Hydrological Processes (3) Runoff generation and runoff modelling; scale effects in hydrology; ramifications of distributed and lumped approaches; computer models of watershed modelling; optimization schemes and minimization functions; special concerns dealing with digital elevation models.

023.782 Operational Hydrology (3) Hydrographic analysis; relation between the physical processes and the hydrograph; estimation and prediction. Floods; statistical analysis; maximum probable floods. Water supply; estimates of dependable flow, simulation, synthetic flow series, statistical analysis.

023.797 Water Resources Project Design (3) Planning and studies and preliminary design of a number of hydraulic structures such as large storage dams with appurtenant works, river diversion works for flood control, hydroelectrical plants, conveyance canals, and irrigation distribution works.

SECTION 11: Classics

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Academic Staff

Professor Emeritus

Berry, E.G., B.A.(Hons.), M.A. (Queen's), Ph.D. (Chicago), F.R.S.C.

Associate Professors

Egan, R.B., B.A. (Assumption), M.A. (Western Ontario), Ph.D. (Southern California); **Gahan**, J.J., B.A. (Delaware), Ph.D. (Johns Hopkins); **Stirling**, L.M., B.A.(Hons.) (Alberta), M.A., M.A., Ph.D. (Michigan).

Assistant Professors

Howorth, D., B.A., M.A. (Oxford); **Lawall**, M., B.A. (William & Mary), M.A., Ph.D. (Michigan).

Program Information

The department provides programs of study leading to the degree of Master of Arts in several areas of classical studies that include Greek and Roman art and archaeology, Greek and Roman history and historiography and Greek and Latin languages and literatures. The department attempts, within the range of expertise of its personnel, to tailor the M.A. program to the particular interests and needs of the individual student. In many instances the M.A. is planned as a preparation for admission to a Ph.D. program in another university. In the past students have had good success in proceeding to doctoral programs in leading North American and British universities.

Fields of Research

- Greek and Roman Art History and Archaeology, with particular strengths in Roman North Africa, Greek ceramics and Late Antique sculpture.
- Greek literature, especially lyric and dramatic poetry, philosophical literature and Hellenistic poetry and prose.
- Greek language: history and lexicology.
- Latin literature, especially epic and dramatic poetry.
- Greek and Roman historiography
- Greek and Roman economic history.

Research Facilities

The university library's holdings are supplemented locally by those of the University of Winnipeg. Both institutions have collected classical monographs and periodicals for over a century. Together they maintain subscriptions to a respectable number of current periodicals representing all fields of classical studies. Through the library students have electronic access to an ever-increasing list of materials such as the *Patrologia Latina*. The department holds licenses for the *Thesaurus Linguae Graecae* data-base and the Packard Humanities Institute's data-bases for Latin literature and for documentary papyri and inscriptions.

The department's research activities are integrated with those of the Centre for Hellenic Civilization. Through the Centre an institutional membership is held in the American School of classical Studies in Athens. The American School makes course and field-work opportunities available to students and also gives them access to various research resources including its excellent library. Field archaeologists in the department regularly offer credit courses and opportunities for field-experience at their overseas excavations or surveys in such places as Greece, Ukraine and North Africa.

M.A. in Classics

Admission

In addition to the minimum admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, demonstrated proficiency in ancient Greek and Latin and an honours B.A. or its equivalent in Greek, Latin or Classics is a prerequisite for admission to the M.A. Program.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar. Course work will normally include two at the 700-level plus one ancillary course which may be taken within the Classics Department or in another department such as Anthropology, History, Philosophy, Political Studies, Religion. All 700-level courses in the Classics Department involve the reading of Greek and/or Latin texts in the original. A knowledge of French and/or German is not required but is desirable.

Second Language Reading Requirement: Latin and Greek

Expected Time to Graduate: One calendar year.

Ph.D.

There is no Ph.D. program in the Department of Classics

Course Descriptions

Major

003.701 Greek Literature (6) A reading course involving a selected Greek author or authors.

003.702 Latin Literature (6) A reading course involving a selected Latin author or authors.

003.703 Roman History (6) The transition from Republic to Empire.

003.708 Greek History (6) The rise and fall of Athenian democracy.

003.714 Roman Civilization (6) A topic in Roman civilization.

003.717 Readings in Selected Topics (6) Intensive study of one or more authors in Greek or Latin literature or of a special topic in ancient history.

Ancillary (undergraduate courses) **Credit Hours**

See the *Undergraduate Calendar* for course descriptions

Greek Literature		
003.389	Advanced Studies in Prose Literature of the Classical Period	6
003.391	Advanced Studies in Greek Poetry	6
Latin Literature		
003.390	Advanced Studies in Republican or Augustan Poetry	6
003.392	Advanced Studies in Latin Prose Literature	6
Classical Studies		
003.252	Greek and Roman Mythology	3
003.260	Greek History	6
003.261	Roman History	6
003.267	Greek Art and Archaeology	3
003.268	Roman Art and Archaeology	3
003.269	Greek Literature in Translation	3
003.270	Latin Literature in Translation	3
003.365	Religion in Ancient Greece	3
003.366	Religion in Ancient Rome	3
003.368	Studies in a Classical Literary Genre 1	3
003.369	Studies in a Classical Literary Genre 2	3
003.370	Studies in a Classical Literary Genre 3	3
003.371	Aspects of Classical Culture 1	3
003.372	Aspects of Classical Culture 2	3
003.373	Aspects of Classical Culture 3	3

SECTION 12: Clothing and Textiles

Acting Head: Lena Horne
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Academic Staff

Associate Professors

Clayton-Gouthro, C.M.M., B.F.A., M.Sc., Ph.D. (Manitoba); **Horne**, L., B.Sc.(H.Ec.), M.Sc. (Alberta), Ph.D. (Iowa State).

Assistant Professors

Goel, S., B.A. (Ranchi), M.Sc., M.A., Ph.D. (Manitoba); **Gonzalez**, J.A., B.Sc. (Mexico), M.Sc, Ph.D. (Alberta).

Adjunct Professors

Han, J.H., B.Sc., M.Sc. (Korea), Ph.D. (Purdue); **King**, M.W., B.Sc. (Manchester), Ph.D. (Compiègne)

Program Information

The Department of Clothing and Textiles offers a program leading to the M.Sc. degree. Programs of study and research may pertain to: properties, utilization and performance of textile materials; consumer behaviour of older adults towards textile products; marketing of textile products; supply chain channel for the Canadian textile complex; and simulation model and quality assurance. The program comprises course work and a thesis.

Graduates from the program have found challenging careers in diverse fields. These include: management, apparel product development, textile testing in industry or government research laboratories, costume design, museums, textile conservation, post-secondary education, and quality assurance.

Fields of Research

Faculty members are currently involved in research pertaining to consumer behaviour towards textile products; development of textile products for older consumers; protective clothing, and fabric formation in complex structures; impact of information technology, and simulation model for global supply chain management in the Canadian textile complex.

Research Facilities

The department has well equipped laboratories for the study of clothing and textiles. Space and equipment are available for chemical, physical, microscopic and sensory investigations of textiles and for textile product development research, and the physical and socio-psychological aspects of clothing. Special equipment includes an Instron tensile tester, an Atlas Fade-Ometer, an IR spectro-photometer, a Hunterlab Color Difference meter, and a range of flammability, electrostatic propensity, thermal comfort and abrasion testers. A computer-aided apparel design laboratory houses personal computers equipped with an industry-standard software system for apparel. The Clothing and Textiles Hallway Museum contains over 2000 artifacts which are used for the study of Prairie heritage and for conservation activities.

The library holds major volumes of English-language periodicals in clothing and textiles and ancillary areas. Networked computer facilities can be accessed from convenient locations including the Faculty of Human Ecology micro-computer laboratory.

The university has several research institutes of potential relevance to the clothing and textiles graduate students; for example, the Centre on Aging, the Intelligent Sensing for Innovative Structures (ISIS) Canada, and the Exercise and Environmental Medical Laboratory.

M.Sc. in Clothing and Textiles

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

Canadian/U.S. students and international students must submit their application and supporting documentation to the Department by December 1.

Program Requirements

Program requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Second language reading requirement: none.
Expected time to graduate: two years.

Ph.D.

The Department of Clothing and Textiles does not offer a Ph.D. program.

Course Descriptions

064.704 Advanced Dress Design (3) Analysis of principles and techniques as a basis for development of original designs and construction methods to utilize the functional properties of selected textiles or to meet the needs of certain physical problems. *Prerequisite:* 064.323, 064.336, or equivalent.

064.705 Research Methods in Textiles and Clothing (3) A review of various areas for research; consideration of appropriate methods for the collection and analysis of data; critical evaluation of research done in the field; planning of and participation in an individual or group project. *Prerequisite:* 064.716

064.706 Problems in Clothing and Textiles (3) Advanced problems in one or more of the following areas: chemical, physical, or biological properties and/or structure of textiles; physiological aspects of textiles and clothing; sociopsychological or marketing aspects; apparel design; or historic costume and textiles.

064.707 Seminar in Textiles and Clothing (3) A critical study of development in selected areas of textiles and/or clothing with emphasis on recent research findings. First half of 064.710.

064.710 Seminar in Textiles and Clothing (6) A critical study of development in selected areas of textiles and/or clothing with emphasis on recent research findings.

064.711 Analysis of Clothing Behaviour (3) Advanced study of dress as a form of human behaviour.

064.712 Topics in Textile and Apparel Marketing (3) A critical examination of practices in the production, distribution, and consumption of textiles and apparel.

064.713 History of Textiles and Apparel (3) A critical examination of the history, methods of documentation and restoration of textiles and apparel from selected periods. *Prerequisites:* students are expected to have some background in history plus six credits from 064.329; 064.332; 064.436 and 064.335 or consent of instructor.

064.714 Topics in Textiles -- Chemical Properties (3) An in-depth study of the properties of textiles of modern and historic origin using qualitative and quantitative chemical and microscopic laboratory techniques. *Prerequisite:* 064.430 or consent.

064.715 Topics in Textiles -- Physical Properties (3) An in-depth study of the properties of fibres, yarns, fabrics, finishes and fabric assemblies using quantitative physical and sensory laboratory techniques. *Prerequisite:* 005.100 and 005.200, 064.430 or consent.

064.716 Concepts in Clothing and Textiles (3) Critical examination of the development of and current activities in clothing and textiles research. Written and oral reports required. *Prerequisite:* graduate student standing.

SECTION 13: Community Health Sciences

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Academic Staff

Professors

Cooper, J., Dip.P., O.T., (Toronto), B.O.T., M.Sc., Ph.D. (Manitoba); **Evans**, J., B.Sc. (Birmingham), Ph.D. (Leicester); **Forget**, E., B.A. (St. Marys), M.A., Ph.D. (Toronto); **Harvey**, D., B.A. (Bimidji State), M.S. (Western Illinois), P.E.D. (Indiana); **Hassard**, T., B.Sc., M.Sc., Ph.D. (Queen's, Belfast); **Havens**, B., B.A. (Downer), M.A.; **Hershfield**, E., M.D., B.Sc., F.R.C.P.C.; **Hogan**, T., B.A., M.A., Ph.D. (Catholic University of America); **Horne**, J., B.A. (Victoria), M.A., Ph.D. (Carleton); **Kaufert**, J., B.A. (Minnesota), M.A., Ph.D. (Northwestern); **Kaufert**, P., B.A.(Hons.) (Leeds), Ph.D. (Birmingham); **McKenzie**, J.K., B.Med.Sc., M.B., Ch.B. (New Zealand), M.D., F.R.A.C.P., F.R.C.P. (London), F.R.C.P.C.; **Moffatt**, M., B.Sc., M.D. (Toronto), M.Sc. (McGill), F.R.C.P.C; **Murray**, R., B.A., M.A., Ph.D. (Manitoba); **O'Neil**, J., B.A., M.A. (Saskatchewan), Ph.D. (Berkeley); **Postl**, B., M.D. (Manitoba), F.R.C.P.C; **Ronald**, A., M.D., B.Sc., F.A.C.P., F.R.C.P.C.; **Roos**, L., A.B. (Stanford), Ph.D. (M.I.T.); **Roos**, N., B.A. (Stanford), Ph.D. (MIT); **Shapiro**, E., B.A., M.A. (McGill); **Sneiderman**, B., B.A., L.L.B. (Connecticut), L.L.M. (with Distinction) (New York); **Stanwick**, R., B.Sc., M.D. (Manitoba), F.R.C.P.C.; **Tenenbein**, M., M.D. (Manitoba), F.R.C.P.C., A.B. M.T.; **Wade**, J., B.S. (North Dakota), M.D. (Manitoba), B.Sc., F.R.C.P.C.; **Yassi**, A., B.Sc. (McGill), M.D., C.O.H.S. (McMaster), M.Sc. (Toronto), F.R.C.P.C. (Manitoba); **Young**, K., B.Sc.(Hons.), M.D., C.M. (McGill), M.Sc. (Toronto), F.R.C.P.C., D. Phil. (Oxford).

Associate Professors

Black, C., M.D. (Manitoba), Sc.D. (Baltimore); **Carriere**, K., B.Sc., M.Sc., M.Sc., Ph.D. (Wisconsin-Madison); **Cohen**, M., B.Sc., M.D. (Manitoba), M.H.Sc. (Toronto), F.R.C.P.C.; **Gelskey**, D., B.S. (Idaho), M.S., M.P.H., D.P.H. (Michigan); **Hammond**, G., M.D., F.R.C.P.C.; **Kliewer**, E., B.Sc., M.Sc. (Manitoba), Ph.D. (UBC); **Kraut**, A., M.D. (Manitoba); F.R.C.P.C.;

Macdonald, S., B.Sc., M.D. (Manitoba), F.R.C.P.C. (Com. Med.); **Manfreda**, J., M.D. (Ljubljana), D.P.H. (Zagreg), M.S. (Minnesota); **Moses**, S., M.D. (Toronto), M.P.H. (Johns Hopkins); **Mustard**, C., B.A., Sc.D. (Johns Hopkins); **Orr**, P., M.D. (Toronto), F.R.C.P.C.; **Plummer**, F., M.D. (Manitoba), F.R.C.P.C.; **Sevenhuysen**, G., B.Sc., Ph.D. (London); **Stewart**.D., B.A., M.A.. (Acadia), Ph.D. (UBC); **Tate**, R.B., B.Sc. (Winnipeg), M.Sc., Ph.D. (Manitoba); **Walker**, J.R., B.A. (Hons.), M.A., Ph.D. (Manitoba).

Assistant Professors

Alexander, P., Ph.D. (Utah), C.C.H.S.E.; **Blanchard**, J., M.D. (Manitoba), M.P.H. (Johns Hopkins); **Brothwell**, D. B.Ed. (Saskatchewan), D.D.P.H., M.Sc. (Toronto), D.M.D. (Saskatchewan); **Brown**, K., M.D., M.B.A. (Western Ontario); **Brownell**, M., B.A., M.A., Ph.D. (Manitoba); **Bruce**, S., B.N., M.A., Ph.D. (Manitoba); **Carrothers**, L., B.A. (Brandon), M.P.A., Ph.D. (Manitoba); **Carson**, J., B.Sc.(Med.), M.D. (Manitoba), F.R.C.P.C.; **Chase**, R., M.D. (McMaster), C.C.F.P., F.R.C.P.C., M.Sc. (McMaster); **Chipperfield**, J., B.A.(Hons.), M.A., Ph.D. (Manitoba); **Elliott**, L., M.D., M.Sc. F.R.C.P.C., C.C.F.P. (Dalhousie), F.R.C.P.C.; **Fast**, M., B.Sc., M.D., F.R.C.P.C., D.T.C.H.; **Finlayson**, M., B.M.R., M.Sc., Ph.D. (Manitoba); **Gelskey**, S., B.Sc. (D.H.) (Marquette), M.P.H. (Michigan), Ph.D. (Manitoba); **Harlos**, S., B.Sc. (Alberta), M.D. (UBC), F.R.C.P.C.; **Katz**, A., B.Sc., M.B.Ch.B. (Capetown), M.Sc. (Manitoba), C.C.F.P.; **Kettner**, J.D., M.D., F.R.C.S.C., M.Sc. (London), F.R.C.P.C.; **Kozyrskyj**, A.L., B.Sc.Phm. (Toronto), M.Sc., Ph.D., (Manitoba); **Krym**, V. B.Sc.N. (Manitoba), M.B. (McMaster), M.P.H. (Harvard); **Lix,** L., B.S.H.Ec. (Saskatchewan), M.Sc., Ph.D. (Manitoba); **Macdonald**, A., M.D. (Queen's), D.P.H. (Toronto), F.R.C.P.C. (Manitoba); **McDonald**, R., B.Sc. (Bishop's), M.D. (Queens), M.P.H. (Boston); **Martens**, P., B.Sc., B.Ed., M.Sc., Ph.D. (Manitoba); **Menec**, V., B.A., M.A., Ph.D. (Manitoba); **Metge**, C., B.Sc. (Alberta), Ph.D. (Maryland); **Miles-Tapping**, C., M.A. (Car.), Ph.D. (Ottawa), B.Sc. (UBC); **Ploudre**, P., M.D. (Ottawa); **Poffenroth**, L., M.Sc., M.D. (Manitoba), F.R.C.P.C.; **Pope**, W., M.D., F.R.C.P.C., L.L.B. (Manitoba); **Reading**, J., M.Sc., Ph.D. (Toronto); **Redekop**, T., B.Sc., M.D. (Manitoba), C.C.F.P., F.R.C.P.C.; **Roberts**, J., M.B., B.S. (Sydney), M.Sc., Ph.D. (Manitoba); **Silver**, M., B.Sc. (Manitoba), Ph.D. (Western Ontario), M.B.A. (Manitoba); **Stranc**, L., B.Sc.A., M.Sc., Ph.D. (Manitoba); **Taback**, S. B.Sc., M.D., F.R.C.P.C.; **Tataryn**, D., B.A., M.A., Ph.D. (Arizona); **Taylor**, M., M.D. (Toronto), F.R.C.P.S.; **Turner**, D. B.Sc. (Victoria), M.Sc. (Calgary), Ph.D. (Alberta); **Tyas**, S., B.Sc. (Guelph), M.Sc., Ph.D (Western Ontario); **Wajda**, A., M.Sc. (Illinois), M.Sc. (Poland); **Walker**, R., B.Sc.(Med.), M.D., F.R.C.P.C.; **Watson**, D., B.Sc. (Alberta), M.B.A. (Western Ontario), Ph.D. (Toronto); **Wotton**, K., B.Sc., M.D. M.Ph. (Johns Hopkins); **Wright**, B., B.Sc., M,D., F.R.C.P.C. (Manitoba), M.B.A., **Yu,** B., B.Sc. (Med.), (Harbin); M.Sc., (Acad. Sci. China), Ph.D. (Manitoba).

Adjunct Professors

Bourgeois-Law, G., M.D., B.Sc.(Med.), C.C.F.P.; **Garro**, L.C., B.S., B.A. (Calgary), Ph.D. (Duke), Ph.D. (California, Irvine); **Norton**, G.R., B.Sc. M.Sc., Ph.D. (Utah State); **Spigelman**, M., B.A. (Winnipeg), M.A., Ph.D. (Waterloo).

Program Information

CHS offers a broad, multidisciplinary training at the diploma, M.Sc. and Ph.D. levels in the concepts and methods of the population-based health sciences and their application in the practice of public health and preventive medicine. In addition to training in the core areas of epidemiology, biostatistics and the social sciences as applied to health (anthropology, economics, sociology and political science), students have an opportunity to obtain advanced training in internationally recognized research programs conducted by specialized units within the department such as the Manitoba Centre for Health Policy and Evaluation, the Northern Health Research Unit and the Environmental and Occupational Health Unit. As a result graduate students have the opportunity to access both internationally regarded researchers and award winning teachers.

The Ph.D. program is designed to produce individuals who will teach in the community health sciences; train other researchers, design and execute major research projects; and serve as senior advisors and consultants in the area of health care policy and planning.

In contrast, the M.Sc. program is intended to satisfy the demand of provincial and federal health departments for health professionals with training in health policy, planning, evaluation and administration; and to provide clinical departments in the medical faculty with clinical researchers with training in epidemiology, biostatistics and research methods.

The diploma program is intended to provide senior clinicians in teaching hospitals and managers in provincial and regional health authorities with a set of core knowledge and skills in the population health sciences which will allow them to become more effective consumers and utilizers of health research data.

Program graduates currently occupy faculty positions in medical, dental, nursing and occupational therapy schools in Canada, the United States and overseas. Others work in government at the provincial and federal levels as medical officers of health, and as directors of research and planning programs. Some graduates have returned to primarily clinical positions in a variety of health disciplines while others have become independent consultants in health services planning and evaluation. Internationally, the program has graduates located in Indonesia, Saudi Arabia, Kenya and Singapore and on the staff of the United Nations Population Fund.

Fields of Research

Researchers in the department are involved in a wide range of research activities in community health and have achieved a national, and in many cases, international reputation in their fields. Particular areas of strength are health policy planning and evaluation, northern and aboriginal health, occupational and environmental health, women's health, disability issues, ageing and health, the health effects of alcohol and tobacco use, and the epidemiology of chronic diseases.

Researchers are also actively working in areas such as health promotion, HIV/AIDS prevention, medical anthropology, health education and socioeconomic factors in health. In addition, several researchers in the department have active interests in International Health with projects currently running in Cuba and Kenya.

The department has researchers with high levels of expertise in both qualitative and quantitative research methodologies. The opportunity for graduate students to work with researchers in both research paradigms represents a major strength of the program.

Research Facilities

The ability to seamlessly interact with internationally regarded research groups located within the department such as the Manitoba Centre for Health Policy and Evaluation, the Northern Medical Research Unit and the Environmental and Occupational Health Research Unit, creates an extremely rich graduate research environment. Through the Manitoba Centre for Health Policy and Evaluation graduate students have potential access to administrative health databases which are unique in Canada.

The department maintains a graduate student computer resource centre supporting a broad range of statistical, graphical and information processing software. The department also maintains a suite of carrels that provide a dedicated study centre for its graduate students.

M.Sc. in Community Health Sciences

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. The M.Sc. program is open to individuals with four year degrees in the health sciences or professions or with honours degrees in the biological or social sciences.

The deadline for receipt of the departmental application form and supporting documents is early January.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar. Thirty credit hours of course work (18 from required courses, 12 from electives) and thesis.

Second language reading requirement: none
Expected time to graduate: two years full-time, four years part-time

Ph.D. in Community Health Sciences

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. The Ph.D. program is open to individuals with thesis-based M.A. and M.Sc. degrees.

The deadline for receipt of the departmental application form and supporting documents is early January.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar. Eighteen credit hours of coursework (six from required courses, twelve from electives), candidacy examination and thesis. (In addition, eighteen credit hours of prerequisite courses, or their equivalents, must have been completed before entering the program or in the first year).

Second language requirement: none
Expected time to graduation: three years full-time, five years part-time

Diploma in Population Health

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. The Diploma program is open to individuals with four year degrees in the health sciences or professions or with honours degrees in the biological or social sciences.

The deadline for receipt of the departmental application form and supporting documents is early January.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Eighteen credit hours of course work (nine from required courses, nine from electives),

Second language requirement: none
Expected time to graduation: 18 months

Course Descriptions

The courses offered in biostatistics and epidemiology are open to students pursuing graduate studies in the basic medical sciences or training in the clinical specialties.

093.732 Organization and Financing of the Canadian Health Care System (3) This course examines public policy events that have influenced the organization and financing of health services delivery in Canada. It focuses on the evolution of events from the early 1940s to the present. Within this focus particular attention is given to the policy role of state actors, institutions, and professional providers.

093.735 Research Methods in Health Care (3) This course provides a survey and practical experience in design, strategies, research methods, and applied socio-medical disciplines as related to health. The course emphasizes the application of quantitative and qualitative techniques, in the measurement of health-related attitudes, behaviours and program outcomes. *Prerequisite:* an undergraduate research methods course in Sociology, Anthropology, Psychology or Nursing and permission of instructor.

093.747 Biostatistics 1 (3) An introduction to statistical ideas and techniques for health sciences research. The description of data. Patterns in data, the normal, binomial and Poisson distributions. Principles of estimation. Principles of hypothesis testing. The major statistical tests (t tests, analysis of variance, chi squared tests, correlation and regression).

093.748 Biostatistics 2 (3) Techniques of research design and analysis for health scientists. Principles of experimental design. Clinical trial planning. Study size determination. Analysis of variance for factorial and split plot experiments. Analysis of covariance. Multiple regression. Non-parametric hypothesis testing. Principles of survey design. *Prerequisite:* 093.747 and permission of instructor.

093.751 Current Topics in Community Health (3) Focus on current issues and topics in community health, particularly as they relate to Manitoba and to Canada. Emphasis will be placed on current literature and ongoing research to examine emerging policies and programs within health care and social development. *Prerequisite:* basic courses in Epidemiology and Statistics.

093.752 Principles of Epidemiology 1 (3) This course will introduce the basic concepts and methods of epidemiology, including the definition and measurement of health status and health determinants in populations, assessing health risks and inferring causation, and issues in the design and analysis of population health studies.

093.753 Principles of Epidemiology 2 (3) This course follows the Principles of Epidemiology I and discusses the applications of epidemiologic principles in public health practice, including the investigations of epidemics, disease surveillance, clinical applications, evaluation of health programs, and the planning of preventive programs. Students will also receive instruction in microcomputer applications and use of EPI-INFO software for data entry, analysis and presentation. *Prerequisite:* 093.752 Principles of Epidemiology 1.

093.713 Methods in Health Services Research and Evaluation (3) Examines the process of planning and conducting research and evaluation to assess health services with an emphasis on the methods by which a question may be translated into a testable hypothesis, and the specification of a research plan that will produce results of maximum internal and external validity. *Prerequisites:* Permission of instructor, 093.747 and 093.752.

093.720 Health and Health Care in Developing Countries (3) The course will focus on the patterns of mortality and morbidity in developing countries and the organization of health care services. Social, cultural, and economic development will be related to health and health services. *Prerequisite:* 093.752 and 093.753 or permission of instructor.

093.721 Epidemiology of Women's Health (3) This course will deal with problems and concerns particular to women's health. The topics will be approached from an epidemiological perspective but use will be made of materials from health economics, evaluation research, medical sociology and anthropology. *Prerequisite:* 093.752 and 093.753 and permission of instructor.

093.722 Health and Health Services of Native and Northern People (3) This course provides a detailed review of the health status and the determinants of health of Canada's native people. *Prerequisite:* 093.752 and 093.753 or permission of instructor.

093.724 Cultural Epidemiology and Primary Care (3) This course will provide an opportunity for students to critically examine the use of social science theory in epidemiological research. Course material will explore the nexus between the health consequences of behaviour and the social and cultural correlates and context of that behaviour. Social and cultural factors will be shown to have direct impact on epidemiological constructs such as the perception of risk factors, management of chronic illness, and the distribution and utilization of primary health care services. *Prerequisite:* permission of instructor and previous coursework in epidemiology, anthropology and sociology.

093.756 Epidemiology of Cancer (3) This course introduces the magnitudes, risk factors and prevention strategies of cancer. It focuses on current knowledge related to the etiology of cancer, medical interventions and potential for prevention. *Prerequisite:* 093.752 and 093.753.

093.727 Epidemiology of Chronic (Non-Cancer) Diseases (3) The objective is to study the natural history of chronic diseases including the distribution of diseases, risk and prognostic factors, rationale and strategies for prevention. The methodological issues concerning the investigation of severe disease are also discussed. *Prerequisite:* 093.752 and 093.753.

093.728 Advanced Biostatistics (3) Techniques for the analysis of complex health and medical data sets involving continuous, categorical and time-related outcome variables. Principles of statistical modeling. Basic regression and linear models. Multiple regression and general linear models. Categorical outcome variables and logistic regression. Survival analysis and proportional hazards regression. *Prerequisite:* 093.748 and permission of instructor.

093.729 Economic Evaluation of Health Care (3) The objectives of this course are to enable students to understand economic evaluation methodologies (cost-effectiveness, cost-benefit, cost-utility analysis) as applied to health care and to familiarize them with the applied literature on economic evaluation of health care. *Prerequisite:* permission of instructor.

093.730 Health Policy and Planning (3) This course examines public management in the health services sector. The first half of the course reviews the role of theory in understanding the scope and content of health policy decisions. The second half focuses on current national and international issues including the application of New Public Management concepts to the organization and financing of existing and emerging services.

093.731 Epidemiology of Health Care (3) This course will discuss the advantages and disadvantages of using large administrative data bases for research purposes. Substantive topics dealt with include: regional variations in provision and utilization of health care, short- and long-term outcome studies, individual physician behaviour, and technology assessment. Policy implications are considered. *Prerequisite:* 093.752 and 093.753, 093.747 and 093.748 or equivalent and permission of instructor.

093.733 Cultural Perspectives on Illness and Medical Practice (3) The objective of this course is to make students aware of the ways in which disease, illness, and medical practice are socially and culturally mediated. The course will examine cultural influences on the experience and expression of illness and consider the medical practitioner's role in the development and provision of culturally responsive health care. *Prerequisite:* permission of instructor.

093.734 Hospital Medical Administration (3) This course provides a broad overview of the principles and practice of Medical Administration for Canadian Hospitals. Special emphasis will be placed on the strategic planning process for hospitals, and the key role played by Clinical Heads and other Medical Staff leaders in this activity. *Prerequisite:* permission of instructor.

093.736 Clinical Trials (3) The Randomized Clinical Trial is the only true experiment in clinical research. This course is intended to give students a detailed knowledge of the design and implementation of RCTs. Students will participate in a systematic review and meta-analysis of RCTs. *Prerequisites:* 093.752 and 093.753, 093.747, 093.748 or equivalents.

093.737 Measurement of Health and Disability (3) A survey of the conceptual and socio-political issues influencing health status and adaptation to disability. The course emphasizes the methodological aspects of developing, validating and applying measures of health status and physical impairment. Determinants of health and disability, stigma, environmental barriers, medicalization, professionalization, policy initiatives in rehabilitation, and the disabled consumers movement in Canada are discussed. *Prerequisite:* permission of instructor.

093.738 Prevention and Health (3) The course will cover frameworks used in formulating preventive strategies. Topics will include risk factor assessment, screening, health education, legislation, litigation, lifestyle and prevention. Actual case studies will be used. *Prerequisite:* 093.752 and 093.753.

093.739 Health Promotion (3) An examination of theories, principles, practices and settings for health promotion. *Prerequisite:* permission of instructor.

093.740 Directed Readings: 1 -- In Epidemiologic Methods (3) An opportunity for ad-

vanced students to acquire knowledge in a defined and specific area of interest. *Prerequisites:* permission of instructor and Graduate Program Director.

093.741 Directed Readings: 2 -- In Epidemiology (3) An opportunity for advanced students to acquire knowledge in a defined and specific area of interest. *Prerequisite:* permission of instructor and Graduate Program Director.

093.742 Seminars on Advanced Topics: 1 -- In Health Care Evaluation (3) Seminars dealing with current research issues, emerging methodologies and analytical techniques will be offered for advanced students. *Prerequisite:* permission of instructor.

093.743 Seminars on Advanced Topics: 2 -- In Methods of Health Care (3) Seminars dealing with current research issues, emerging methodologies and analytical techniques will be offered for advanced students. *Prerequisite:* permission of instructor.

093.745 Epidemiology of Communicable Diseases (3) Overview of epidemiological principles in communicable disease investigation and prevention and specific issues in controls of certain specific communicable diseases of public health importance in Canada will be introduced. *Prerequisite:* permission of instructor.

093.746 Environmental and Occupational Health (3) The aim of the course is to acquaint the student with the role of the environment (general and specifically working) as the determinant of health. The content of the course will be presented in the form of lectures, seminars, and field visits. *Prerequisite:* permission of instructor.

093.749 Empirical Perspectives on Social Organization and Health (3) This course will focus on a selected review of the epidemiological literature which has integrated social factors in the investigation of the distribution of health and illness in society. The course will review a selection of important empirical studies investigating the roles played by social, psychological and economic status factors in determining health and illness. Emphasis will be placed on identifying the central theoretical and methodological approaches to defining and measuring socioeconomic status in this literature. *Prerequisite:* permission of instructor.

093.754 Advanced Epidemiology (3) Advanced epidemiologic research methods focusing on selected epidemiological issues (bias, confounding, matching, etc.). Discussion will be directed to both epidemiological and statistical considerations to find the optimal solution to a research problem. *Prerequisites:* 093.752, 093.753, 093.728.

093.755 Observational Epidemiology (3) Intermediate epidemiologic research methods focusing on case-control and cohort studies, with discussion on issues relating to planning and design, implementation, and data analysis. *Prerequisite:* 093.752.

93.757 Managing Health Systems (3) An internet -based course involving students from Europe and Canada. The course provides a greater understanding of the health care systems of participating countries through comparative analysis of topics such as health service funding and delivery issues, impact of health system reform and evidence based management.

SECTION 14: Computer Science

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Academic Staff

Distinguished Professor

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Professors

Arnason, A.N., B.Sc., M.Math. (Waterloo), Ph.D. (Edinburgh); **Collens**, R.J., B.Sc., M.Sc., Ph.D. (Waterloo), F.I.M.A.; **Hoskins**, J.A., B.E.S., M.Sc., Ph.D. (Manitoba); **King**, P.R., B.Sc., Ph.D. (Nottingham), I.S.P.; **Kocay**, W.L., B.Sc.(Hons.) (Manitoba), M.Math., Ph.D. (Waterloo); **Meek**, D.S., B.Math. (Waterloo), M.Sc. (Toronto), Ph.D. (Manitoba); **Scuse**, D.H., B.A. (Math.) (York), M.Sc., Ph.D. (Manitoba); **van Rees**, G.H.J., B.Math., M.Math., Ph.D. (Waterloo); **Walton**, D.J., B.Sc.(Hons.) (South Africa), M.S.Math (Illinois), M.Sc., Ph.D. (Manitoba)

Associate Professors

Anderson, J.E., B.Sc.(Hons.), M.Sc., Ph.D. (Manitoba); **Baltes**, H., B.Sc., Ph.D. (Calgary); **Bate**, J.A., B.Sc.(Hons.), M.Sc., Ph.D. (Manitoba); **Cameron**, H.A., B.Sc., M.Sc. (Manitoba), Ph.D. (Waterloo)**; Ehikioya**, S., B.Sc.(Hons.) (Benin), M.Sc. (Lagos), Ph.D. (Manitoba); **Graham**, P., B.C.Sc.(Hons.), M.Sc., Ph.D. (Manitoba); **Laucht**, C.M., B.Sc., M.Sc., Ph.D. (Manitoba); **Misic**, J., B.Sc., M.Sc., Ph.D. (Belgrade).

Assistant Professors

Eskicioglu, M.R., B.Sc. (Istanbul Technical), M.Sc. (Middle East Technical), Ph.D. (Alberta); **Irani**, P. B.Sc., Ph.D. (New Brunswick); **Kemke**, C., B.Sc. (Dortmund), B.Sc. (Open U.), Ph.D.(Bielefeld); **Li**, P., B.Sc.(Hons), M.Sc., Ph.D. (Manitoba); **Li**, Y.E., B.Eng. (Beijing), M. Math., Ph.D. (Waterloo); **Misic**, V., B.Sc., M.Phil., Ph.D. (Belgrade); **Thulasiram**, R., B.Sc., M.Sc. (Madursi-Kamaraj), M.Sc., Ph.D. (Indian Inst. Of Science); **Thulasiraman**, P., B.Eng., M.A.Sc. (Concordia), PhD. (McGill), Ph.D. (Deleware); **Toulouse**, M., B.Comm. (Quebec), B.A. (Laval), M.Sc., Ph.D. (Montreal)

Adjunct Professors

Barker, K., B.Sc., MSc. (Calgary), Ph.D. (Alberta); **Chen**, Y., B.Sc. (China), Ph.D. (Kaiserslautern); **Maheswaran**, M., B.Sc. (Peradeniya, Sri Lanka), M.Sc., Ph.D. (Purdue); **Peters**, R., B.Sc.(Hons), M.Sc., Ph.D.(Alberta); **Pizzi**, N. B.Sc., M.Sc., Ph.D. (Manitoba)

Program Information

The department offers Master's and Ph.D. programs at the graduate level, which cover many areas of computer science. The department also participates in the new Master's in Mathematical, Computational and Statistical Sciences program offered through the Institute of Industrial Mathematical Sciences. Graduates find employment in industry and academia.

Fields of Research

The department has people working in the areas of algorithms and complexity, computer graphics, artificial intelligence and expert systems, robotics, computer communications and networking, parallel computing, databases, distributed computing, digital logic, graph theory, number theory and cryptography, simulation, software engineering, text processing, hypertext and videotex and the theory of languages and environments. More information about specific individuals and their current graduate students can be found on the department web pages.

Research Facilities

The department provides each graduate student with a study space and access to computers, laser printers, mail, photocopier, fax machine, a reading room and a lounge.

Computing facilities for research include a large number of UNIX workstations, PC's, and some Macintosh computers. Operating systems used include Solaris, Linux, AIX, Windows NT and 2000, and MacOS.

M.Sc. in Computer Science

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this Calendar. Students may be admitted to the Master's program if they hold an Honours Bachelor's degree in Computer Science and if they present a suitable selection of courses. However, space is limited and only the best qualified students will be admitted.

Students can also be admitted to the Master's program upon successful completion of their pre-Master's program. In special cases, where a student holds a first or upper second class Honours bachelor's degree and has previous experience or academic qualifications in Computer Science equivalent to the pre-Master's program, consideration will be given to his/her admission directly into the Master's program. Please contact the Department for details.

Application Deadlines

The Department of Computer Science allows students to begin their program in September or January. For admission for each of these start dates, Canadian/U.S. students should send their applications with complete supporting documentation to the Department of Computer Science no less than three (3) months before the intended start date. Non-Canadian students should have their applications with complete supporting documentation received by the Department of Computer Science no later than eight months (8) before the intended start date.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students must complete 24 credit hours of coursework and comprehensive examinations or 12 credit hours of coursework and a thesis. In both cases, all credit hours must be at the 700 level and must include the 0-credit-hour Research Methodologies course. See the departmental supplemental regulations and Student Handbook for information. Students must consult with their departmental advisor prior to deciding on courses. The courses listed below may not all be offered in any one particular year.

Second language reading requirement: none
Expected time to graduate: two years

Ph.D. in Computer Science

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. A candidate must normally complete an M.Sc. degree before entering the Ph.D. program. Individual qualifications other than these will be considered.

Application Deadlines

The Department of Computer Science allows students to begin their program in September or January. For admission for each of these start dates, Canadian/U.S. students should send their applications with complete supporting documentation to the Department of Computer Science no less than three (3) months before the intended start date. Non-Canadian students should have their applications with complete supporting documentation received by the Department of Computer Science no later than eight months (8) before the intended start date.

Program Requirements

Program requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Second language reading requirement: none
Expected time to graduate: four years

Course Descriptions

074.722 Research Methodologies (0) This course explores the research process in general and the resources for research in computer science. Traditional research approaches and use of emerging technology will be discussed. Attendance at Department seminars and classes is required. The course is evaluated on a pass/fail basis.

074.757 Advanced Topics in Computer Science 1 (3) Topics of current research interest in areas of computer science, available on an occasional basis, subject to the interests and availability of faculty. *Prerequisite:* written consent of instructor.

074.758 Advanced Topics in Computer Science 2 (6) Topics of current research interest in areas of computer science, available on an occasional basis, subject to the interests and availability of faculty. *Prerequisite:* written consent of instructor.

074.770 Advanced Design and Analysis of Algorithms (3) An advanced course covering models of computation, advanced analysis techniques, lower bounds, NP-completeness (from an algorithmic viewpoint), with applications of these techniques to various areas. *Prerequisites:* 074.317 or equivalent or written consent of instructor.

074.771 Group Algorithms and Graph Isomorphisms (3) Techniques for representing and manipulating permutation groups by computer; Schreier s algorithm, stabiliser towers, orbits, block systems, graph isomorphism, coset enumeration in permutation groups, the Butler-Sims base change algorithm. *Prerequisites:* 074.434 or equivalent or written consent of instructor.

074.772 Advanced Topics in Algorithms (3) Topics of current research interest in advanced algorithms. Possible topics include string matching, data compression, computational geometry, probabilistic algorithms; subject to the interests and availability of faculty. *Prerequisites:* 074.317 or equivalent or written consent of instructor.

074.773 Theory of Computation and Complexity (3) Study of the nature and complexity of computations. Formal theory of computability and decidability. Complexity on Turing machines, RAM s and circuits. Non-deterministic computation and NP-completeness. New developments on topics including randomized algorithms, parallel computation, counting problems, and approximation. *Prerequisites:* 074.317 and 074.303 or equivalents or written consent of instructor.

074.774 Symbolic and Algebraic Computation (3) Problems in both the theory and practice of symbolic and computational algebra. Possible topics include implementation issues in Computer Algebra Systems, polynomial factoring, symbolic solution of systems of equations, Grobner bases, probabilistic techniques, algebraic complexity theory. Applications to cryptography, error correcting codes, robot motion planning, and others. *Prerequisite:* written consent of instructor.

074.775 Advanced Topics in Computation Theory (3) Topics of current research interest in computation and complexity theory. Possible topics include decidability and complexity theoretic issues in parallel computation, cryptography, graph theory, or number theory, subject to the interests and availability of faculty. *Prerequisite:* written consent of instructor.

074.776 Algorithmic Methods in Number Theory and Combinatorics (3) Large scale problems arising in combinatorics and number theory; practicable algorithms for solution of such problems. Computer implementation of these algorithms. *Prerequisite:* written consent of instructor.

074.777 Coding Theory (3) Algebraic background of coding theory. Theory of linear codes. Hamming, Golay, Reed-Mller, Macdonald, and Hadamard codes. Structure of finite fields. Application to cyclic and Bose Chaudhuri codes. Decoding algorithms and error-correcting bounds. Specialized topics. *Prerequisite:* written consent of instructor.

074.778 Queuing Theory and Performance Evaluation (3) Theory and application of queuing systems applied to problems of computer systems performance. Investigation of deterministic and stochastic models of single and multiple queuing systems using analytical, numerical, and simulation techniques. Performance evaluation methods for computer systems and communications networks. *Prerequisites:* 005.100 or equivalent or written consent of instructor.

074.779 Advanced Topics in Mathematical Foundations Computer Science (3) Topics of current research interest in the area of mathematical foundations of computer science. Possible topics include cryptography, computational number theory, combinatorics, queuing theory, statistical computing and performance evaluation; subject to the interests and availability of faculty. *Prerequisite:* written consent of instructor.

074.781 Computer Networks (3) A selection of current research topics from such areas as network modeling and analysis, packet switching, circuit switching, non-switched nets, frame relay, cell relay, ATM, integrated voice/video/data networks, B-ISDN, and emerging technologies. *Prerequisites:* 005.100 and 074.430 or equivalents or written consent of instructor.

074.782 Advanced Topics in Computer Architecture (3) Topics of current research interest from such areas as computer design and architecture, distributed systems, multiprocessor and parallel systems, computer networks, specialized architectures, and VLSI; subject to the interests and availability of faculty. *Prerequisites:* written consent of instructor.

074.783 Distributed Database Systems (3) Architecture and management of distributed database systems; distributed design, query processing, transaction management; traditional and object-oriented database systems; overview of existing systems. *Prerequisites:* 074.438 or equivalent or written consent of instructor.

074.784 Operating Systems Design and Implementation (3) A discussion of the current research issues in operating systems including, but not limited to: distributed operating systems, multiprocessor operating systems, and other application-specific operating systems such as those for mobile computing. *Prerequisites:* 074.343 or equivalent or written consent of instructor.

074.785 Advances in Parallel Computing (3) This course introduces advanced research topics in parallel architectures, parallel programming, parallelizing compilers, runtime systems, and parallel I/O. *Prerequisite:* written consent of instructor.

074.786 Advanced Topics in Computer Systems (3) Topics of current research interest in database and operating systems. Possible topics include: operating systems, parallel systems, real-time systems, networks, and database systems; subject to the interests and availability of faculty. *Prerequisite:* written consent of instructor.

074.787 Advanced Programming Language Design, Translation, and Implementation (3) A selection of topics taken from the following: formal methods for the description and translation of programming languages, parsing theory and methods, automatic translator writing systems, recent developments in programming language design and implementation. *Prerequisites:* 074.429 or equivalent or written consent of instructor.

074.788 Object-Oriented Software Development (3) Object-oriented principles; OO life cycle models; OO analysis and design; OO programming and testing; discussion on research topics in OO techniques. *Prerequisites:* 074.335 or equivalent or written consent of instructor.

074.789 Advanced Topics in Languages and Software (3) Topics of current research interest in the areas of programming languages or software engineering. Possible topics include program language design and implementation, visual programming languages, formal specification techniques, and software verification and validation; subject to the interests and availability of faculty. *Prerequisite:* written consent of instructor.

074.791 Advanced Graphics (3) This course will focus on two major advanced topics in computer graphics: the principles and properties of lighting models such as Phong shading, ray tracing and radiosity; and a selection of visualization and modelling techniques. *Prerequisites:* 074.449 or equivalent or written consent of instructor.

074.792 Advanced Topics in Graphics and Human Interfaces (3) Topics of current research interest in advanced graphics and human interfaces, chosen from such areas as intelligent user interfaces, user modelling, user interface design, visualization, computer animation, advanced multimedia, and computer-based training; subject to the interests and availability of faculty. *Prerequisite:* written consent of instructor.

074.793 Natural Language and Speech Processing (3) Analysis and evaluation of computational models of language and speech understanding and generation including: syntactic analysis, semantic interpretation, statistical methods in speech and language understanding, applications of NLP such as machine translation, information extraction, and human-computer interfaces. *Prerequisites:* 074.319 or equivalent or written consent of instructor.

074.794 Machine Learning (3) This course examines topics in machine learning. Topics will be chosen from: statistical learning, symbolic learning, neural networks, and genetic algorithms. *Prerequisites:* 074.319 or equivalent or written consent of instructor.

074.795 Advanced Topics in Artificial Intelligence (3) Topics of current research interest in artificial intelligence chosen from such areas as: expert systems, knowledge

representation, intelligent systems, planning systems, multi-agent systems, symbolic logic, knowledge engineering, and automated reasoning; subject to the interests and availability of faculty. *Prerequisites:* 074.319 or equivalent or written consent of instructor.

074.796 Image Processing (3) A detailed study of the methods used for image processing including: image quantization, transformations, enhancement, and analysis. *Prerequisites:* 074.449 or equivalent or written consent of instructor.

074.797 Curves and Surfaces in Computer Graphics (3) Algorithms and techniques for curve and surface generation, representation, and display in an interactive computer graphics environment. Discussion of applications to computer-aided design and computer-aided geometric design. *Prerequisites:* 074.449 or equivalent or written consent of instructor.

074.798 Advanced Topics in Scientific and Numerical Computing (3) Topics of current research interest in scientific and numerical computing chosen from areas such as geometric modelling, special splines, problems related to medical imaging, or other topics subject to the interests and availability of faculty. *Prerequisites:* 074.791 or 074.792 or written consent of instructor.

SECTION 15: Dentistry

SECTION 15.1 Oral Biology

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Associate Professors

Birek, C., D.D.S. (Turgu-Mures), Ph.D. (Toronto), Dip.Oral Path. (Toronto); **Gilchrist**, J.S.C., B.Sc. (Liverpool), M.Sc. (Alberta), Ph.D. (UBC); **McNicol**, A., B.Sc., Ph.D. (Glasgow).

Assistant Professor

Scott, D.A., B.Sc. (Hons.), Ph.D. (McGill)

Program Information

The Department of Oral Biology was the first of its kind in North America and reflects the longstanding philosophy that dental education should include a strong science base provided by academic staff with major commitments to undergraduate dentistry and basic dental/medical research. This approach fosters not only the teaching of material relevant to dentistry, but serves to integrate the sciences into the various clinical programs. Associated with this philosophy is the concept that such committed faculty would also foster Faculty research supporting a graduate program in Oral Biology, as well as providing research and teaching expertise for the clinical graduate and post-graduate programs. Today, Oral Biology at Manitoba is recognised nationally and internationally as an outstanding basic science research department.

The Department of Oral Biology offers graduate instruction and research leading to MSc and PhD degrees in a unique environment. Because of the size of the department, individual instruction and direction in research is a cornerstone of the graduate experience. The graduate programme is designed to accommodate students seeking career opportunities in oral biology or in related basic dental and medical science disciplines. At the heart of the Oral Biology program is the requirement in both degrees for the completion of a substantial and original research project in the laboratory of a faculty member. In most cases, the research undertaken will fall within the area of expertise of the faculty member and will employ the most up-to-date techniques available in the field. In addition students are required to complete a number of formally instructed courses in oral biology and/or related disciplines. The diversity of scientific areas within the Department of Oral Biology allows students to be accepted with either an appropriate professional degree or a B.Sc. (Hons.) with satisfactory background in the biological sciences. In addition, the Department of Oral Biology offers a Pre-Master's Program for selected students with general undergraduate degrees.

The Department of Oral Biology, as a leader in oral biology research, has established connections with numerous researchers and institutes all over the world. Ongoing research collaborations include those with universities in the United States, Sweden, and the United Kingdom. The Faculty of Dentistry consistently ranks among the top three dental faculties in Canada for basic science research. Basic science and clinical/basic science research has received high levels of funding from the Medical Research Council of Canada for more than 30 years.

Recipients of higher degrees from the Department of Oral Biology have been extremely successful following graduation. Recent graduates have either secured positions, or are completing further training, at the universities of British Columbia, Florida, Harvard, Laval and with the federal government.

Fields of Research

Researchers have identified a role for arachidonic acid and other lipid derivatives in cell signalling processes, suggesting they may act as controllers of salivary gland function. Current studies also address the genetics of sugar transport in oral bacteria. Microbiologists have identified an alternative pathway for sugar transport into oral bacteria which cause caries, opening up the possibility for control of sugar uptake by oral bacteria and thus control of caries. They have demonstrated for the first time that fluoride liberated from a surface can directly affect bacteria in biofilms like dental plaque. Scientists are also exploring the molecular mechanisms involved in normal functioning, metabolism and repair of oral and facial tissues. Studies by dental faculty involve the development of models to aid in the early detection of cancerous lesions in oral tissues. Studies of fetal lung development have identified potential routes for treating premature babies with respiratory distress while studies of heart function have highlighted signaling mechanisms in cardiac response to ischemia. Studies on platelet function have revealed a role for GTP-binding proteins and protein kinases in regulated secretion.

Research Facilities

The faculty has modern laboratories with state-of-the-art equipment for research in microbiology, physiology, biochemistry and molecular biology. Excellent tissue and cell culturing facilities are present as is unique equipment for such specialities as atomic absorption spectroscopy, chemostat bacterial culture and Fourier transform infrared spectroscopy through collaborations with NRC. Excellent clinical facilities also provide opportunities for graduate students to carry out orthodontic and periodontal work. These facilities, when combined with basic science and biomaterials laboratories, allow for the effective integration of research and clinical practice.

M.Sc. in Oral Biology

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this Calendar. Students should possess an appropriate professional degree or B.Sc. (Hons.) degree with a satisfactory background in biological sciences or satisfactory completion of a pre-master's program in the Department of Oral Biology. The qualifications of all students applying for admission to the M.Sc. programs in Oral Biology will be assessed by the Department of Oral Biology Committee on Graduate Studies and Research and a recommendation made to the head of the department. Students with other degrees or backgrounds may be eligible for admission to a pre-Master's program to the satisfaction of the department. Contact the department for information.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this Calendar. The M.Sc. program requires satisfactory completion of course requirements as

specified by each student's supervisory committee and a thesis based on original research. Minimum course requirements are 12 credit hours **which must include** course 100.719 Communication Skills in Dental Research (unless students have previous credit for this or an equivalent course). **Courses taken during the pre-Master's program cannot be transferred as credits towards the Master's program.** M.Sc. students are expected to attend all departmental seminars. Students shall present one seminar on their research to the department each year, updating it each year. In addition, students must pass an oral examination on the subject of the thesis and matters relating thereto. The examination shall be open to all members of the university community who wish to attend. The form of the oral examination shall be the same as that for the Ph.D. thesis oral examination described in the Faculty of Graduate Studies Regulations governing the Ph.D. program.

Second Language Reading Requirement: none
Expected Time to Graduate: dependent on progress

Ph.D. in Oral Biology

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. An M.Sc. degree is required, although students of exceptional or proven ability holding an appropriate professional degree or a B.Sc. (Hons.) degree may be admitted. The qualification of all students applying for admission to the Ph.D. program will be assessed by the Department of Oral Biology Committee on Graduate Studies and Research and a recommendation made to the head of the department.

A student whose knowledge of the field of Oral Biology is in doubt, after first registration for the degree, may be required to take a qualifying examination within the first 12 months of study at the discretion of the advisory committee. It is the responsibility of the committee to organize this examination.

The qualifying examination, which will consist of a written and an oral component, will be administered as in the candidacy examination. The result will be indicated as "pass" or "fail." A student who fails will be required to withdraw.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this Calendar. The Ph.D. program requires satisfactory completion of course requirements as determined by each student's advisory committee and a thesis based on original research. Minimum course requirements shall be 12 credit hours at the 700 level beyond the Master's degree, **and must include** course 100.719 Communication Skills in Dental Research (unless students have previous credit for this or an equivalent course). **Courses taken during the pre-Master's and Master's programs cannot be transferred as credits towards the Ph.D. program.** Ph.D. students are expected to attend all departmental seminars. Students shall present at least one seminar on their own research to the department each year.

Second language requirement: none
Expected time to graduation: dependent on progress

Course Descriptions

100.703 Glandular Metabolism and Secretion (3) Lectures and seminars dealing with all aspects of membrane transport and processes associated with transport within the cell.

100.709 Pharmacology and Therapeutics (3) A combined lecture and seminar course on the pharmacological basis of therapeutics. Special attention will be paid to drugs used commonly in the practice of dentistry, their side effects and their interaction.

100.710 Oral Microbial Ecology (3) Study of principles of ecology in relation to the various ecosystems in the oral cavity. In depth examination of the taxonomic relationships of oral bacterial species. Emphasis will be placed on the growth and metabolic activities of oral bacteria which lead to successful colonization of the mouth.

100.711 Infectious Diseases and the Oral Cavity (3) The description of the aetiology of microbial infections in the mouth and infections elsewhere in the body which involve oral bacteria. The control of such infections by vaccines, antibiotics and antimicrobial drugs. Treatment of infections in the immuno-suppressed, post operative infections and nosocomial infections. The relationships of host immune system to the oral flora.

100.712 Special Problems in Oral Biology (3) Each student will be required to carry out a minor research project in an area of oral biology other than that of their thesis work. The results of this project will be presented in a seminar and submitted as a written report.

100.713 Macromolecular Interactions of Connective Tissue in Health and Disease (6) A comprehensive study of the macromolecular constituents of connective tissue, of their synthesis, metabolism, macromolecular interaction in health and disease, and of their regulatory mechanisms.

100.718 Recent Advances in Oral Biology (6) This course is given by staff in the form of lectures and tutorials. Additional lectures may be given by visiting scientists. Students are expected to familiarize themselves with the relevant literature and are examined for an in-depth appreciation of the topics covered.

100.719 Communication Skills in Dental Research (3) A course to develop written, visual and oral communication skills in scientific and clinical disciplines related to dentistry.

SECTION 15.2 Oral and Maxillofacial Surgery

Dental Diagnostic and Surgical Sciences

Head: S. C. Gelskey
Head, Oral and Maxillofacial Surgery: J. Curran
General Office: 790 Bannatyne Avenue
Telephone: 204 789 3633
Fax: 204 789 3913
E-mail: oral_surgery@umanitoba.ca
Website: www.umanitoba.ca/dentistry

Academic Staff

Professors

Bowden, G.H.W., M.Phil., Ph.D. (London); **Karim**, A.C., B.Sc. (Sir George Williams), M.Sc., Ph.D. (McGill).

Associate Professors

Ahing, S.I., B.Sc. (Sir George Williams), D.D.S. (McGill), M.S.D. (Indiana), F.R.C.D.; **Baker**, R.C., D.M.D. (Manitoba), Dip.Ortho. (Toronto), F.A.C.D., F.I.C.D.; **Birek**, C., D.D.S. (Turgu-Mures), Ph.D. (Toronto), Dip.Oral Path. (Toronto); **Boyar**, R.M., D.M.D., M.Sc. (Manitoba); **Cohen**, M., B.Sc., B.D.S., M.Dent. (Witwatersrand), F.R.C.D.(C); **Cross**, H.G., B.Sc., D.M.D. (Manitoba), Cert. Pedo. (Connecticut.), M.S.C. (Manitoba); **Curran**, J., B.D.S. (NUI), F.R.C.D.(C), F.F.D., R.C.S. (Irel); **Mazurat**, R., B.Sc. (Calgary), D.D.S. (Alberta), Dip. Prostho. (Med.Coll.ofGeorgia); **McNicol**, A., B.Sc., Ph.D. (Glasgow); **Perry**, J.B., A.R.C.T., D.M.D. (Manitoba), Cert. Oral Path. (Emory), M.Sc. (Manitoba); **Pruthi**, V.K., B.D.S. (India), Cert. Perio. (Florida), Diplomate, American Board of Periodontology., F.A.C.D.

Assistant Professors

McFadden, L., D.D.S. (Alberta), M.Sc. (Dalhousie), M.R.C.D.(C); **Stoykewych**, A.A., B.S. (Manitoba), D.M.D. (Manitoba), Dip. O.M.S. (Manitoba).

Program Information

The Master of Dentistry (Oral and Maxillofacial Surgery) which is four years in length includes a four-year hospital residency for which a Postgraduate Training Certificate is awarded. Usually one student is accepted per year. The program has full accreditation from the Commission on Dental Accreditation of Canada. The primary objective of the program is to train dentists to become competent, ethical Oral and Maxillofacial surgeons for practice in Canada, and to provide them with a scientifically based curriculum which will prepare them for the challenges they will face in the development of their speciality, throughout their professional careers.

The clinical program provides comprehensive training in all the major areas generally included within the scope of practice of an Oral and Maxillofacial Surgery. Students are provided with opportunities to attend and present papers at National and International conferences related to aspects of their speciality and an external elective rotation is permitted subject to approval of the Program Director.

Fields of Research

Faculty supervise every student in at least one research project during the training period and their interests provide for a wide spectrum of clinically related topics. dental implants, maxillofacial trauma, temperomandibular disorders, cleft lip and palate, dento-facial deformity, surgical pathology and therapeutics are examples of areas in which faculty have published and have a continuing interest. Collaborative research with other departments is encouraged and does occur.

Research Facilities

The research facilities in the Faculties of Dentistry and Medicine, the Health Sciences Centre and related institutions in the Winnipeg Regional Health Authority are extensive, accessible, and provide opportunities for a wide range of research endeavours by graduate students in Oral and Maxillofacial Surgery.

Master of Dentistry (Oral and Maxillofacial Surgery)

Admission Requirements

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*, applicants must be Canadian citizens or permanent residents of Canada and be eligible for licensure as a dentist in a province of Canada. They must comply with provincial requirements for licensing of interns and residents. For information on admission, sponsored foreign applicants should contact the Program Head.

Application Deadlines

Students must submit their application and supporting documentation to the Department by September 30, prior to the year of admittance.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students must complete: all clinical rotations and assignments as set out in the four years of hospital residency training; courses 103.723, 103.724, 103.725, 103.726, 103.727, 103.728 and 103.729; ancillary course 080.706 and other basic science courses as selected by the department. An essay/research project 103.722 in a specified area selected in consultation with the department is required.

Second Language Reading Requirement: None
Expected Time to Graduate: four years

Ph.D.

There is no Ph.D. Program in Oral and Maxillofacial Surgery

Course Descriptions

103.722 Essay/Research Project (0) An essay/research project is required for each student. It is selected in consultation with, and approved by the department head.

103.723 Advanced Oral Pathology (6) The four major etiopathogenic categories of diseases affecting the oral and paraoral structures are discussed with emphasis on common conditions and entities significant to various dental specialties. Lectures cover epidemiology, clinical and laboratory features and management principles with supplementation by seminars or laboratories.

103.724 Advanced Oral and Maxillofacial Surgery Seminar 1 (3) This course includes a thorough review of the applied scientific basis for the practice of oral and maxillofacial surgery and emphasizes surgical anatomy and pathology, diagnosis and technique. Instruction will be given by means of lectures, seminars, case presentations and a critical review of current literature. Year 1.

103.725 Clinical Advanced Oral and Maxillofacial Surgery 1 (6) The first year of hospital residency includes training in history taking and physical diagnosis; hospital protocols and ward procedure; minor oral surgery procedures and pain control techniques; operating room procedures and general in-patient care. Year 1.

103.726 Advanced Oral and Maxillofacial Surgery Seminar 2 (3) Lectures, seminars, case presentations and reviews of current literature will emphasize the state of current knowledge regarding the clinical practice of advanced oral and maxillofacial surgery. Year 2.

103.727 Clinical Advanced Oral and Maxillofacial Surgery 2 (6) The second year of the hospital residency training program includes training in minor oral surgery, including dento-alveolar, pre-prosthetic surgery and implantology. It also provides an introduction to advanced oral and maxillofacial surgery and maxillofacial imaging. A rotation to Internal Medicine is included. Year 2.

103.728 Clinical Advanced Oral and Maxillofacial Surgery 3 (6) The third year of the hospital residency training program includes rotations in Anaesthesia, Internal Medicine, General and Plastic Surgery, Surgical Intensive Care and Emergency Room. It also includes training in advanced oral and maxillofacial surgery. An elective rotation may also be arranged. Year 3.

103.729 Clinical Advanced Oral and Maxillofacial Surgery 4 (6) The fourth year of the hospital residency training program is devoted to advanced oral and maxillofacial surgery. The student is designated chief resident and assumes a greater degree of responsibility in patient care and administrative activities. Year 4.

SECTION 15.3 Orthodontics

Preventive Dental Science

Head and Graduate Chair: W.A. Wiltshire
General Office: 780 Bannatyne Avenue
Telephone: (204) 789 3628
Fax: (204) 789 3913
E-mail: grad_orthodontic@umanitoba.ca
Website: www.umanitoba.ca/dentistry/programs/orthdontics.html

Academic Staff

Senior Scholar

Odlum, O., B.D.S. (London), B.D.S.(Hons.), M.Sc. (Manitoba).

Professors

Bhullar, R.P., B.Sc. (McMaster), Ph.D. (Manitoba); **Hassard**, T.H., B.Sc., M.Sc., Ph.D. (Queen's, Belfast); **Lavelle**, C.L.B., B.Sc., B.D.S., Ph.D., M.D.S., D.Sc. (Birmingham), F.R.C.D.(C), M.R.C.(Path.) (London), Ph.D. (California) D.D.S (Birmingham) F.R.C.P., M.B.A. (London), F.I.C.D.(C); **Lekic**, C., D.D.S. (Belgrade), M.Sc. (Belgrade), Ph.D. (Belgrade) **Scott**, J.E., B.Sc. (Brandon), M.Sc., Ph.D. (Manitoba); **Wiltshire**, W., B.Ch.D., B.Ch.D. (Honors), M.Ch.D. (Ortho), D.Sc. (Odont.) (Pret.).

Associate Professors

Ahing, S.I., B.Sc. (Sir George Williams), D.D.S. (McGill), M.S.D. (Indiana), F.R.C.D.; **Baker**, R.C., D.M.D. (Manitoba), Dip.Ortho. (Toronto), F.A.C.D., F.I.C.D.; **Birek**, C., D.D.S. (Turgu-Mures), Ph.D. (Toronto), Dip.Oral Path. (Toronto); **Perry**, J.B., A.R.C.T., D.M.D. (Manitoba), Cert.Oral Path. (Emory), M.Sc. (Manitoba); **Pruthi**, V.K. B.D.S. (India), Cert. Perio, (Florida), Diplomate, American Board of Periodontology, F.A.C.D., **Williams**, P.T., B.A.Sc., D.D.S. (Toronto), M.S. (Indiana).

Assistant Professors

Baker, A.B., D.M.D. (Man.), Dip. Ortho. (Tor.); **Hechter**, F.J., D.M.D., M.Sc., M.Ed. (Manitoba); **Smith,** D.M., B.A. (Emory), D.D.S. (Maryland), Dip. Fixed Prostho, (New York), M.S. (SUNY Binghampton), **Winburn**, J.T., D.M.D. (Manitoba), Dip.Ortho. (Connecticut).

Program Information

The department offers a 3-year (minimum 35 months) Master's program in orthodontics, fully accredited by the Commission on Dental Accreditation of Canada. This program provides eligibility to sit the examination of the Royal College of Dentists of Canada (RCDC) and the American Board Exams in Orthodontics (ABO). The program is intended to provide a background in the basic sciences underlying orthodontic treatment and develop a critical, independent, problem-solving approach toward clinical practice.

Graduate orthodontic students have the opportunity to treat approximately 65 new patient starts and a similar number of transfer and retention patients using a wide variety of orthodontic techniques. The strength of the clinical program is a wide range of diversity in instructor philosophies of treatment and the opportunity to learn several techniques such as full fixed modified edgewise type mechanics, sectional arch mechanics, early treatment philosophies and functional orthopaedics. In addition, a variety of surgical and cleft palate combination orthodontic surgical cases.

Graduate students also are expected to do some limited teaching in the undergraduate orthodontic clinic, present their research at an international congress, submit an article for peer-reviewed publication based on their research and orally defend their research project.

Graduates of the program over the past years have gone on to establish successful practices world-wide in such countries as Canada, U.S.A., Australia, Ireland, Columbia, Taiwan, Finland and the United Arab Emirates, amongst others.

Fields of Research

The current foci of research are in orthodontic biomaterials, adhesivity, anticariogenicity, allergenicity, fluoride release, epidemiology of malocclusion, public health orthodontics, preventive and interceptive orthodontics, clinical research in temporomandibular joint dysfunction, and the biology of tooth movement.

Research Facilities

The graduate orthodontic program offers a state-or-the-art 14 chair clinic with modern computerized diagnostic equipment and an on-site dedicated orthodontic technician. The latest addition to the research facilities is a state-of-the-art Zwick materials testing machine, in addition to the general research laboratories of the Faculty of Dentistry.

M.Sc. in Dental Science, Orthodontics Speciality

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this Calendar. Application deadline to the Department is September 1.

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar. Students must successfully complete all courses offered by the department as well as 080.706, 093.747, 102.715, 103.723. A thesis based on original research and acceptable to the Faculty of Graduate Studies and successful oral defence is also required, as well as submission of a peer-reviewed paper suitable for publication to the satisfaction of the program director.

Clinical Requirements

Students are required to treat approximately 65 new cases, a number of active transfer cases, plus approximately 80 retention cases including cleft palate and combined orthodontic-surgical patients to the satisfaction of the clinical faculty and an external examiner. The minimum full-time requirement to complete the total program is 35 months.

Second Language Reading Requirement: None
Expected Time to Graduate: minimum 35 months

Ph.D.

There is no Ph.D. Program offered in the Department of Preventive Dentistry.

Course Descriptions

The following courses are required of students in the orthodontic program:

101.700 Neural Basis of Oropharyngeal Function (3) A program of problem-oriented seminars on the sensory and reflex mechanisms affecting the respiratory and alimentary functions of the mouth and pharynx, mandibular posture and movement and respective application to oropharyngeal dysfunction and orthodontic therapy. One seminar per week for one term.

101.702 The Mechanics of Orthodontic Therapy (6) The mathematics of three dimensional space, force and moment systems are given as the basis for considering the mechanics of orthodontic treatment. The mechanical properties of some orthodontic materials are studied as a background for appliance design. The quantitative aspects of tooth movement are discussed in terms of patient treatment planning. Seminar and laboratory sessions.

101.703 Biological Basis of Craniofacial Growth and Development (3) A program of student-based seminars on the biophysical, biochemical and histological basis of growth and development of craniofacial structures.

101.704 Clinical Craniofacial Growth and Development (3) A program of student-based seminars on the morphogenesis of craniofacial structures and their significance to clinical problems.

101.706 Cephalometric Analysis (3) A seminar program on the application of cephalometric radiography to craniofacial morphological research, orthodontic diagnosis and case analysis.

101.707 Biology of Orthodontics and Facial Orthopedics (3) A program of student-based seminars and lectures on the biological basis of orthodontic and facial orthopedic diagnosis and therapeutic technique.

SECTION 15.4 Periodontics

Dental Diagnostic and Surgical Sciences

Head: S. C. Gelskey
Head, Periodontics: D. L. Singer
General Office: 790 Bannatyne Avenue
Telephone: 204 789 3633
Fax: 204 789 3913
E-mail: periodontics@umanitoba.ca
Website: www.umanitoba.ca/dentistry

Academic Staff

Professors

Bowden, G.H.W., M.Phil., Ph.D (London); **Dawes**, C., B.Sc., B.D.S. (Manchester), Ph.D. (Durham); **Lavelle,** C.L.B., B.Sc., B.D.S., Ph.D., M.D.S., D.Sc. (Birmingham), F.R.C.D.(C), M.R.C.(Path.) (London), Ph.D. (California) D.D.S. (Birmingham) F.R.C.P., M.B.A. (London), F.I.C.D. (C); **Scott**, J.E., B.Sc. (Brandon), M.Sc., Ph.D. (Manitoba); **Singer**, D.L., D.D.S. (Alberta), Ph.D., Dip. Perio (Manitoba)

Associate Professors

Ahing, S.I., B.Sc. (Sir George Williams), D.D.S. (McGill), M.S.D. (Indiana), F.R.C.D.; **Bhullar**, R.P., B.Sc. (McMaster), Ph.D. (Manitoba); **Birek,** C., D.D.S. (Turgu-Mures)**,** Ph.d. (Toronto), Dip.Oral Path. (Toronto); **Boyar,** R.M., D.M.D., M.Sc. (Manitoba); **Cohen,** M., B.Sc., B.D.S., (M.Dent. (Witswatersrand), F.R.C.D.(C); **Christie**, W.H., D.M.D. (Manitoba), M.S. (Ohio State), F.R.C.D.(c), F.I.C.D., F.A.C.D; **Curran,** J B.D.S. (NUI), F.R.C.D.(C), F.F.D., R.C.S. (Ireland); **Gelskey**, S.C., B.Sc. (D.H.) (Marq.), M.P.H (Michigan), Ph.D. (Manitoba); **McNicol**, A., B.Sc., Ph.D. (Glasgow); **Perry**, J.B., A.R.C.T., D.M.D. (Manitoba), Cert.Oral Path. (Emory), M.Sc. (Manitoba); **Pruthi**, V.K., B.D.S. (India), Cert. Perio. (Florida), Diplomate, ABP, F.A.C.D.

Assistant Professors

Mazurat, R., B.Sc. (Calgary), D.D.S. (Alberta), Dip. Prostho. (Med.Coll.of Georgia); **Scott,** D.A., B.Sc. (Edinburgh), Ph.D. (McGill); **Stoykewych**, A.A., B.S., D.M.D., Dip. O.M.S. (Manitoba).

Program Information

Introduction

The three-year Master of Dentistry (Periodontics) Program is one of only four graduate programs in periodontics in Canada. The program accepts two students per year and entails clinical training, lectures, seminars in the clinical and related basic sciences and research. The program is certified and fully accredited by the Commission on Dental Accreditation of Canada and, as such, is also recognized by the American Dental Association.

The mission of the program is to educate dentists to be scientifically-based, clinically-competent, and community-concerned, ethical periodontists. The program provides periodontal consultation and treatment services, including dental implantology, to patients attending the dental school and patients referred by dentists in Winnipeg and throughout Manitoba. Students are provided the opportunity to treat a full range of periodontal problems and to participate in on-going clinical and basic periodontal research. The Graduate Periodontics Clinic, which treats over 120 patients annually, simulates a private periodontics practice and provides dental hygienist and dental assistant support to students. In addition, a clinic is held at the adjacent Health Sciences Centre where periodontal consultative and treatment procedures are provided for patients who have serious medical conditions.

Fields of Research

Research interests of faculty involved with the program include (a) clinical trials of therapeutic interventions in the treatment of periodontitis, (b) the effect of materials used to promote guided tissue regeneration on cell proliferation and differentiation in healing periodontal tissues, and (c) the effect of tobacco on periodontal tissues and smoking cessation initiatives in periodontics. In addition, collaborative research opportunities are available in such areas as saliva, calculus and plaque formation, the microbiology of periodontitits and cell signaling mechanisms, through the Department of Oral Biology.

Research Facilities

In addition to the clinical facilities, general laboratories, radiographic and darkroom facilities of the Faculty of Dentistry, there is a research laboratory, as well as access to all equipment belonging to the Department of Oral Biology. Animal house facilities are also available for conducting experimentation on small animals. Clinical facilities are also available at the adjacent Health Sciences Centre Hospital.

Master of Dentistry (Periodontics)

Admission Requirements

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*, applicants must have a D.M.D. degree or its equivalent from an approved college or university.

Application Deadlines

Students must submit their application and supporting documentation to the Department by September 1, prior to the year of admittance.

Program Requirements

In addition to the minimum course requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*, students must complete: courses 103.701, 103.705, 103.712, 103.713, 103.715, 103.721, 103.723 and 103.730; ancillary courses in the basic sciences as selected by the department; An essay/research project (103.722) in a specified area selected in consultation with the department.

Second Language Reading Requirement: None
Expected Time to Graduate: three years

Ph.D.

There is no Ph.D. Program in Periodontics

Course Descriptions

103.701 Biology and Pathology of the Periodontium (6) Selected topics in cell biology precedes a comprehensive and detailed survey of the periodontium, its constituent tissues and its function; the cell dynamics of inflammation and wound healing and the histopathology of the early and advanced periodontal lesion.

103.705 Oral Medicine and Oral Diagnosis (3) This course provides the student, through clinical rotations, with the opportunity to enhance diagnostic and non-surgical management of oral pathologic conditions including mucosal and intrabony lesions, temporomandibular joint disorders, and oral manifestations of systemic disease in both otherwise healthy and medically compromised patients.

103.712 Advanced Clinical Periodontics (4) This seminar course will review contemporary clinical periodontics by considering assigned readings in current texts and review articles. This course is intended to assure that students have a comprehensive overview of conventional periodontal therapy early in their education.

103.713 Occlusion (3) A seminar series devoted to the diagnosis, treatment planning and management of patients with craniomandibular disorders.

103.715 Review of Periodontal Literature (6) This course will consider the concepts underlying the current practice of periodontics by reviewing assigned readings from the scientific literature. Students will be expected to apply principles of critical evaluation in order to identify and appreciate the limitations of these studies and thus the limitations of the current concepts derived from them.

103.721 Clinical Practice in Periodontics (18) Designed to provide the clinical experience which is essential for specialty practice in Periodontics (circa 1600 hours).

103.722 Essay/Research Project (0) An essay/research project is required for each student. It is selected in consultation with, and approved by the department head.

103.723 Advanced Oral Pathology (6) The four major etiopathogenic categories of diseases affecting the oral and paraoral structures are discussed with emphasis on common conditions and entities significant to various dental specialties. Lectures cover epidemiology, clinical and laboratory features and management principles with supplementation by seminars or laboratories.

103.730 Dental Implantology (3) A seminar course devoted to providing an in-depth understanding of the basic and applied aspects of the placement of dental root form implants in humans. This course is a prerequisite to the actual surgical placement of implants undertaken in 103.721.

15.5 Restorative Dentistry

Head and Graduate Chair: M. Suzuki
General Office: D227-780 Bannatyne Avenue
Telephone: (204) 789 3516
Fax: (204) 789 3916
E-mail: Mike_Suzuki@umanitoba.ca
Website: www.umanitoba.ca/dentistry

This M.Sc. program is intended for those who wish to pursue a career oriented towards dental materials research and/or teaching. The department does not currently offer the program. To find out more information, contact the department.

SECTION 16: Disability Studies

Acting Head: Don Fuchs
General Office: 128 Education Building
Telephone: (204) 474-7017
Fax: (204) 474-7551
E-mail: disability_studies@umanitoba.ca
Website: www.umanitoba.ca/disability_studies

Academic Staff

Professors

Cooper, J.E., Dip. P. & O.T. (Toronto), B.O.T., M.Sc., Ph.D. (Manitoba); **Evans**, C., B.Sc., M.Cl.Sc. (Western Ontario), Ph.D. (Manitoba); **Freeze**, D.R., B.A., B.Ed. (Queen's), M.A., Ph.D. (Victoria); **Fuchs**, D.M., B.A. (Regina), M.S.W. (Calgary), Ph.D. (Toronto); **Kaufert**, J., B.A. (Minnesota), M.A., Ph.D. (Northwestern); **LeBow**, M.D., B.A. (UCLA), M.A. Ph.D. (Utah); **Witty**, D., B.A. (Hons.), M.A. Urban & Reg. Plan. (Waterloo), Public Admin. Prog. (Manitoba), Ph.D. (British Columbia), F.C.I.P.

Associate Professors

Blais, C., B.Sc., M.Sc., Ph.D. (Ottawa); **Etcheverry**, E., Dip.O.T., B.O.T., M.Ed., Ph.D. (Manitoba); **Heinonen**, T., B.A. (Alberta), B.S.W. (Calgary), M.S.W. (McGill), D.Phil. (Sussex); **Kaminski**, L.E., B.A., M.S.W. (Manitoba); **Lutfiyya**, Z.M., B.A. (Manitoba), M.S., Ph.D. (Syracuse); **Mactavish**, J., B.P.E. (UBC), M.Sc. (Manitoba), Ph.D. (Minnesota).

Adjunct Professor

Ringaert, L.A., B.Sc., B.O.T., M.Sc. (Manitoba)

Program Information

The focus of the program allows students to examine the policies and practices of all societies in order to understand the social, rather than the physical or psychological determinants, of the experience of disability. This focus shifts the emphasis from a prevention, treatment, remediation paradigm to a social, cultural, political one.

We offer an interdisciplinary Master's Degree Program in Disability Studies. We also offer a graduate level Option in Disability Studies that is available to both Master's and Doctoral students.

Students in the Master's Program will have the opportunity to apply their undergraduate degrees and work experience to pursue advanced interdisciplinary research and scholarship. Students taking the Option in Disability Studies will complement their major program area of study with coursework which analyses the social construction of disability.

M.A./M.Sc. in Disability Studies

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. Graduates of honours or equivalent programs at the University of Manitoba (or equivalent from other recognized universities) with a minimum Grade Point Average (GPA) of 3.0 in the last 60 credit hours, are eligible for direct admission to a course of study leading to the Master's degree. Students who have completed a University of Manitoba Pre-Master's program with a minimum GPA of 3.0 are also eligible for admission. Pre-Master's programs taken at other universities may be accepted.

Students with undergraduate degrees from a wide range of disciplines – such as Architecture, Arts, Education, Human Ecology, Management, Medicine, Nursing, Physical Education and Recreation Studies, Science, Social Work and Women's Studies - will be considered eligible to apply if they meet the above requirements.

Application Deadlines

The deadline for receipt of the program application form and supporting documents in the department is March 1, 2003 for International Students and June 1, 2003 for Canadians and Americans as well as permanent residents.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar.

The Master's Degree in Disability Studies requirements are twenty-four credit hours; eighteen credit hours of required course work, six credit hours of elective course credit, plus a thesis. The six credit hours of elec-

tive courses can be taken from a list of approved courses at the 300, 400, 500 or 700 level.

Students who wish to pursue an M.Sc., will be required to have an undergraduate degree in Science. They will also be required to take at least six hours of elective credit hours at the 700 level in science subjects in those Faculties offering the M.Sc. The student's Advisory Committee or the Disability Studies Graduate Program Committee may require other additional science courses at the 300 or 400 level. It should be noted that students will normally be required to fulfil 700 level course prerequisites before enrolling in 700 level courses.

Students' proposed course work, Advisory Committee membership and thesis topic will be examined by a subcommittee of the Disability Studies Graduate Program Committee in order to identify the program as leading to an M.Sc. or M.A. degree. The decision as to which degree will be offered to the student will be based on: (a) the nature of the thesis proposal, (b) the nature of the course work and (c) the discipline(s) represented on the Thesis Advisory Committee. The Dean of the Faculty of Graduate Studies (or his/her designate) will seek the advice of the Deans of the Faculty of Arts and the Faculty of Science where programs do not fall clearly into either an Arts or Science paradigm.

All academic programs must be approved by the Disability Studies Graduate Program Committee. This is normally done on the recommendation from the student's advisor and/or Advisory Committee following consultation with the student.

Option in Disability Studies

Admission

The Interfaculty Option in Disability Studies is offered by the following faculties: Architecture, Arts, Education, Human Ecology, Management, Medicine, Nursing, Physical Education and Recreation Studies, Science, Social Work and Women's Studies. Upon completion of the requirements, a "comment" will be recorded on the student's transcript. For information concerning the option, interested students are directed to their student advisor.

Program Requirements

The Option in Disability Studies requirements are 162.702 (3) The History of Disability, and either 162.701 (6) Disability Studies or 162.703 (3) Evaluation and Application of Research Methods in Disability Studies,.

Course Descriptions

162.701 Disability Studies (6) This course will explore the key concepts and issues in disability studies. This will include a critical examination of models and theories of disability, Canadian and other national laws and international standards, social and economic policy, and professional and service responses.

162.702 History of Disability (3) This course will trace historical development of responses to disability, by the medical/rehabilitation community, the governments, advocacy organizations and others. Canadian history will be the initial framework and the historical developments in other countries (including the UK, France, the USA, the Caribbean) will be used as a comparison. *Pre- or co-requisite:* 162.701

162.703 Evaluation and Application of Research Methods in Disability Studies (3) This course will provide a critical evaluation of quantitative and qualitative research methodologies used in disability studies. Methods to address disability used in different disciplines as well as transformative and empowerment methodologies such as participatory action and feminist disability research will be examined. *Pre- or co-requisite:* 162.701

162.704 Selected Topics in Disability Studies (3) One key theme will be chosen for each year from the interests and availability of faculty. Topics could include women with disabilities, international dimensions of disability, disability policy and practice, disability organizing and other topics developed over time. *Pre- or co-requisite:* 162.701

SECTION 17: Economics

Head: Wayne Simpson
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Academic Staff

Professors Emeriti

Barber, C. L., B.A. (Saskatchewan), M.A. (Clark), Ph.D. (Minnesota); **Bellan**, R.C., B.A. (Manitoba), M.A. (Toronto), Ph.D. (Columbia).

Senior Scholars

Gonick, C. W., Ph.D. (Berkeley); **Gray**, J.A., B.S.F. (UBC), M.Sc.(Econ.) (London), Ph.D. (Michigan); **Laureyssens**, J., M.A. (Brussels), Ph.D. (Ghent);); **Rempel**, H., B.Comm. (Manitoba), M.A. (Ohio), Ph.D. (Wisconsin);

Professors

Cameron, N.E., B.A. (Queen's), M.A. (Western Ontario), Ph.D. (Michigan); **Chernomas**, R., B.A. (Bridgeport), M.A., Ph.D. (New School of Social Research); **Dean**, J.M., B.Comm. (St.Mary's), M.A. (Dalhousie), Ph.D.(VPI); **Hum**, D., B.Sc.(Hons.) (Mount Allison), M.A. (Oxford), Ph.D. (Toronto); **Lobdell**, R.A., B.A. (Kansas), M.A. (Wisconsin), Ph.D. (McGill); **Loxley**, J., B.A.(Hons.), Ph.D. (Leeds); **Phillips**, P.A., M.A. (Saskatchewan), Ph.D. (London); **Simpson**, W., Ph.D. (London); **Waterman**, A.M.C., M.A. (Cambridge), B.Th. (St. John's), Ph.D. (Australia National).

Associate Professors

Cameron, B.J., B.A. (Michigan), M.A. (Manitoba), Ph.D. (Michigan); **Chuchman**, G., B.A., M.A. (Manitoba), Ph.D. (Western Ontario); **Dennis**, K.G., B.Comm., M.A. (Manitoba), D.Phil.(Oxford); **Dhruvarajan**, P. S., B.Sc. (Mysore), M.A. (Chicago), Ph.D. (Northwestern); **Lipnowski**, I.F., M.A. (Manitoba), Ph.D. (London); **Mason**, G.C., Ph.D. (UBC); **Nicolaou**, C.A., B.A.(Hons.) (Athens), Ph.D. (Manitoba); **Sepehri**, A., B.A. (National University of Iran), M.A., Ph.D. (Alberta); **Vorst**, J. I., Ph.D.(Equiv.) (Netherlands School of Economics).

Assistant Professors

Baragar, F., B.A. (Winnipeg), M.A. (Manitoba), Ph.D. (Utah); **Brown**, L., B.A. (Alberta), M.A. (Carleton), Ph.D. (Queen's); **Guard,** J., B.A.(Western Ontario), M.E.S., (York), Ph.D. (Toronto); **Hudson, I.,** M.A. (Carleton), Ph.D. (Manitoba); **Kornienko, T.,** M.S. (Moscow); M.A., Ph.D. (Pittsburgh); **Troutt**, E., B.S. (Cornell), M.A., Ph.D. (Wisconsin-Madison).

Adjunct Professor

Blomqvist, A.G., Civilekonon (Stockholm), Ph.D. (Princeton)

Program Information

The Department of Economics offers graduate instruction leading to MA and PhD degrees. Enrolment is limited in order to sustain the flexibility and other advantages of a small graduate program and to tailor the program to individual needs. Students in the program come from Canada and around the world. Departmental funding policies are geared to the maintenance of a broad, international student base.

The Department of Economics at the University of Manitoba is both heterodox and policy-oriented. Faculty are heavily involved in shaping policy locally as well as at the national and international levels. Faculty have strong ties to economic research and forecasting organizations, international aid agencies and institutes for social policy research. Faculty members include neoclassicists, Keynesians, post-Keynesians, Marxists, institutionalists, empiricists, and econometricians. In addition to the standard economics curriculum, graduate students can choose from a variety of approaches and research areas, as well as take advantage of the department's openness to research topics that extend beyond the bounds of the department itself.

Fields of Research

Faculty interests span the areas of labour economics, macro and micro economics, public finance, development, international trade, econometrics, environmental and resource economics, sustainable development, institutional economics, economic history, history of economic thought, health economics, alternative economic theory, and agricultural economics.

Research Facilities

The department maintains a graduate student computing room for use by students. The department also maintains close links to other departments on campus in order to facilitate student learning in a wide range of areas. Graduate students are encouraged to do interdisciplinary research associated with the Transport Institute, the Natural Resources Institute, the Centre

on Aging, the Labour and Workplace Studies program and the Northern Studies committee. These centres offer academic expertise, facilities, grass roots connections, and, occasionally, funding opportunities.

M.A. in Economics

Admission

Applicants with a B.A. (Hons.) degree in Economics from the University of Manitoba, or its equivalent, may be admitted to the M.A. degree program. All M.A. students must successfully complete 018.604, which will ordinarily be taken during a two-week period immediately preceding the first term of each academic year. However, applicants lacking the level of education normally required, i.e. B.A. (Hons.) in Economics or equivalent, for entry into the M.A. program or to the M.A. year of a Ph.D. program will be expected to acquire these qualifications in one or more pre-M.A. years.

Application Deadline Dates

September Admission

January 15 (International Students) June 1 (Canadian/US Students)

Please send application and all supporting documentation to the Department of Economics. Please note that students applying to the Department of Economics must submit 4 letters of reference with their application.

Please note that the Department of Economics does not normally accept students in the January session as the required Math and Theory courses start in September.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar. Master's in Economics students must complete 15 credit hours of coursework, including at least six credit hours at the 700 level in Economics, 018.604, and the completion of a suitable thesis. Six credit hours of coursework shall be in an ancillary field.

Alternatively, candidates may complete the M.A. degree by comprehensive examination. A minimum of 27 credit hours of coursework is required, including 018.604 and at least 12 credit hours at the 700 level in Economics. Six credit hours of coursework may be in an ancillary field.

A minimum of six credit hours of coursework in economic theory at the graduate level is normally required. The theory requirement consists of either 018.765 or 018.768 and either 018.772 or 018.775. On the recommendation of the student's advisor and with the approval of the Graduate Studies Committee, a student completing a thesis may be allowed to substitute an ancillary for part of the theory requirement.

Ancillary courses are normally selected from disciplines related to Economics and to a candidate's thesis (e.g., political studies, sociology, history, statistics, mathematics). An external ancillary subject is preferred but the ancillary may be taken within the department when appropriate (e.g., major study, economic development; ancillary subject, economic history).

Second Language Reading Requirement: none
Expected Time to Graduate: one year

Ph.D. in Economics

Admission

1) Except as provided in 2) below, applicants for admission to the Ph.D. program must have completed the entrance requirements and the program requirements of an M.A. degree in Economics or in Agricultural Economics equivalent to that awarded by the University of Manitoba.

2) In exceptional cases, applications may be considered from students who have completed an Honours degree in Economics equivalent to that awarded by the University of Manitoba. In such cases, the applicant will be required to fulfil, in addition to the requirements below, all course work requirements for the M.A. degree by comprehensive examination option.

Application Deadline Dates

September Admission

January 15 (International Students) June 1 (Canadian/US Students)

Please send application and all supporting documentation to the Department of Economics. Please note that students applying to the Department of Economics must submit 4 letters of reference with their application.

Please note that the Department of Economics does not normally accept students in the January session as the required Math and Theory courses start in September.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar. Ph.D. students in Economics must complete:

- A minimum of 24 credit hours of course work of which at least 12 credit hours must be at the 700 level in Economics. No more than 6 credit hours may be taken in a department other than Economics as part of this minimum course work requirement.

- A minimum of 36 credit hours of 700 level courses in Economics in their M.A. and Ph.D. programs.

- A minimum of 12 credit hours in economic theory. The theory requirement will normally be 018.765, 018.766, 018.772, and 018.773. Upon the recommendation of a student's advisory committee, the Graduate Studies Committee may permit a student to substitute two of the following for 018.766 and 018.773: 018.767, 018.768, 018.774, and 018.775.

- Candidates must also include

6 credit hours of History of Economic Thought
AND
Either:
6 credit hours in Economic History
OR
A research paper in Economic History which will be submitted for approval to a committee appointed by the Graduate Studies Committee. The student's thesis advisor will normally be one of the members of the appointed committee.

These requirements may be waived if, in the judgement of the Graduate Studies Committee, equivalent courses have been taken by the candidate at the undergraduate level or as part of the M.A. program.

- Candidates must present and defend a suitable thesis.

Fields of Concentration and Candidacy Examinations

Students must present themselves for two sets of candidacy examinations: theory and fields. The theory examination consists of microeconomic and macroeconomic theory, which are assessed separately. In the field examination, the student is jointly assessed in two fields. Fields from which a student may select are:

Agricultural Economics
Economic Development
Econometric
Economic History
Labour Economics
International Economics
Comparative Systems
Monetary Economics
Public Finance
Industrial Organization
History of Economic Thought
Resource Economics
Marxian Economics

The Ph.D. in Agricultural Economics is offered with the cooperation with the Department of Agribusiness and Agricultural Economics. For information on faculty, course offerings and specialization, contact the department of Agribusiness and Agricultural Economics.

Second language requirement: none
Expected time to graduation: four years

Course Descriptions

Courses 018.604, 018.752, 018.765, 018.766, 018.768, 018.772 and 018.773 will be offered each year, assuming sufficient demand. Other courses listed below are offered on an alternating or occasional basis. For further information about those available in the 2003-2004 session contact the Department of Economics. Reading courses 018.723 and 018.730 are available subject to agreement with the instructor.

018.601 Urban Economic Issues (3) Not currently offered.

018.602 Macroeconomic Theory: Survey and Applications (3) A review of the principles of contemporary macroeconomic theory and of the application of that theory, in both closed and open economies.

018.603 Microeconomic Theory: Survey and Applications (3) A review of the principles of contemporary microeconomic theory and of the application of that theory, in both closed and open economies.

018.604 Survey of Mathematical Topics for Economists (3) A review of mathematical concepts used in economics, particularly at the graduate level. Topics include linear economic systems and matrix algebra, differentiation and optimisation, integration, economic dynamics and optimisation through time, and difference and differential

equations. This course cannot be counted toward the minimum degree requirements for M.A. and Ph.D. degrees.

018.720 Industrial Organization (6) The structure of industries; nature and performance of markets. Anti-combines legislation. Characteristics of public enterprise. Problems of regulations of industry.

018.721 Comparative Economic Systems (6) Not currently offered.

018.723 Directed Special Studies in Economics (6) Intensive study of advanced work in a selected field of economics.

018.730 Directed Special Studies in Economics (3) First term of 018.723.

018.731 Research Seminar in Economics (3) Not currently offered.

018.733 National and Social Accounting (3) Not currently offered.

018.735 Public Finance: Public Expenditures (3) The role of government expenditures and criteria for their evaluation. Public goods theory. Externality problems. Public choice. Benefit-cost analysis. Public enterprising pricing.

018.736 Public Finance: Taxation (3) Examination of income, profits, sales, property and other taxes, their allocational and distributional effects. Canadian tax policy. Tax incentives. Resource taxation. Intergovernmental fiscal relations in Canada and elsewhere. Public debt.

018.743 Advanced Theory of Resource Economics (3) Economic theory of the development and management of natural resources. Application of capital theory, investment theory, the theory of externalities and decision-making theory to resource utilization and management. A strong background in microeconomics is required. Also offered as 061.743 by the Department of Agribusiness and Agricultural Economics.

018.744 Renewable Resource Economics (3) A research seminar in applied economic analysis of the development and management of renewable natural resources, agriculture, environmental quality, forestry, fisheries, game, outdoor recreation and other renewable resources. Also offered as 061.744 by the Department of Agribusiness and Agricultural Economics.

018.745 Non-Renewable Resource Economics (3) A research seminar in applied economic analysis of the development and management of non-renewable resources, concentrating on specific topics and policy issues in energy and mineral resources. Also offered as 061.745 by the Department of Agribusiness and Agricultural Economics.

018.750 Monetary and Financial Theory (3) The microeconomics of money and other financial assets, in partial and general equilibrium frameworks. Explanation of financial market structure and behaviour with and without costless information. Students may not hold credit for both 018.750 and the former 018.704.

018.751 Advanced Monetary Macroeconomics (3) Mainstream and other theories of how money matters to macroeconomics, theory and practice of policy rules for both monetary and other stabilization policy tools. Students may not hold credit for both 018.751 and the former 018.704.

018.752 Advanced Econometric Theory (3) An examination of econometric methods beyond the classical linear regression model. Topics may include nonlinear regression methods, maximum likelihood estimation, time series analysis, nonparametric and semiparametric regression, and Bayesian econometrics. Students may not hold credit for both 018.752 and the former 018.717.

018.753 Advanced Econometric Research Seminar (3) A seminar concerned with modern econometric methodology and selected advanced topics in econometrics. Students will be required to conduct and present an advanced econometric research project. Students may not hold credit for both 018.753 and the former 018.717. Prerequisite: 018.752.

018.754 Advanced History of Economic Thought (3) Not currently offered.

018.761 Approaches, Methodologies and Techniques in Economic History (3) A review of methodologies, approaches, techniques, and contemporary controversies in economic history.

018.762 Selected Studies in Economic History (3) Not currently offered.

018.763 Theory of International Trade (3) Theories of trade flow; trade and income distribution; economic growth and changes in trade flows; instruments of trade intervention; international labour and capital movements; and economic integration.

018.764 International Money and Finance (3) Analysis of the theory of international money and finance. Assessment of existing international institutions dealing with money and finance. Theory, rationale and evaluation of structural adjustment policies. Prerequisite: 018.763 or both 018.750 and 018.751 (or the former 018.704) or permission of instructor.

018.765 Advanced Macroeconomic Theory 1 (3) A review of contemporary macroeconomic theories and their applications; analysis of static equilibrium and disequilibrium models; exploration of such models' implications for cyclical behaviour and for policymaking. Prerequisite: 018.604 which may be waived on demonstration of equivalent mathematical competence.

018.766 Advanced Macroeconomic Theory 2 (3) Analysis of cyclical models and of equilibrium growth models, and a review of contemporary theories of stabilization policy. Prerequisite: 018.765.

018.767 Advanced Macroeconomic Topics (3) Not currently offered.

018.768 Post-Keynesian and Marxian Macroeconomics (3) A review of post-Keynesian and Marxian macroeconomic theories of the domestic and international economy and their policy prescriptions.

018.769 Structuralist Theories of Development (3) Study of structuralist classical Marxist and Neo-Marxist theories of development and underdevelopment. Appraisal of the development strategies which follow from the various theories.

018.770 Human Resources and Development (3) A study of the place of people in economic development. Topics include population, labour markets, migration, education, health and entrepreneurship.

018.771 Economic Planning (3) A review of the rationale for planning, of planning techniques and models, and of third world planning experience.

018.772 Advanced Microeconomic Theory: Production and Consumption (3) This course will cover topics in theories of consumer demand, production and cost, distribution, market equilibrium and market organization. Prerequisite: 018.604 which may be waived on demonstration of equivalent mathematical competence.

018.773 Advanced Microeconomic Theory: General Equilibrium and Welfare (3) This course will cover topics in general equilibrium theory, welfare economics, market failure and social choice. Prerequisite: 018.772.

018.774 Advanced Topics in Microeconomic Theory (3) Not currently offered.

018.775 Marxian and Neo-Ricardian Microeconomic Theory (3) A review of Marxian and Neo-Ricardian microeconomic theories and their extension to monopoly, segmented labour markets, labour reproduction and the household.

018.776 Multinational Enterprise and Nation States (3) Not currently offered.

018.777 Economics of Marx (3) An intensive study of Marx's mature theory and especially of Capital. Theories of Surplus Value, and the Grundrisse.

018.778 Debates in Marxian Economics (3) An analysis of the major theoretical debates within the Marxian paradigm.

018.779 Advanced Labour Economics (3) A review of the theoretical and empirical foundations of modern labour economics.

018.780 Labour Problems and Policies (3) A course dealing with various contemporary problems and controversies in labour economics. Prerequisite: 018.779.

018.790 Advanced Agricultural Marketing (3) Critical evaluation of microtheory vis-a-vis technical and economics structure of plants; theory of location in relation to time, form and space. Also offered as 061.710 in the Department of Agribusiness and Agricultural Economics.

018.794 Production Economics (3) Development of static microeconomic theories of the firm, functional forms, aggregation issues, productivity analysis, risk and uncertainty and in introduction to dynamics. The following are emphasized; a rigorous treatment of the models using duality; a critical understanding of the limitations and possibilities for generalizing the models; and relevance of the models for empirical research, especially in agriculture. Also offered as 016.794 by the Department of Agribusiness and Agricultural Economics. Students may not hold credit for both 018.794 and 061.794 or the former 018.793 or 061.713.

SECTION 18: Education

18.1 Educational Administration, Foundations and Psychology

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Academic Staff

Dean Emeritus

Stapleton, J.J., B.S. (Iona), M.T.S. (C.U.A.), M.A., Ph.D. (Toronto).

Professors Emeriti

Poonwassie, D., B.A. (Manitoba), B.Ed., M.Ed., Ph.D. (Oregon); **Riffel**, J.A., B.A., M.Ed. (Saskatchewan), Ph.D. (Alberta); **Wilson**, K., M.A. (Sheffield), M.Ed. (Manitoba), Ph.D. (Michigan State).

Senior Scholar

Poonwassie, D., B.A. (Manitoba), B.Ed., M.Ed., Ph.D. (Oregon).

Professors

Bartell, R., B.A., M.A. (Hebrew University, Jerusalem), Ph.D. (Chicago); **Chinien**, C., B.Ed., M.Ed., Ph.D. (Ohio State); **Clifton**, R.A., B.Ed., M.Ed. (Alberta), Ph.D. (Toronto), Ph.D. (Stockholm); **Freeze**, D.R., B.A., B.Ed. (Queen's), M.A., Ph.D. (Victoria); **Levin**, B., B.Ed. (Manitoba), M.Ed. (Harvard), Ph.D. (OISE); **Long**, J.C., B.Ed. (Alberta), M.Ed. (Calgary), Ph.D. (Alberta); **Magsino**, R., B.A. (Magna Cum Laude), B.Sc., Ed. (Magna Cum

Laude) (Luzonian), M.Ed. (Sydney), M.A., Ph.D. (Wisconsin); **Schulz**, W.E., B.A. (Winnipeg), B.Ed. (Manitoba), M.Ed., Ph.D. (Wyoming); **Seifert**, K.L., B.A. (Swarthmore), M.A., Ph.D. (Michigan); **Stapleton**, J.J., B.S. (Iona), M.T.S. (C.U.A.), M.A., Ph.D. (Toronto); **Wiens**, J.R., B.A., B.Ed., M.Ed. (Manitoba), Ph.D. (Simon Fraser); **Young**, J.C., B.A., M.A. (Durham), P.G.C.E. (Cambridge), M.Ed. (Queen's), Ph.D. (Toronto).

Associate Professor

Lutfiyya, Z.M., B.A. (Manitoba), M.S., Ph.D. (Syracuse).

Assistant Professors

Creamer, D.G., B.Sc., B.Ed. (St. Mary's), M.Div. STB. (Regis College), M.Ed. Ed.D. (OISE); **Evans**, C., B.Sc., M.Cl.Sc. (Western), Ph.D. (Manitoba); **Mandzuk**, D., B.Ed., M.Ed., Ph.D. (Manitoba); **Mani**, P., B.Ed. (Alberta), M.Ed. (Ottawa), Ph.D. (Victoria); **Piquemal**, N., DEUG, Licence, Maitrise, D.E.A. (Strasbourg), Ph.D. (Alberta); **Renaud**, R., B.A. (Hons.), M.A., Ph.D. (Western Ontario).

Adjunct Professors

Boutin, L., M.A. (Gonzaga), M.A. (Ottawa), Ph.D. (Toronto); **Bruno-Jofré**, R., Licentiate in History (National University of the South, Argentina), Professorship in History, Ph.D. (Calgary); **Bryant**, C., B.A. (Concordia), M.Ed. (Harvard), M.A., M.Phil. (Waterloo); **Feldgaier**, S., B.A. (McGill), M.A., Ph.D. (Ohio State); **Foster**, R., B.A.(York), Cert. d'education (Quebec), B.Ed., Ph.D. (Alberta); **Fulton**, K.L., A.B. (Stanford). M.A., Ph.D. (Western); **Hall,** M., B.A., (British Columbia), M.A., Ph.D. (Simon Fraser); **Henley**, R., B.A. (Mount Allison), B.Ed. (New Brunswick), M.Ed. (Manitoba), Ph.D. (Toronto); **McCluskey**, K.W., B.A., M.A., Ph.D. (Manitoba);

Program Information

The Department of Educational Administration, Foundations, and Psychology offers specializations in the areas of adult education, educational administration, guidance and counselling, inclusive special education, and the social foundations of education.

Fields of Research

The department is a leader in research in a variety of areas including: Equity and Education (race, gender, disabilities); school reform and school improvement; citizenship education; counselling; cross-cultural education; disability studies; and adult/vocational education.

M.Ed. in Educational Administration, Foundations and Psychology

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*, the Department of Educational Administration, Foundations and Psychology has the following admission application deadline dates (see below for the Guidance and Counselling specialization):

For sessions starting	Canadian/U.S. students	International students
January	October 1	July 2
May/July	February 1	November 1
September	June 1	March 1

Guidance and Counselling has only one set of admission dates:

May/July/September	February 1	November 1

Some areas of specialization may require appropriate work experience. Applicants should consult with the department head.

The Guidance and Counselling and Inclusive Special Education specializations require specific prerequisite coursework that must be completed prior to admission.

Applicants should note that admission to the M.Ed. program is competitive. A number of factors are taken into account in arriving at an admissions decision: (1) the applicant's previous academic background; (2) the applicant's letter of study and research intent; (3) the ability of the department to provide the program of studies requested by the applicant; and (4) the availability of a faculty member to supervise the applicant.

Transfer of Credit

Students may transfer up to nine credit hours of graduate level courses from other accredited universities to the thesis-based route and up to 12 credit hours of graduate level coursework to the course-based route if the coursework is suitable to the student's program and approved by the advisor and department head.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. The M.Ed. in Educational Administration, Foundations and Psychology has a thesis-based route and a course-based route.

The following program requirements apply to all specializations in the Department of Educational Administration, Foundations and Psychology. Specific specialization requirements are listed under each specialization below.

M.Ed. programs have a maximum completion time of six years from the date of first registration.

Second Language Reading Requirement: None

Expected Time to Graduate: full-time: 2 - 3 years; part time, 4 - 5 years

Program by Coursework and Thesis

- A minimum of 18 credit hours of coursework. At least 12 credit hours must be at the 700 level or equivalent. The remaining 6 credit hours may be at the 500 level or above, in the Faculty of Education and/or at the 300 level or above in other faculties.
- As part of their coursework, students must take 3 credit hours of research methodology at the 700 level in Education or 300 level or above in other faculties.
- Thesis

Program by Coursework and Comprehensive Examination (Course based)

- A minimum of 30 credit hours of coursework. At least 18 credit hours must be at the 700 level or equivalent. The remaining 12 credit hours may be at the 500 level, or above, in the Faculty of Education and/or at the 300 level or above in other faculties.
- Comprehensive Examination

Adult Education Specialization

The Master of Education in Adult Education is a Faculty-wide program designed within a life-long learning paradigm. It includes course options in Educational Technology, Health Education/Promotion Education, Literacy in Adult Education, Post-Secondary Studies, and Technical and Vocational Education. Students may choose a General Adult Education program using courses from the different concentrations in consultation with the Advisor.

This program is designed to develop leadership in adult education in different settings and contexts. As this program attempts to balance research, theory, policy and practice, it will be of particular interest to professionals working with adult learners in the school system, community colleges, business and industry, or non-profit organizations.

When selecting courses students must consult with their advisor and take availability into consideration when making course selection in any given year. With the approval of the program advisor, equivalent courses, including distance education courses, may be chosen from other faculties and from other universities, in particular those falling within the Western Dean's Agreement.

Admission and Program requirements are listed above. Specific course requirements are as follows:

Required courses: 129.740, 129.742 and 129.580. Course based students must also take 129.743.

Educational Administration Specialization

The Master's Program in Educational Administration is designed to develop leadership for the province's school systems and to provide students with an in-depth and theoretical understanding of educational administration as both a moral and a technical endeavour.

Students in this program will benefit from their prior experiences as teachers or administrators in an educational organization. This experience need not be restricted to public schools. Experience is important because the program takes seriously the relationship between theory and practice in education.

Provincial Certification

It is expected that all candidates in the Master's Program with specialization in Educational Administration will attain provincial certification in Educational Administration (Level 2) by the time they complete their Master's degree. In some instances, this may require additional coursework. Certification is granted by Manitoba Education, Training and Youth and not by the Faculty of Education or the University of Manitoba.

Admission and Program requirements are listed above. Specific course requirements are as follows:

- Required courses: 129.701, 129.705 and 129.580. Course based students must also take 129.720.

- Thesis based students will select 6 credit hours, course based students will select 12 credit hours from: 129.504, 129.510, 129.702, 129.703, 129.704, 129.706, 129.707, 129.708 or other courses approved by the program advisor and department head.

Guidance and Counselling Specialization

The purpose of the Master's Program in Guidance and Counselling is to prepare counselling graduates who are able to integrate critical knowledge and understanding of the theoretical bases of counselling, the counselling process and outcome research, and current professional issues in counselling, with competent ongoing development of counselling skills. The model of training is scientist-practitioner with an emphasis on reflective practice.

Specifically, the graduate program is designed to help students with the development of generic skills of individual and group counselling; the capacity to conduct research and to interpret current research; a knowledge of the latest developments in counselling and literature in the field; education/training in group leadership and communication skills; a knowledge of career development, career information and job search skills; the principles, processes and methods of interviewing children, adolescents and adults; and the skills of measurement and evaluation.

The program provides an array of supervised practicum placements that support a more specialized experience to meet individual needs and interests. Graduates find employment in a wide range of settings, including schools, community agencies, clinics, hospitals, business and industry, rehabilitation centres, government service and private practice.

In addition to the admission and program requirements listed above, admission to the Guidance and Counselling specialization requires the following prerequisite coursework:

- A minimum of 9 credit hours of university coursework at the 500 level or equivalent consisting of:
- 129.548 Counselling Skills (3)
- 129.550 Theories and Issues in School Counselling (3)
- 129.554 Groups in Guidance (3)

For applicants who have attended the University of Manitoba, the prerequisite coursework can be fulfilled by taking the above courses. Applicants who have attended other universities can fulfil the prerequisite requirements by taking courses equivalent to the ones listed above; the alternate courses, however, will need to be approved by the Guidance and Counselling Area Group.

Specific course requirements are as follows:

- Required courses: 129.752, 129.755 and 129.580.

Thesis based students will select 3 credit hours and course based students will select 18 credit hours from: 129.751, 129.753, 129.754, 129.775,

129.776. Course based students may also select approved electives at the 500 level. (NOTE: 129.775 requires advisor approval.)

Inclusive Special Education Specialization

The Master's Program in Inclusive Special Education (ISE) is designed not only to develop skills needed to serve students with special needs directly, but also to develop leadership and research skills for assisting educators and other professionals working on behalf of persons with disabilities. To this end, the graduate courses are designed to enable graduate students to conduct research in a variety of formats and paradigms, to lead in the professional development of their colleagues, to foster program development at their workplaces, and to provide clinical or consultant services to classroom teachers. Courses in the program are focused on topics in inclusive special education as a profession, on applied learning theories and assessment of learning, on critical thinking, and on research methods and findings in this field. Graduates from the program work in a variety of callings: as administrators, clinicians, consultants, program leaders, resource and special education teachers. Many graduates also are active in research, educational program development, advocacy groups, teacher education and professional development.

In addition to the admission and program requirements listed above, admission to the Inclusive Special Education Specialization requires the following prerequisite coursework:

A minimum of 18 credit hours of university level coursework at the 500 level or equivalent with a Grade Point Average of 3.0 (B) consisting of:

- 129.560 Introduction to Inclusive Special Education (6)
- 129.563 Assessment and Instruction in Inclusive Special Education (6); and

6 credit hours from:

- 129.561 Field Experience in Inclusive Special Education (6)
- 129.562 Teaching Children through Alternative and Augmented Communication (3)
- 129.564 Inclusive Special Education: Early and Middle Years (3)
- 129.565 Inclusive Special Education: High School and Transition to Adult Life (3)
- 129.566 Organization and Delivery of Resource Program and Support Services (3)
- 129.567 Strategies for Organizing Inclusive Classrooms and Schools (3)
- 129.568 Promoting Responsible Behaviour in Educational Settings (3)

Specific course requirements are as follows:

- Required courses: 129.760 and 129.580
- Thesis based students will select a minimum of 3 credit hours and course based students will select a minimum of 6 credit hours from: 129.761, 129.763, 129.765, 129.774, 129.775. (NOTE: 129.774 and 129.775 require advisor approval)
- In addition, thesis based students will select a maximum 3 credit hours and course base students will select a maximum 6 credit hours from: 129.561, 129.562, 129.564, 129.565, 129.566, 129.567, 129.568.
- Students may also choose from a variety of courses not directly related to special education, depending on their interests and career goals. Students should consult the *Undergraduate and Graduate Calendars* for course titles and brief descriptions:
129.507, 129.522, 129.524, 129.550, 129.555, 129.557, 129.559, 129.570, 129.573, 129.574, 129.575, 129.581, 129.590, 129.593, 129.762, 129.771, 129.772, 132.534, 132.540, 132.577, 132.706, 132.748

Certification in Special Education

It is expected that all students in the M.Ed. Program with specialization in Inclusive Special Education will attain provincial certification in special education by the time they complete their Master's degree. Students who already have provincial certification at the time of entry into the program will therefore not need to take any prerequisite coursework for this purpose. Those who do not already have provincial certification, however, should expect to take additional credit hours of coursework to fulfil this requirement. The precise number and nature of the additional work will depend on the prior academic background of the student, as well as on the specific courses taken to complete the M.Ed. degree. To assess the additional work needed informally, it is recommended that students consult with their Faculty Advisor early in their program, and also obtain and read a copy of the special education certification guidelines published by Manitoba Education, Training and Youth. Official assessment of required coursework, however, can only be done by providing Manitoba Education, Training and Youth with a complete set of academic transcripts and requesting a formal assessment from them. Certification is granted by Manitoba Education and Training, not by the Faculty of Education or the University of Manitoba.

Social Foundations of Education Specialization

The aim of Social Foundations of Education is to develop educational researchers who are critical and reflective about educational theory and practice. Theories from the humanities and the social sciences will guide students as they examine, criticize, and explain the meanings, intents and the effects of education in both its institutional and non-institutional forms.

The Master's Program in Social Foundations is designed to promote the understanding of normative educational thought and practice and to probe assumptions about education and schooling. The analysis is multi-dimensional and interdisciplinary.

Admission and Program requirements are those listed above. Specific course requirements are as follows:

- Required course: 129.580
- Thesis based students will select 6 credit hours and course based students will select 9 credit hours from: 129.720, 129.728, 129.734. Course based students may substitute 3 credit hours from the Faculty of Arts for any one of these three courses (must be approved by advisor).
- Thesis based students will also select 6 credit hours and course base students will also select 18 credit hours from: 129.721, 129.722, 129.723, 129.724, 129.725, 129.727/8, 129.730; or
- All students may select courses chosen from the Faculty of Arts of the University of Manitoba or from other universities, in particular those within the Western Dean's agreement approved by the program advisor and department head.

Course Descriptions

Courses are offered on rotation and not all courses are offered each year. The graduate course offering rotation schedule is posted on the Faculty's Website: www.umanitoba.ca/education

Adult Education

129.740 Adult Education as a Field of Study and Practice (3) Description and analysis of adult education as a field of study and practice. Attention will be given to theory, particularly the philosophical and social bases of adult education. Consideration of contemporary practice will also be undertaken. Students may not hold credit for both 129.740 and the former 116.739.

129.741 Seminar in Adult Education (3) An examination of selected topics in adult education, with special reference to Canada. Students may not hold credit for both 129.741 and the former 116.720.

129.742 Program Planning in Adult Education (3) Introduction to factors affecting the planning of programs for adults. Examination of various planning models in relation to principles of adult education. A consideration of theory with major emphasis on directions for planning a program for adults. Local examples will be used. Students may not hold credit for both 129.742 and the former 116.733.

129.743 Topics in Adult Education (3) The study of selected topics in adult education. Opportunity will be provided for students to investigate in depth, significant topics within the area of adult education which are of interest to students. Students may not hold credit for both 129.743 and the former 116.734.

Educational Administration

129.701 Educational Administration as a Field of Study and Practice (3) An overview of educational administration, focusing on a review of some of the main intellectual traditions in the study of educational administration and on an analysis of some of the forces which shape administrative practice. Students may not hold credit for both 129.701 and the former 116.731.

129.702 Politics of Education (3) A review of the political features of educational organizations, with emphasis on value systems, community power structures, local government, and political change. Students may not hold credit for both 129.702 and the former 116.702.

129.703 Educational Finance (3) Study of economic and financial aspects of education, with emphasis on costs and analysis of expenditures; sources and types of revenue; productivity and efficiency, planning and budgeting. Students may not hold credit for both 129.703 and the former 116.703.

129.704 Legal Aspects of Education (3) Studies of legal issues in education. Students may not hold credit for both 129.704 and the former 116.704.

129.705 Theoretical Perspectives on Educational Administration (3) A study of the main currents of organization theory and administrative thought and their implications for the study and administration of educational organizations. Students may not hold credit for both 129.705 and the former 116.705.

129.706 Organizational Planning and Development in Education (3) A review of approaches to planning and development in education. Major emphasis is placed on the systematic development of educational organizations. Students may not hold credit for both 129.706 and the former 116.709.

129.707 The Analysis of Educational Organizations (3) The application of methods of organizational analysis to educational institutions. Students may not hold credit for both 129.707 and the former 116.710.

129.708 Principles of Curriculum Organization and Implementation (3) A review of approaches to curriculum change and implementation. Major emphasis is placed on the systematic approaches to curricular change in education. Students may not hold credit for both 129.708 and the former 116.726.

129.709 Seminar in Administrative Problems in Education (3) Application of theoretical concepts in field situations. Students may not hold credit for both 129.709 and the former 116.706.

129.710 Topics in Educational Administration (Readings) 1 (3) A readings course in topics of significance to educational administration.

129.711 Topics in Educational Administration (Field) 2 (3) A projects and field study course in topics of significance to educational administration.

Educational Psychology

129.770 Field Work in School Psychology (6) Students will engage in a minimum of one day a week of supervised experience in psychoeducational assessment and programming, counselling and consulting with teachers, students, parents and related others. Students may not hold credit for both 129.770 and the former 043.723. Prerequisite: 129.772 (or the former 043.725), 129.787 (the former courses 129.782 or 043.710), 129.776 (or the former 043.717) and one of 129.780 (or the former 043.709) or (the former courses 129.783 or 043.711) and one of 017.820 or 017.821.

129.771 Development in Learning Environments (3) This course explores recent advances in developmental psychology as they apply to learning in classrooms and other education-related settings. Emphasis will be given to cognitive change, but motivation and social skill development will also be considered as they relate to cognitive development. Students may not hold credit for both 129.771 and the former courses 043.708 or 043.724.

129.772 Psychology of Classroom Learning (3) This course explores recent advances in cognitive research as they apply to classroom learning and to other education-related settings. Emphasis will be given to information processing theory, situated cognition, and the development of expertise, as they relate to educational processes, especially in classrooms. Students may not hold credit for both 129.772 and the former courses 043.708 or 043.725.

129.773 Psychological Perspectives in Early Education (3) An examination of psychological theories as they relate to early years education. Emphasis will be placed on research about children's learning and development, especially as it is situated in classroom settings for grade levels K-4. Students may not hold credit for both 129.773 and the former 043.727.

129.774 Topics in Educational Psychology 1 (3) A reading and research course in topics of significance to educational psychology.

129.775 Topics in Educational Psychology 2 (3) A reading and research course in topics of significance to educational psychology.

129.776 Interview Techniques with Children and Adolescents (3) This course focuses on the principles, processes and methods of interviewing and counselling individual children, adolescents, parents, school personnel and others. The course aims at integrating theory and practice involving diagnostic and therapeutic communication and observation of behaviour in natural situations with individual children. Students may not hold credit for both 129.776 and the former 043.717. *Prerequisite*: 129.582 (or the former 043.505), 129.555 (or the former 043.515), or 129.548 and 129.549 (or the former 129.556 or the former 043.516).

129.777 Advanced Computer Application in Educational Psychology (3) This course will deal with the use of recent innovations in computer-assisted learning technology and will be set up to take into account the needs of the graduate level student in the Faculty of Education. Students may not hold credit for both 129.777 and the former 043.716. *Prerequisite*: any one of the following courses: 129.585 or the former courses 043.526 or 043.306 or 081.412 or 081.528.

Guidance and Counselling

129.751 Seminar in Current Issues in Counselling (3) Focus on research, theoretical and professional developments; critical contemporary issues; and specific social problems in counselling. Students may not hold credit for both 129.751 and the former 043.703.

129.752 Practicum Seminar in Counselling (6) Supervised experience in both individual and group counselling. Attention is given to analysis of case studies using audio- and video-tapes. A minimum of 180 hours of counselling experience in placement situations is required. Students may not hold credit for both 129.752 and the former 043.704. *Prerequisite*: 129.548 or the former 129.556 or the former 043.516 and permission from the instructor.

129.753 Group Counselling: Theory and Practice (6) Study of theories, rationale, objectives, and research. Acquisition of an experiential understanding of group work through participation in class activities. Development of leadership skills in group counselling by conducting counselling groups under supervision. Students may not hold credit for both 129.753 and the former 043.718. *Prerequisite*: 129.554 or the former 043.512 and 129.548.

129.754 Programs in Career Development (3) A practical course designed for helpers wishing a wider knowledge of career development programs. Participants will investigate and evaluate a wide variety of career counselling techniques and programs and will develop specific, innovative programs to meet the needs of their future counsellees. Students may not hold the credit for both 129.754 and the former 043.719.

129.755 Theories of Counselling (3) The objectives of counselling, assessment of counselling outcomes, theories of personality and counselling. Students may not hold credit for both 129.755 and the former 043.701 or the former 129.750.

Inclusive Special Education

129.760 Seminar in Inclusive Special Education (6) A forum for the discussion of topics related to disability issues. Opportunity will be provided for students to examine issues related to their particular professional and scholarly needs. Students may not hold credit for both 129.760 and the former 043.705. *Pre- or corequisite:* 18 credit hours in Special Education at 500 level or equivalent.

129.761 Behavioural Issues in Educational Settings (3) A study designed to give teachers and school counsellors the necessary theoretical background as well as the practical tools to implement programs for children in conflict. Students may not hold credit for both 129.761 and the former 043.707. *Pre- or corequisite:* 129.560 (or the former 043.518) or 129.568 (or the former 043.542).

129.762 Seminar in Disability Studies (3) The aim of this course is to review research literature which is directly related to the problems of learning and instruction of the mentally retarded. Students may not hold credit for both 129.762 and the former 043.721. *Prerequisite*: a course in mental retardation (such as the former 043.531 or the former 043.534) or permission of instructor.

129.763 Advanced Assessment and Instruction in Inclusive Special Education (3) An advanced study of diagnostic/prescriptive techniques used to ameliorate learning and behavioural problems in special education. Emphasis is on the development and analysis of related instructional delivery systems. Students may not hold credit for both 129.763 and the former 043.722. *Pre- or corequisite:* 129.563 or the former 043.536.

129.765 Field Experience in Inclusive Special Education (6) A minimum of 200 hours of supervised placement in an inclusive special education setting. Scheduled seminars facilitate directed study and discussion. Prerequisite: 18 credit hours at the 500-level in Inclusive Special Education or its equivalent. Students may not hold credit for both the former 129.764 or 043.706.

Research and Evaluation Courses

129.780 Methods of Educational Research (3) A study of design and data collection techniques for educational research in field settings. Topics covered include quasi-experimentation, survey and observational techniques, simulation, content analysis, and sociometry. Students may not hold credit for both 129.780 and the former 043.709. *Prerequisite*: 129.580 or one of the former courses: 129.680, 043.610 or consent of instructor.

129.781 Evaluating Educational Programs (3) An introduction to current approaches to evaluating educational programs. A review of various evaluation methods/approaches, along with consideration of specific design, ethical, consulting and political issues will be the main focus of this course. Specific skills to be developed are the implementation of educational evaluations, data collection and analysis, and final report writing. Students may not hold credit both 129.781 and the former 043.726.

129.784 Qualitative Research Methods in Education (3) An introduction to qualitative research methods. While the theoretical underpinnings of qualitative research will be discussed, emphasis is placed on learning to conduct a study including design, collecting and analyzing data, and research ethics. Prerequisite: 129.580 or the former 043.503 or equivalent.

129.785 Design and Analysis of Educational Research (Quantitative) (3) A study of the use of quantitative methods of analyzing educational research data. Descriptive and inferential procedures commonly used in educational research will be discussed and students will learn to use statistical packages. The course will also address when it is appropriate to employ quantitative designs and present common designs and their associated analyses. Prerequisite: 129.580. Students may not hold credit for both 129.785 and the former courses 129.681 or 43.535 or 43.611.

129.786 Advanced Topics in Educational Research (3) An advanced study of special topics in educational research with an in-depth study of specific topics which will change from year to year. Prerequisite: 129.580 and permission of the instructor. Students may not hold credit for both 129.786 and the former courses 129.783 or 043.711

129.787 Measurement and Evaluation in Schools (3) An advanced study of the principles of measurement and evaluation and their application to teaching and learning in schools. Current issues in measurement and evaluation, including alternative forms of classroom assessment and standard setting, will be discussed. Prerequisite: 129.581 or the former 043.301 or equivalent, or consent of instructor.

Social Foundations of Education

129.720 Philosophy of Education (3) A study of the philosophic foundations of education. Emphasis will be given to various schools of philosophic inquiry as they relate to education and to contemporary philosophy of education issues. Students may not hold credit for both 129.720 and the former 116.735.

129.721 Educational Sociology (3) An examination of the relationship between education and society, with particular attention to ethnicity, family, and socio-economic status and to the role of the school in the socialization process in the Canadian context. Students may not hold credit for both 129.721 and the former 116.736.

129.722 History of Education in Manitoba (3) A study of the themes underlying the historical development of education in Manitoba. Students may not hold credit for both 129.722 and the former 116.737.

129.723 Social Criticism in Education (3) A critical examination of education, giving special attention to various perspectives which challenge conventional interpretation of education and schooling. Students may not hold credit for both 129.723 and the former 116.738.

129.724 Values in Education (3) This course examines the place of values in education. It explores the notion of values, its pervasiveness in education, the approaches to values in education, and the trends and issues related to values in education. Students may not hold credit for both 129.724 and the former 116.732.

129.725 Comparative Education (3) An analysis of educational systems and problems in selected environments in terms of social, political, economic, cultural and other contexts. Students may not hold credit for both 129.725 and the former 116.714.

129.726 Education and Development (3) A study of the interrelationships between education and social, economic and political development in a variety of areas. Students may not hold credit for both 129.726 and the former 116.715.

129.727 Seminar in Cross-Cultural Education 1 (3) A critical analysis of the social theories and research which form the basis of cross-cultural education. Students may not hold credit for both 129.727 and the former 116.724.

129.728 Seminar in Cross-Cultural Education 2 (3) A critical analysis of the approaches and research in cross-cultural education. Students may not hold credit for both 129.728 and the former 116.725.

129.730 History of Canadian Education from 1867 (3) A study of the historical development of education in Canada from 1867 to the present. Students may not hold credit for both 129.730 and the former 116.723.

129.733 Topics in Educational Foundations (Readings) 1 (3) A reading and research course in topics of significance to educational foundations.

129.734 Seminar in Educational Thought (3) Intensive studies of the works of selected educational theorists. Students may not hold credit for both 129.734 and the former 116.719.

18.2 Curriculum, Teaching and Learning

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General Office: 262 Education Building
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Academic Staff

Dean Emeritus

MacPherson, E.D., B.A., M.A. (UBC), Ph.D. (Washington State).

Professors Emeriti

Osborne, K.W., B.A.(Hons.) (Oxford), B.Ed., M.A. (Manitoba); **Trosky**, O., B.A., B.Ed., M.Ed. (Manitoba), Ph.D. (Toronto).

Senior Scholars

Connor, S., B.Sc., B.Ed. (Manitoba), Ph.D. (Texas); **Irvine**, J.L., B.A., B.Paed., B.Ed., M.Ed. (Man.); **Spencer**, P., B.A., B.Ed., M.Ed., Ed.D. (New York).

Professors

Cap, O., B.A. (Quebec), M.Ed. (Rutgers), Ph.D. (Ohio State); **Chinien**, C., B.Ed., M.Ed., Ph.D. (Ohio State); **Harvey**, D.A., B.A. (Bemidji), M.Sc. (Western Illinois State), P.E.D. (Indiana); **Hlynka**, L.D., B.Sc., B.Ed. (Manitoba), M.A. (Minnesota), Ph.D. (Michigan State); **Jenkinson**, D.H., B.A., B.Ed. (Manitoba), B.L.S., M.Ed. (Alberta), Ph.D. (Minnesota); **Stinner**, A.O., B.A., B.Sc., B.Ed. (Alberta), M.Sc. (York), Ed.D. (Toronto); **Straw**, S.B., B.A., M.A. (Missouri), Ph.D. (Minnesota).

Associate Professors

Johns, B.A., B.S. (Indiana), M.A. (Michigan State); **Kanu**, Y., B.A., Dip.Ed., M.Ed. (Sierra Leone), Cert.Curr.Dev.Soc.St. (Leeds), B.Litt. (Birmingham), Ph.D. (Alberta); **Lewthwaite**, B., B.Sc., B.Ed. (Saskatchewan), M.Ed. (Massey), Sc.Ed.D. (Curtin); **Mason**, R., B.Ed., M.A. (Calgary), Ph.D. (Alberta); **Morin**, F., A.C.M. (Affiliate Teacher Toronto), B.P.E., M.Ed. (Manitoba), Ph.D. (North Dakota); **Schulz**, R., B.A. (Manitoba), M.Ed. (Queen's), Ph.D. (North Dakota); **Serebrin**, W., B.A., B.Ed. (Dalhousie), Ph.D. (Indiana).

Assistant Professors

Kouritzin, S. , B.A., M.A., Ph.D. (UBC); **Linklater**, F., B.Mus. (Brandon), M.Mus. (North Texas), Ph.D. (Michigan); **MacPherson**, S., B.A., Ph.D. (UBC); **McMillan**, B.A., B.Sc. (Wisconsin), B.Sc.(Hons.), M.Sc., Ph.D. (Manitoba); **Rosenstock**, S.A., B.A. (Manitoba), M.A. (North Dakota), Ph.D. (Ohio State); **Smith**, K., B.F.A., Cert.Ed. (Manitoba), M.Ed. (UBC), Ph.D. (Manitoba); **Wares**, A., B.A. (Maine), B.Sc. (Dakota), M.Sc., Ph.D. (Illinois State); **Welsh**, J.C., B.Sc., B.Ed. (Manitoba), M.A., Ph.D. (Minnesota).

Adjunct Professors

Ebenezer, J.V., B.Sc. (Spec.) (Madurai), B.A., M.Ed. (Western Washington), Ed.D. (UBC); **Zakaluk**, B.L., B.A., B.Ed., M.Ed. (Manitoba), Ph.D. (Minnesota).

Program Information

The Department of Curriculum, Teaching and Learning offers the Master of Education Program with specializations in language and literacy; teaching English as a second language; and general curriculum (an area that includes art, drama and music; curriculum studies; early years curriculum; educational technology; language and literacy curriculum; mathematics education; science education; social studies education; teaching English as a second language; and technology education).

Fields of Research

Department members provide leadership in a variety of areas including curriculum development, curriculum reform and curriculum theorizing;

teacher inquiry, professional development and teacher practice; teaching and learning within and across individual curriculum areas and streams (Early, Middle and Senior Years); language and literacy development; and teaching English as a second language.

M.Ed. in Curriculum, Teaching and Learning

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, the Department of Curriculum, Teaching and Learning has the following admission application deadline dates:

For sessions starting	Canadian students	International students
January	October 1	July 2
May/July	February 1	November 1
September	June 1	March 1

Appropriate academic background as required by the area of specialization. Any prerequisite coursework must be completed prior to entry to the M.Ed. program.

Some areas of specialization may require appropriate work experience. Applicants should consult with the Department Head.

Applicants should note that admission to the M.Ed. program is competitive. A number of factors are taken into account in arriving at an admission decision: the applicant's previous academic background, letter of study and research intent; the ability of the department to provide the program of studies requested by the applicant; and the availability of a faculty member to supervise the applicant.

Transfer of Credit

Candidates may be allowed to transfer up to 12 credit hours of graduate level courses from other universities, provided the coursework is suitable in content and level to the candidate's program, and is approved by the Advisor and the Program Director.

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. The M.Ed. in Curriculum, Teaching and Learning has a thesis-based route and a course-based route with an oral defense.

The following program requirements apply to all specializations in the Department of Curriculum, Teaching and Learning. Specific specialization requirements are listed under each specialization below.

M.Ed. programs have a maximum completion time of six years from the date of first registration.

Second Language Reading Requirement: None

Expected Time to Graduate: full-time: 2 to 3 years; part-time: 4 to 5 years

Program by Coursework and Thesis

- A minimum of 18 credit hours of coursework. At least 12 credit hours must be at the 700 level or equivalent. The remaining 6 credit hours may be at the 500 level or above, in the Faculty of Education and/or at the 300 level or above in other faculties.
- Students must take 3 credit hours of research methodology at the 700 level in Education or 300 level or above in other faculties.
- Thesis and oral defense.
- Upon entry into the program, a student will be assigned a program advisor who is not necessarily the thesis advisor. Students who have chosen to follow the thesis-based route should contact the head of department to identify a faculty member with expertise in the proposed specialization and who is available to supervise their thesis.

Program by Coursework and Comprehensive Option (either Examination or Project) (Course based)

- A minimum of 30 credit hours of coursework. At least 18 credit hours must be at the 700 level, which may include 132.754, or equivalent. The remaining 12 credit hours may be at the 500 level or above in the Faculty of Education and/or at the 300 level or above in other faculties.
- All coursework plus comprehensive option programs require a culminating activity and an oral defence. This requirement may be met through taking a comprehensive examination, or carrying out a research project. The research project may take a variety of forms including a research review, a small-scale study, or a curriculum/instruction application project. In some cases, the research project may include the student taking 132.754 Final Seminar in Curriculum, Teaching and Learning to facilitate the development of the project. Students should contact and discuss with their advisors the specific requirements of both the examination and the research project activities.

General Curriculum Specialization

The Master of Education in General Curriculum includes a range of potential concentrations: art, drama, music; curriculum studies; early years curriculum; educational technology; language and literacy curriculum; mathematics education; science education; social studies education; teaching English as a second language; and technology education. In consultation with their faculty advisors, students will be encouraged to create a program of study that addresses their own interests in a particular curricular field and which enhances the students' understanding of curriculum and its intents and effects. The aim of the program is to develop individuals who are informed, critical, and reflective about curriculum theory and practice in their particular area of concentration. In order to support this aim, courses are designed to provide graduate students with the requisite skills to conduct and to understand research in a variety of formats and paradigms.

Admission and Program requirements are those listed above. Specific course requirements are as follows:

- Required course: 129.580, 132.755
- Thesis based students select 3 credit hours from: 132.756, 132.742. Course based students are required to take both courses.

Language and Literacy Specialization

Language and Literacy is a broad field encompassing a number of major sub-fields from pre-school to post-secondary levels. The sub-fields include developmental reading, clinical reading, composition studies, rhetoric, oral language development, children's and adolescent literature, response to literature, the language arts associated with listening, representing, viewing, spelling, and handwriting instruction, along with instruction in comprehension. The purpose of the program is to strengthen practitioners' theoretical understanding of one or more of these sub-fields, and to develop skills that will enable them to conduct independent research into language and literacy practices in their chosen area of concentration. Students in the program can anticipate experiences that range from general courses in curriculum development and implementation to specialized courses specific to their own needs and interests.

Admission and Program requirements are listed above. Specific course requirements are as follows:

- Required courses: 132.753 and 129.580
- Thesis based students will select 3 credit hours and course based students will select 6 credit hours from: 132.707, 132.710, 132.718
- In addition, thesis based students will select 6 credit hours and course based students select 18 credit hours from: 132.706, 132.707, 132.709, 132.710, 132.711, 132.712, 132.715, 132.717, 132.718, 132.719, 132.720, 132.729, 132.742, 132.755, 132.756. Course based students may also select from: 132.733, 132.754.

Teaching English as a Second Language Specialization

The purpose of the Master's in Teaching English as a Second Language (TESL) Program is to further the knowledge of experienced ESL teachers. Courses are designed to enable teachers to reflect on their teaching practices in light of influential and relevant research in second language acquisition/learning, curriculum theory and development, and TESL pedagogy. Students accepted into the program will be introduced to the research methodologies employed in educational research and in TESL, and will have the opportunity to develop expertise in one or more research methodologies.

Admission and Program requirements are those listed above. Specific course requirements are as follows:

Required courses: 132.721, 132.722, 132.755, 132.758, 129.580. Course based students must also take 129.727 or 129.728.

In addition, course based students will select 12 credit hours with a minimum of 3 credit hours at the 700 level from: 132.551, 132.552, 132.583, 132.740, 132.754, or courses from the Faculties of Education or Arts of the University of Manitoba or other universities, in particular those within the Western Deans Agreement, and approved by the program advisor and the department head.

Course Descriptions

Courses are offered on rotation and not all courses are offered every year. The graduate course offering rotation schedule is posted on the Faculty's Website: www.umanitoba.ca/education

Curriculum

132.732 Twentieth Century Curriculum Development History and Biography (3) Not currently offered. Students may not hold credit for both 132.732 and the former 063.736.

132.733 Inquiry in Curriculum and Instruction (3) An examination of the issues involved in critiquing and synthesizing inquiry in curriculum and instruction studies in the humanities and social sciences. The course will also introduce students to the variety of ways in which inquiry may be conducted in instructional settings and will focus on how the research on curriculum and instruction can be validly synthesized across studies. Students may not hold credit for both 132.733 and the former 063.754. *Prerequisite*: 132.755 or the former 132.730 or the former 063.734 or permission from the instructor.

132.734 Topics in Curriculum: Humanities and Social Sciences (3) The study of selected topics in curriculum and instruction in the humanities and social sciences.

132.735 Independent Studies in Curriculum: Humanities and Social Sciences (3) Independent study of selected issues related to curriculum and instruction in the humanities and social sciences. This course may be used for field studies.

132.736 Topics in Curriculum: Mathematics and Natural Sciences 1 (3) A reading and research course in topics of significance to curriculum development in the areas of specialization offered by the department.

132.737 Topics in Curriculum: Mathematics and Natural Sciences 2 (3) A continuation of 132.736 for students engaging in readings and research too great in scope to be included within a three-credit program.

132.738 Field Seminar in Curriculum: Mathematics and Natural Sciences (6) Not currently offered. Students may not hold credit for both 132.738 and the former 081.709.

132.739 Curriculum in Vocational Education (3) A review of the major curriculum changes in vocational education with reference to the public school, the community college and post-compulsory institutions. Emphasis will be on models, supportive research and curricular design strategies. Students may not hold credit for both 132.739 and the former 081.714.

132.742 Study of Teaching (3) Views of teaching, paradigms, and methodologies for studying teaching and carrying out inquiries into teaching. Students may not hold credit for both 132.742 and the former 081.722.

132.754 Final Seminar in Curriculum, Teaching and Learning (3) Seminar and workshop on processes and products in writing and defending an M.Ed. final inquiry paper. Both qualitative and quantitative research models will be acknowledged. Prerequisite: Minimum 24 credit hours completed in a comprehensive M.Ed. Program.

132.755 Historical and Contemporary Approaches to Curriculum (3). Historical Developments of curriculum as a field of study and inquiry, including the philosophical, social, political, and cultural contexts of curriculum. Students may not hold credit for both 132.755 and either former 132.730 and 063.734.

132.756 Theory and Practice of Curriculum Design and Development (3) An examination of the theory and practice of the design, development, implementation and evaluation of curricula for K-12 and adult/post-secondary levels. *Prerequisite*: 132.755 or the former 063.734, 081.717, 081.718, 132.730 or written consent of instructor. Students may not hold credit for both 132.756 and either former 132.731 and 063.735.

132.798 Supervision of Educational Programs (3) A study of supervisory methods; staff roles and utilization; use and evaluation of materials and programs as these apply in one or more of the curricular areas. Students may not hold credit for both 132.798 and the former 081.703.

Early Years Curriculum

132.728 Early Years Curriculum: Philosophical Traditions and Future Directions (3) An exploration and evaluation of models, issues, and priorities in Early Years curriculum (K-4). Participants will design curriculum which realizes and particularizes the theories, models, concepts and engagements being examined in the course. Students may not hold credit for both 132.728 and the former 063.747.

132.729 Curriculum Research in the Early Years: Young Children and Social Semiotics (3) An investigation of the social nature of learning and children's use of semiotic systems (language, art, music, dance, drama, and mathematics) as ways of knowing in the Early Years (K-4) classroom. Participants will conceive, organize, and conduct a research project that allows them to develop an understanding of children's use of one or more semiotic systems within a curriculum context. Students may not hold credit for both 132.729 and the former 063.748.

Educational Technology

132.745 Seminar in Educational Technology (3) A review of current research in educational technology and a critical appraisal of recent technology in instructional development. Students may not hold credit for both 132.745 and the former 081.721.

132.746 Information Technology and Education (3) A theoretic study of information media and environments, their educational and societal impact, and their educational application. Students may not hold credit for both 132.746 and the former 081.723.

English as a Second Language

132.721 Seminar in E.S.L. Theory and Practice (3) Opportunity will be given to examine critically the major theories and methodologies used in E.S.L. instruction and research. Students may not hold credit for both 132.721 and the former 063.727. *Pre-or corequisite:* one or more of 132.549 or the former 063.509, 132.558 or the former 132.550, 063.586, or the former 063.322 or permission of instructor.

132.722 Research Issues and Application in TESL (Teaching English as a Second Language) (3) This course focuses on a survey of ESL and language development research issues, procedures, and findings. This research review will serve as the basis for students to plan individual research and conduct a pilot study. Students may not hold credit for both 132.722 and the former 063.753. *Prerequisites*: 132.558 or the former 132.550, 063.586, or equivalent and 129.580 or the former 043.503 or equivalent or permission of instructor.

132.758 Theory and Research in a Second Language Acquisition (3) Examination of the development of the field of second language acquisition study, including historical views, issues, theories and models in relation to language universals, cognitive development, language mastery, and second language acquisition and learning. *Prerequisites*: 132.182 or the former 132.161 or 132.162 and 126.120.

French

132.723 Apprentissage du français langue seconde et la didactique (3) Mise à jour des connaissance théoriques sur l'acquisition du langage et de l'apprentissage de français langue seconde. Utilité de la recherche en éducation. Retombée de la recherche sur la pratique éducative. Not to be held with the former 063.745.

132.724 La didactique du français langue seconde et la recherche (6) Etude critique de documents de recherches dans le domaine des langues secondes. Interprétation des données. Retombées de la recherche sur la didactique du français langue seconde. Initiation des enseignantes(es) au processus du recherche. Not to be held with the former 063.746.

Health/Physical Education

132.751 Educational Problems and Advanced Methods in Health and/or Physical Education (3) An examination of the relationship of research to educational practice in the teaching of health and/or physical education. Students may not hold credit for both 132.751 and the former 081.711.

132.752 Contemporary Curricula in Health and/or Physical Education (3) An examination of principles and content of health and/or physical education curricula and programs. Logistical and social-political factors associated with implementation will be examined. Students may not hold credit for both 132.752 and the former 081.712.

Language and Literacy

132.706 Seminar and Practicum in Clinical Diagnosis and Remediation (6) A thorough study of the etiology, diagnosis, and treatment of complex reading disabilities; practical experience under supervision in diagnosing reading problems and in prescribing, treating, interpreting, and reporting findings. Students may not hold credit for both 132.706 and the former 063.705. *Prerequisite*: 132.540 or the former 063.599.

132.707 Classical Research in Reading (3) A critical review, analysis, and synthesis of classical research studies in the psychology, psycholinguistics, sociology, and pedagogy of reading. Students may not hold credit for both 132.707 and the former 063.713.

132.708 Designing, Conducting, and Evaluating Reading Research (3) A critical evaluation of current research in reading; emphasis on design, methodology, and statistical consideration for conducting reading research. Students may not hold credit for both 132.708 and the former 063.714. *Prerequisite*: 132.707 or the former 063.713.

132.709 Seminar in Reading Processes (3) A critical examination of theories and models of reading; a thorough study of the reading processes in relation to language, vision, hearing, neurological development, cognition and motivation. Students may not hold credit for both 132.709 and the former 063.739.

132.710 Language and Literacy Curriculum Inquiry in the Early Years (3) A study of language and literacy curriculum in the early years of schooling. Participants will identify and examine issues and problems arising out of theory, research, and curriculum practices in early years classrooms. Participants will have the opportunity to develop and pursue a curriculum project in accordance with their professional research interests. Students may not hold credit for both 132.710 and the former 063.755.

132.711 Research in Language and Literacy Development (3) An exploration of language and literacy development issues of professional interest to teachers. Participants will critically analyze language/literacy development theories, published research, and classroom observations. Opportunities will be created for participants to conduct their own language/literacy development inquiry in an educational setting. Students may not hold credit for both 132.711 and the former 063.756.

132.712 Curricular Issues in English Language Arts Education (3) This course will address a number of problematic issues in the development and implementation of school-based instruction in English language arts through critically considering the relationship of current theory, research and pedagogy. Students may not hold credit for both 132.712 and the former 063.757.

132.714 The Legacy of Theory and the Teaching of Literature (3) This course pro-

vides an in-depth study of the writings of major theorists with a view to assessing critically the current and future influence of their theoretical legacy on the nature and direction of literacy instruction in the schools. Students may not hold credit for both 132.714 and the former 063.759.

132.715 Seminar in Reading and Response to Literature (3) This course is designed to familiarize students with the historical and philosophical trends in reading and response to literature; it will survey major developmental reading and literary response trends, examine the epistemological assumptions associated with those developments and explore the developing thought in how students process written texts, in particular, literary tests. The course will also examine curricular implications in reading and literary response. Students may not hold credit for both 132.715 and the former 063.760.

132.716 Language Teacher as Researcher (3) The purpose of this course is to investigate the characteristic parameters of teachers as researchers in the context of their own classroom. Three fundamental principles provide a curricular perspective to guide the participants: voice conversation and community. With this perspective the language teacher engages in classroom inquiry with the goal of understanding language and teaching through the learners as curricular informants. Students may not hold credit for both 132.716 and the former 063.761.

132.717 Rhetoric in Education (3) This course is intended to demonstrate how rhetorical theory can serve as a pattern for developing pedagogy in language, reading, and composition. The course will briefly cover classical models for rhetoric, but will focus on modern language and rhetorical theories and their relationships to developing curricula in language arts. Students may not hold credit for both 132.717 and the former 063.762.

132.718 Research in Written Composition (3) A critical analysis of research and research methods in written composition process and pedagogy. Consideration will be given to classic studies, historical development, current trends and research, and evaluation procedures as they apply to the study and teaching of writing. Students may not hold credit for both 132.718 and the former 063.763.

132.719 Research in Language for Learning (3) A critical study of the research literature in how language can support learning in all areas of schooling. The course will focus on the role of language in supporting learning in all subject areas and will specifically investigate the research about the role of talking, reading, and writing as tools for learning. Students may not hold credit for both 132.719 and the former 063.764.

132.720 Language Literacy and Policy Development (3) A survey seminar in how policy has been developed in literacy and how these policies impact on our conceptualizations of a literary curriculum and our definitions of literacy. An emphasis will be on concepts of functionality in literacy and policy in literacy education. Students may not hold credit for both 132.720 and the former 063.765.

132.753 Curriculum Development and Implementation in Language and Literacy (3) A study of historical antecedents – issues, theory and research – in relation to both the reading and writing curriculum contrasted with current structuralist, poststructuralist and deconstructivist views of knowledge construction with emphasis on discourse synthesis, individual cognitive processes and social influences on literacy learning. *Prerequisite:* A minimum of 3 credit hours of reading courses.

Mathematics

132.747 Seminar in Mathematics Education (3) An analysis of methods and materials in mathematics education, a review of research, and a critical appraisal of current curriculum development. Students may not hold credit for both 132.747 and the former 081.720.

132.748 Advanced Seminar in Mathematical Diagnosis and Remedy (3) A close examination of the theory and practice of mathematical diagnosis and remedy across the school curriculum. Students may not hold credit for both 132.748 and the former 081.724. *Prerequisite*: permission of instructor.

132.749 Theories of Teaching Mathematics (Secondary) (3) An examination of the objectives of secondary school mathematics, mathematics curriculum organization and development, theories of learning and teaching secondary school mathematics, and mathematics assessment programs. Students may not hold credit for both 132.749 and the former 081.725.

Science

132.750 Seminar in Science Education (3) A review of current research in science education, and a critical appraisal of current curriculum development in science. Students may not hold credit for both 132.750 and the former 081.719. *Prerequisites*: 005.100 and 005.200 or 129.580 or the former 043.503 or the former 005.221 or equivalent.

132.799 Seminar in Environmental Education (3) Designed for graduate students wishing to concentrate on environmental education; emerging issues and concepts will be reviewed. Extant and projected programs of and approaches to environmental education will be subjected to critical analysis. Not to be held with the former 081.710

Social Studies

132.725 Theoretical Foundations of the Social Studies (3) An examination of the development of social studies education, including the theories, research, ideas and ideologies that have and continue to shape social studies curriculum and pedagogy. Students may not hold credit for both 132.725 and the former 063.737.

132.726 Seminar in Social Science Education (3) An examination of current trends and developments in social science education as they affect the school curriculum at all grade levels, K-12. Particular attention will be paid to questions of curriculum contents, teaching strategies and student evaluation. Students may not hold credit for both 132.726 and the former 063.738.

132.727 Culture, Citizenship and Curriculum (3) An examination of the role of school curricular in preserving, transmitting and transforming conceptions and practices of culture and citizenship, with particular reference to social and political education in schools. Not to be held with the former 063.749.

Technical/Vocational

132.743 Trends in Vocational Education (3) An examination of the historical trends in vocational education as influenced by a changing society. Special emphasis will be placed on the contributions of individuals on the impact of federal and provincial legislation as it affects vocational education. Students may not hold credit for both 132.743 and the former 081.713.

132.744 Seminar in Home Economics Education (3) An application of current research to the design, implementation and evaluation of programs in home economics education. Students may not hold credit for both 132.744 and the former 081.716.

132.759 Internationalization of Technical and Vocational Education and Training (3) An exploration and critical evaluation of basic assumptions underlying the theories and values of globalization and the internationalization of technical and vocational education and training (TVET). Emphasis will be placed on the examination of how these theories and values influence institutions, programs, policies and practices in TVET.

The Arts

132.701 Seminar in Art Education 1 (3) An examination of the major historical, philosophical, psychological and socio-cultural foundations of art education. The study of major developments in each of these areas will form a basis for understanding current theory and practice. Students may not hold credit for both 132.701 and the former 063.725.

132.702 Seminar in Art Education 2 (3) The study of the methodology, content and problems of art education research, curriculum development and practice. Students will explore research methodology and curriculum design through individualized projects related to classroom practice. Students may not hold credit for both 132.702 and the former 063.726.

132.703 The Arts in Education (3) An examination of the role of the arts in general education. Emphasis will be placed on knowledge of the role of perception, aesthetic valuing and cognition in arts education, and application of this understanding and knowledge to educational practice. Students may not hold credit for both 132.703 and the former 063.750.

132.704 Seminar in Educational Drama (3) A critical examination of the literature and current research in educational drama. Consideration will be given to the philosophy, theory, and practice of drama in the classroom, and the evaluation of programs. Students may not hold credit for both 132.704 and the former 063.743.

132.705 Seminar in Educational Theatre (3) A critical examination of the literature and current research in educational theatre. Consideration will be given to the philosophy, theory, and practice of theatre in the school setting, and to the evaluation of programs. Students may not hold credit for both 132.705 and the former 063.744.

18.3 Post-Secondary Studies Division

Director and Graduate Chair: D. Kirby
General Office 230 Education Building
Telephone: (204) 474 9004
Fax: (204) 474 7551
E-mail: Education@umanitoba.ca
Website: www.umanitoba.ca/education

Academic Staff

Professors

Clifton, R.A., B.Ed., M.Ed. (Alberta), Ph.D. (Toronto), Ph.D. (Stockholm); **Kirby**, D.M., B.Sc., Ed.Cert. (London), M.Ed. (Memorial), Ph.D. (London); **Morphy**, D.R., B.A. (Alberta), M.A. (Calgary), Ph.D. (Michigan State); **Perry**, R.P., B.A. (UBC), M.Sc., Ph.D. (Calgary); **Roberts**, L.W., B.A., M.A., Ph.D. (Alberta); **Straw**, S.B., B.A., M.A. (Missouri), Ph.D. (Minnesota).

Associate Professors

Kops, W.J., B.A., M.B.A. (Manitoba), Ed.D. (Toronto); **Kristjanson**, C., B.P.E., M.Ed., Ph.D. (Manitoba); **Taylor**, K.L., B.Sc., B.Ed. (Memorial), M.A. (Dalhousie), Ph.D. (Ottawa).

Assistant Professor

Schonwetter, D.J., B.Th. (CMBC), B.A., M.A., Ph.D. (Manitoba)

Program Information

This specialization is designed to prepare students for teaching, leadership, and research roles in a range of post-secondary education settings. Reflecting the complex dynamic of contemporary post-secondary education, this program of study is structured to develop understanding of the roles of culture, organization, and teaching and learning processes in post-secondary education, and to prepare candidates to use their knowledge to optimize teaching and administrative practices in post-secondary education environments.

Fields of Research

The research areas of specific interest to the this division include: teaching and learning in post-secondary education; curriculum planning in post-secondary education; academic leadership; instructional development of future professoriate; student perceived control in first year experience; perceived control of future professoriate and new hires; college student motivation and performance; evaluation and improvement of college teaching; sociology of higher education; higher education in Canada; public policy in higher education; ethnographics of on-line learning communities; student affairs administration; student-centred education; and student judicial affairs

Research Facilities

As the result of two special SSHRCC grants, the program library holdings in the area of post-secondary teaching and learning are among the best in the country. In addition, the post-secondary program works in close collaboration with the Centre for Higher Education Research and Development (CHERD), which is recognized internationally for its work in the area. Close collaboration is maintained as well with the University Teaching Services (UTS), which is directly involved in research and development in post-secondary teaching, learning and curriculum.

M.Ed. in Post-Secondary Studies

Admission

Admission requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*, the Post-Secondary Studies specialization admission application deadline dates are as follows:

For sessions starting	Canadian students	International students
January	October 1	July 2
May/July	February 1	November 1
September	June 1	March 1

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. The M.Ed. in Post-secondary Studies has a Thesis-Based Route and a Course-Based Route. Completion of the Thesis-Based Route requires a minimum of 18 credit hours of coursework and a thesis. Completion of the Course-Based Route requires 30 credit hours of coursework including the capstone course.

M.Ed. programs have a maximum completion time of six years from the date of first registration.

Second Language Reading Requirement: None

Expected Time to Graduate: 3 - 4 years for part-time students

Program by Coursework and Thesis

- A minimum of 18 credit hours of coursework. At least 12 credit hours must be at the 700 level or equivalent. The remaining 6 credit hours may be at the 500 level or above, in the Faculty of Education and/or at the 300 level or above in other faculties.
- As part of their coursework, students must take 3 credit hours of research methodology at the 700 level in Education or 300 level or above in other faculties
- Thesis.
- The program advisor is not necessarily the thesis advisor of students who choose to take this program. Students who have chosen to follow the thesis-based route should contact the division director to identify a faculty member with expertise in the proposed specialization and who is available to supervise their thesis.

Program by Coursework (Course-Based)

- A minimum of 30 credit hours of coursework including capstone course 129.744. At least 18 credit hours must be at the 700 level or equivalent. The remaining 12 credit hours may be at the 500 level, or above, in the Faculty of Education and/or at the 300 level or above in other faculties.

Specific course requirements are as follows:

- Required courses: 129.540, 129.708, 129.709, 129.745, 129.580.
- Course based students are also required to take 129.744 and 12 credit hours of electives. The electives may be chosen from other faculties and from other universities, in particular those within the Western Deans' Agreement and distance education courses.

NOTE: 129.708 and 129.709 are offered is special sections for post-secondary educators.

Course Descriptions

Courses are offered on rotation and not all courses are offered every year. The graduate course offering rotation schedule is posted at Website: www.umanitoba.ca/education

129.744 Seminar in Post-Secondary Education (3) A consideration of the nature of post-secondary education and of fundamental issues in the development of systems of post-secondary education. Special attention will be given to issues of philosophy, curriculum, clientele, organization and governance. Students may not hold credit for both 129.744 and the former 116.721.

129.745 Seminar in Post-Secondary Instruction (3) Intensive study and research in selected topics in post-secondary instruction. Students may not hold credit for both 129.745 and the former 116.730.

18.4 Ph.D. Program

Head and Graduate Chair: Z.M. Lutfiyya
General Office: 230 Education Building
Telephone: (204) 474 9004
Fax: (204) 474 7551
E-mail: Education@umanitoba.ca
Website: www.umanitoba.ca/education

Academic Staff

Adjunct Professor

Stevens, W.M., B.A. (Texas A. & M.), M.Th. (Southern Methodist), S.T.M. (Union Theological Seminary), Ph.D. (Emory).

Currently, the faculty offers specific programs of studies in educational administration, language and literacy, mathematics education, and science education.

Fields of Research

Equity and education; school reform and school improvement; reading and language arts curriculum; classical reading; reading processes; clinical reading; language and literacy development; emergent literacy; middle school education; viewing and representing; language for learning; reading and response to literature; rhetoric and composition; post-secondary teaching and learning; curriculum reform; professional development and leadership; assessment and evaluation; learning and understanding; motivation; teacher education; social and sociological factors; clarifying the role of contextual teaching in science and developing large context problems for the science classroom; investigating the uses of history in the science classroom from early years to senior years: the role of historical vignettes, case studies, confrontations, and the place of themes or the "big ideas" of science; using the locally established LEP (Logic-Evidence-Psychology) conceptual development model in the classroom; describing the interface problem between high school science and first year university science; writing stories and developing dramatic settings for the teaching of science; outlining the relationship between humanistic education and science education; investigating what contemporary cognitive theories say about the nature of the learner and science education; examining the nature of science and its place in teaching toward scientific literacy; the road from a scientifically literate society to a scientific culture; integrating the history and philosophy of science, science teaching, and the conceptual development of scientific models; investigating the relationship between science and mathematics education; ongoing collaboration with the Deutches Museum in Munich Germany; classroom research in early years and senior years science education: contextual teaching

Ph.D. in Education

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*, students must possess:

- A minimum Grade Point Average of 3.0 in the last 60 credit hours;

An appropriate academic background as defined by the program area to which admission is being sought;

- Appropriate research capability as evidenced by a: thesis from a recognized institution; major research paper equivalent to a thesis from a recognized institution; independently completed research article published in a refereed journal; or a research product equivalent to one of the categories above; and appropriate occupational experience in educational settings as evidenced by: teaching in schools or non-school settings; post-secondary

teaching; practice in school counselling; psychology, or a similar helping profession; educational administration; administrative experience in a government department; or experience equivalent to one of the five categories above.

• Admission to the Ph.D. in Education program is competitive. A combination of factors are taken into account in arriving at an admission decision: the applicant's previous academic background; the referees' assessments of the applicant; the ability of the faculty to provide the program of studies and research requested by the applicant; and, the availability of a faculty member competent and willing to supervise the program of studies and research of the applicant.

The application deadline date for the Ph.D. in Education program is January 15, for admission in the following September.

Program Requirements

In addition to the minimum course requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*, students must complete a minimum of 24 credit hours of coursework.

Second Language Reading Requirement: None
Expected Time to Graduate: 3 to 4 years for full-time studies

Course Descriptions

The graduate course offering rotation schedule is posted at Website: www.umanitoba.ca/education

124.703 Doctoral Tutorial in Education (3) Directed independent study relevant to a student's area of doctoral specialization. *Prerequisite: 069.801 Candidacy Examination.*

124.704 Current Issues in Mathematics Education (6) Investigation of topics of current theoretical and practical significance in mathematics education. Students will be required to complete a series of explorations, typically involving observation or experimentation in the field, which will be the focus of discussion.

124.705 Doctoral Study in Education (3) Directed study of contemporary research and theory in selected areas within the field of education. The content of this course will vary from year to year and will depend upon students' research interests.

124.706 Advanced Seminar in Educational Administration 1 (3) A study of alternative conceptions of educational administration, from its origins as a field to the present. Attention will be given both to historical and contemporary theories of administration. Limited to Ph.D. students and compulsory for Ph.D. students with a focus in educational administration.

124.707 Advanced Seminar in Educational Administration 2 (3) A consideration of some of the central problems of contemporary social theory and their relationship to the study and practice of educational administration. The course is limited to Ph.D. students and is compulsory for Ph.D. students with a focus in educational administration. *Pre- or corequisite*: 124.706

124.708 Language and Rhetoric Education (3) Current theories of language with a particular emphasis on concepts of education as discourse and instruction as a rhetorical activity. *Prerequisite*: admission into the Ph.D. program in Language and Literacy Education.

124.709 Language Arts Curriculum (3) How current research, scholarship and theorizing in the areas of language, literature and curriculum studies can assist in developing fresh approaches to reconceiving the nature and purpose of the language arts curriculum as a linguistic, political and cultural enterprise. *Prerequisite*: admission into the Ph.D. program in Language and Literacy Education.

124.710 Reading Education (3) Current trends, curricular issues and new concerns in reading education including the continuing tension between traditional and progressive ideologies. Identifies, from a historical perspective, what has changed, what has not and why; reflects on what is known and what to study; and sets a research agenda for the study of literacy. *Prerequisite*: admission into the Ph.D. program in Language and Literacy Education.

124.711 Doctoral Seminar in Science Education (3) Exploration of current research, scholarship and thinking in science education as exemplified by key themes and current issues related to science and science education. *Prerequisite*: admission into the Ph.D. program in Science Education.

124.712 Current Issues in Science Education (3) Examination of current issues in science education by way of selected topics tailored to individual students' programs and interests. *Prerequisite*: admission into the Ph.D. program in Science Education.

124.713 Language and Identity in Second Language Contexts (3) An exploration of linguistics and cultural issues arising from the internationalization of English as a second language (ESL) teaching and learning, including current research on linguistic imperialism, linguistic human rights, cultural hybridization, sexual politics, and the feminization of speech. Prerequisite: 132.721 or permission of instructor.

18.5 Collège Universitaire de Saint-Boniface

Head and Graduate Chair: Richard R. Benoit
General Office: 200, de la Cathédrale Avenue
Telephone: (204) 233 0210
Fax: (204) 233 0217
E-mail: rbenoit@ustboniface.mb.ca
Website: www.ustboniface.mb.ca

Program Information

The program focuses on one of three major areas of study, namely: Curriculum, Psychology and Research, and Administration and Foundations. Some courses are the French equivalent of the courses offered at the Faculty of Education, University of Manitoba. Many courses are specific to French education in the Province of Manitoba.

Contact the department for information on this program of study.

SECTION 19: Electrical and Computer Engineering

Head: R.W. Menzies
General Office: 504 Engineering
Telephone: (204) 474 9603
Fax: (204) 261 4639
E-mail: enquiries@ee.umanitoba.ca
Website: www.ee.umanitoba.ca

Academic Staff

Distinguished Professors

Card, H.C., B.Sc. (E.E.), M.Sc. (Manitoba), Ph.D. (Manchester), P.Eng.; **Shafai**, L., B.E.Sc. (Tehran), M.A.Sc., Ph.D. (Toronto), F.I.E.E.E., P.Eng.

Dean Emeritus

Kuffel, E., B.Sc., M.Sc., Ph.D. (E.E.) (Dublin), D.Sc. (E.E.) (Manchester), PEng.

Professors Emeriti

Bridges, E., M.Sc. (E.E.) (Manitoba), P.Eng.; **Kao**, K.C., B.Sc.(E.E.) (Nanking), M.Sc. (Michigan), Ph.D., D.Sc. (Birmingham), F.Inst.P., F.I.E.E., C.Eng., P.Eng.; **Martens**, G.O., B.Sc.(E.E.) (Manitoba), M.A.Sc. (Toronto), Ph.D. (Illinois), P.Eng.; **Swift**, G.W., M.Sc.(E.E.) (Alberta), Ph.D. (Illinois Institute of Technology), P.Eng.; **Tarnawecky**, M.Z., M.Sc. (E.E.) (Manitoba), P.Eng.; **Wexler**, A., B.Sc.(E.E.) (Manitoba), Ph.D., D.I.C. (London) F.R.S.A., P.Eng.

Professors

Alfa, A.S. B.Eng. (Ahmadu Bello), M.Sc. (Manitoba), Ph.D. (New South Wales); **Bridges**, G.E.J., B.Sc.(E.E.), M.Sc., Ph.D. (Manitoba), P.Eng.; **Ciric**, I.M.R., B.Sc., Dipl.Ing., Ph.D., Dr.Ing. (Bucharest), F.I.E.E.E.; **Gole**, A.M., B.Tech. (Bombay), M.Sc.(EE), Ph.D. (Manitoba), PEng.; **Kinsner**, W., M.Sc. (Wroclaw-Breslau), Ph.D. (McMaster), P.Eng.; **Lehn**, W.H., B.Sc.(E.P.) (Manitoba), M.Sc.(E.E.) (M.I.T.), P.Eng.; **McLeod**, R.D., B.Sc. (E.E.), M.Sc., Ph.D. (Manitoba); **Menzies**, R.W., B.Sc.(E.E.) (Hons.) (McMaster), Ph.D. (St. Andrews), P.Eng.; **Onyshko**, S., M.Sc. (Alberta), Ph.D. (Washington), P.Eng.; **Pawlak**, M., M.S. (Control and Comp Eng.), Ph.D. (Comp Eng.) (Wroclaw); **Raghuveer**, M.R., B.Sc.(Hons.) (Delhi), B.Eng. (Indian Inst. Sci.), M.Sc. (Manitoba), Ph.D. (Windsor), PEng.; **Shwedyk**, E., M.Sc.(E.E.) (Manitoba), Ph.D. (New Brunswick), P.Eng.; **Thomson**, D.J., B.Sc.(E.E.), M.Sc. (Manitoba), Ph.D. (Stanford).

Associate Professors

Annakkage, U., B.Sc. (Moratuwa), M.Sc., Ph.D. (Manchester IST); **Buchanan,** D.A., B.Sc., M.Sc. (Manitoba), Ph.D. (Durham); **LoVetri**, J., B.Sc., M.Sc. (Manitoba), Ph.D. (Ottawa); **Peters**, J.F., B.A. (California), M.S. (Santa Clara), Ph.D. (Kansas).

Assistant Professors

Ferens, K., B.Sc.(E.E.), M.Sc., Ph.D. (Manitoba); **Hossain**, A.E., B.Sc., M.Sc., (Buett), Ph.D. (Victoria); **McNeil**, D., B.Sc., M.Sc., Ph.D. (Manitoba); **Moussavi**, Z., B.Sc. (Sharif U.), M.Sc. (Calgary), Ph.D. (Manitoba); **Shafai**, C., B.Sc.(E.E.), M.Sc. (Manitoba), Ph.D. (Alberta); **Thomas**, G. B.S.E.E.

(IETSM, Mexico), M.Sc., Ph.D. (El Paso); **Yanampath**, P., B.Sc. (Moratuwa, M.Sc. (Trondheim), Ph.D. (Manitoba).

Adjunct Professors

Antar, Y.M.M., B.Sc. (Alexandria), M.Sc., Ph.D. (Manitoba); **Barakat**, M.A., B.Sc. (Alexandria), M.Sc., Ph.D. (Manitoba), P.Eng.; **Baumgartner**, R., M.Sc. (Slovak Technical University), Ph.D (Technology Vienna); **Bowman**, C.S., B.Sc.(Hons.), M.Sc. (Manitoba), Ph.D. (Arizona); **Chapman**, D.G., B.Sc. (Manitoba), Ph.D. (London), P.Eng; **Cuhadar**, A., B.Sc., M.Sc. (METU), Ph.D. (Essex); **Gordon**, R., B.Sc., M.Sc. (Chicago), Ph.D. (Oregon); **Ittipiboon**, A., B.Sc.(E.E.) (Hons.) (Khon Kaen), M.Sc., Ph.D. (Manitoba), PEng.; **Liao**, S.X., B.Sc. (Beijing); M.Sc., Ph.D. (Manitoba); **Maguire**, T.L., B.Sc., M.Sc., Ph.D. (Manitoba); **Maheswaran**, M., B.Sc. (Peradenlya), M.Sc., Ph.D. (Purdue); **McLaren**, P.G., B.Sc.(E.E.) (St. Andrew's), Ph.D. (Dundee), F.I.E.E.E., PEng.; **Pedrycz**, W., B.Sc.. Ph.D., Dr.P. (Silesian Technical University); **Pizzi**, N., B.Sc.(Hons.), M.A., Ph.D (Manitoba); **Rashwan**, M., B.Sc. (Alexandria), M.Sc., Ph.D. (Manitoba); **Remy**, F., B.Eng. (Technology Compiegne, France), M.Sc., Ph.D. (Paris XI, France); **Rueda**, J.A., B.Sc. (Nuevo Leon), M.Sc., Ph.D. (Manitoba); **Sebak**, A., B.Eng. (Cairo), B.Sc. (Shams, Egypt), M.Eng., Ph.D. (Manitoba), P.Eng.; **Simons**, N., B.Sc(EE), M.Sc., Ph.D. (Manitoba); **Sivaramakrishna**, R., B.Sc. (Madras, India), M.E. (Indian Institute of Science), Ph.D. (Manitoba); **Thulasiraman**, P., B.Eng., M.A.Sc. (Concordia), Ph.D. (McGill); **Turanli**, H., B.Sc., M.Sc. (METU, Turkey), Ph.D. (Manitoba); **Wedepohl**, M., B.Sc. (Witwatersrand, South Africa), Ph.D. (Victoria, Manchester); **Woodford**, D.A., M.Sc. (Manitoba), Assoc. Dip.of EE (Melbourne), PEng.; **Zhao**, Q., B.Sc. E.E. (NEU, China), Ph.D. (Western Ontario); **Ziomek**, W., M.Sc., Ph.D. (Poznan, Poland).

Program Information

The department offers programs leading to the Master of Engineering, Master of Science, and Doctor of Philosophy. The department has well equipped research and teaching laboratories. Students may select either a specialized research-oriented activity, an interdisciplinary program, or collaboration with industry or research centres in Canada.

Fields of Research

The areas of research in the department which are internationally recognized include: applied electromagnetics; atmospheric optics; biomedical engineering; communications engineering; computer architecture and software systems; microelectronics; power apparatus and systems; signal processing; and systems engineering.

Research Facilities

The Applied Electromagnetics Laboratories has two anechoic chambers in the frequency range of 500 MHz to 50 GHz for antenna research. The larger one is equipped with an automated data acquisition and compact range measurement system; the smaller one has a near-field scanning system. In addition, to the anechoic chambers, there is an outdoor antenna measurement range, which is equipped for testing large antenna units. The microwave area has two laboratories for high frequency circuit design and measurements research. The measurement laboratory has a Wiltron 360 network analyzer for measurements up to 65 GHz.

The Biomedical Engineering Laboratory includes image acquisition/processing stations, a fully instrumented 3-dimensional human movement lab including EMG acquisition and analysis. A number of facilities are shared with researchers in the Department of Mechanical Engineering. The Department of Radiology maintains a breeding colony of a species of salamander, the axolotl Ambystoma mexicanum. These are being used to analyze the mechanical and electrical components of the development of axolotl embryos, which provide a good model system for normal development and major birth defects in humans. Equipment for computer controlled time-lapse microscopy is being assembled.

Software Systems is an area that represents a strong research program in the Department. The VLSI laboratory is an important component of the research program in Computer Engineering, as well as supporting research areas in Electrical Engineering such as electronics, signal processing and communications. The laboratory includes a network of Sparc workstations for research and education. The laboratory has access to the fabrication of chip designs, via the Canadian Microelectronics Corporation. The current implementation technologies are full-custom CMOS, FPGAs, and integrated sensors. Software CAD packages available include CADENCE, simulators for Neural Networks and many standard university programs such as circuit and logic simulators. There are also facilities for experimental work with mobile robots.

The Computational Intelligence (CI) Laboratory has a collection of robots (two Kheperas, and a number of individual hexapod and tractor robots). In addition, the CI Laboratory has two Sun workstations, three Pentium workstations, two PowerPC workstations and two printers. Research is carried out in the design of intelligent systems (both hardware and software), data acquisition and classification of data using a number of technologies commonly associated with computational intelligence; namely, fuzzy measure theory, fuzzy sets, fuzzy Petri nets, granular computing, neural networks and, especially, rough neural networks, rough Petri nets, and rough sets. Research in software and hardware system design and measurement using CI technologies is aided by a number of tools such as Rosetta, Rough Set Exploration System (RSES), DesignCPN, and Matlab.

The Power Systems and Machine Laboratories are well equipped with several workstations, a real time digital power system simulator (developed at the HVDC Research Centre), a large variable frequency supply, and several well instrumented machine sets. Facilities for developing DSP-based controllers and protection devices are available.

The McMath High Voltage Power Transmission Research Laboratory is the largest of its kind amongst Canadian universities and is equipped with generating and measuring apparatus, including digital data acquisition systems for research on insulation, HV phenomena and diagnostics.

The Data and Signal Compression Laboratory has dedicated and network computers, a high resolution scanner, a video capture facility, a digital camera, a CD-ROM mastering system, and an FPGA development facility. It also has access to a large ATM facility for research.

The Microprobe and Microfabrication Laboratory is a well-equipped laboratory with three faculty members. Topics of interest include scanning probe microscopy, micromachining and microfabrication, semiconductor manufacturing, and high frequency microelectronics and microwave circuit testing. Probe microscopy systems include tunnelling (STM), ultra high vacuum STM, atomic force (AFM), resistive (SRM), capacitive (SCM), and dynamic electrostatic force microscopes used for in situ IC testing. CAD platforms include four SUN Ultra workstations, two Pentium III computers, and G3 and G4 Macintosh computers. CAD tools used are Cadence, L-EDIT and MEMSPro for IC design, and Libra, Spice, Ensemble and HFSS for high frequency modelling. RF test equipment includes 50 GHz sampling scopes, a 6 GHz Network Analyser and on-wafer probing facilities. Microfabrication capabilities include a cleanroom, thermal evaporation, 3 inch mask aligner, wet etching, oxidation furnaces, electroplating, UHV system, and an inspection microscope. Equipment to be added in the years 2000-2001 includes a 1000 sq. foot cleanroom, 6 inch two-sided mask aligner, ICP plasma etching, XeF2 etching, RF sputtering, E-beam evaporation, Alpha-Step surface profiler, 50 GHz millimeter wave probe station, and a wafer saw.

Computing facilities: The department has substantial computing facilities used for research. These include a network of over 67 SUN and HP workstations and six undergraduate laboratories with a total of 84 Pentium computers. A large number of microcomputers are also distributed throughout the department's research laboratories. These computers, as well as those of individual researchers, are networked by Ethernet.

M.Sc. in Electrical and Computer Engineering

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, a student must normally hold a B.Sc. degree in Electrical or Computer Engineering (or its equivalent) from a recognized university.

Application Deadlines

Potential M.Sc. students should complete the online pre-application form, (*www.ee.umanitoba.ca/admissions/preapplication.html)* prior to making a formal application to the Department. Canadian/U.S. students, if invited by the Department to submit a formal application, should submit their application and supporting documentation to the Department at least four months prior to their intended start date. International students, if invited by the Department to submit a formal application, should submit their application and supporting documentation to the Department at least 8 months prior to their intended start date.

Program Requirements

In keeping with the minimum course requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, the M.Sc. program in Electrical and Computer Engineering requires

a minimum of 18 credit hours of advisor-approved course work as follows: a minimum of 12 credit hours at or above the 700 level; and 6 credit hours at or above the 300 level from other departments or 400 level elective courses from this department. **At least 12 of the 18 credit hours must be from this Department.**

An M.Sc. thesis, which is based on research work normally carried out at this university, is required. All full-time M.Sc. students are also required to present a paper, at least once during their program, at the Department's annual graduate student conference, as outlined at the website www.ee.umanitoba.ca/~gradcon.

For complete supplemental regulations on the M.Sc. program in Electrical and Computer Engineering, see website: www.ee.umanitoba.ca.

Second language reading requirement: none
Expected time to graduation: two years

M.Eng. in Electrical and Computer Engineering

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, a student must normally hold a B.Sc. degree in Electrical or Computer Engineering (or its equivalent) from a recognized university.

Application Deadlines

Potential M.Eng. students should complete the online pre-application form *(www.ee.umanitoba.ca/admissions/preapplication.html)* prior to making a formal application to the department. Canadian/U.S. students, if invited to submit a formal application by the department, should submit their application and supporting documentation to the Department at least four months prior to their intended start date. International students, if invited to submit a formal application by the department, should submit their application and supporting documentation to the Department at least 8 months prior to their intended start date.

Program Requirements

This program is meant to satisfy the particular needs of students and practising engineers wishing to extend their studies on a broad basis of coursework and an engineering project.

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. The M.Eng. program in Electrical and Computer Engineering requires a minimum of 24 credit hours of advisor-approved course work as follows: a minimum of nine credit hours at or above the 700 level from this department, a maximum of nine credit hours of elective courses from this department at or above the 400 level and a maximum of 12 credit hours from other departments at or above the 300 level. In exceptional cases, the student may be allowed to take 200 level courses from other departments if pre-approved by the student's advisor.

In addition, the student is required to complete an advisor-approved engineering project and proposal. The effort involved in this project should be at least the equivalent of six credit hours of coursework.

For complete supplemental regulations on the M.Eng. program in Electrical and Computer Engineering, refer to the website www.ee.umanitoba.ca

Second language reading requirement: none
Expected time to graduation: two years

Ph.D. in Electrical and Computer Engineering

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, a student must normally hold a Master of Science degree in Electrical or Computer Engineering from a recognized university. Provisional acceptance of students nearing completion of the M.Sc. degree in Electrical or Computer Engineering may be considered.

Application Deadlines

Potential Ph.D. students should complete the online pre-application form *(www.ee.umanitoba.ca/admissions/preapplication.html)* prior to making a formal application to the department. Canadian/U.S. students, if invited to submit a formal application by the department, should submit their application and supporting documentation to the Department at least four months prior to their intended start date. International students, if invited to submit a formal application by the department, should submit their application and supporting documentation to the Department at least 8 months prior to their intended start date.

In exceptional cases, a transfer into the Ph.D. program from the M.Sc. program may be recommended for students holding a B.Sc. degree in Electrical or Computer Engineering, provided the following three conditions are met: the transfer occurs within 12 months of initial registration in the M.Sc. program; the student has successfully completed at least nine credit hours of approved course work at or above the 700 level, **all** from this Department; and the transfer is recommended by the departmental Graduate Studies Committee. In this case, the time spent in the Master's program will normally be counted as time in the Ph.D. program.

If preliminary admission into a Master's program is being recommended by the advisor with the intention of reviewing the student's status for possible upgrading to a Ph.D. admission, then this must be indicated on the application form at the time of admission. Otherwise, the student will be required to pay both M.Sc. and Ph.D. program fees.

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar. The Ph.D. program in Electrical and Computer Engineering depends on student classification as follows:

- For students who hold an M.Sc. degree in electrical and Computing Engineering and have been admitted directly into the Ph.D. program, a minimum of 12 credit hours of advisory committee approved course work is required at or above the 700 level. **At least 9 of the 12 credit hours must be from this Department.**
- For students who hold a B.Sc. degree in Electrical or Computer Engineering and who are recommended for transfer into the Ph.D. program from the M.Sc. program in Electrical and Computer Engineering at this university, a minimum of 24 credit hours of advisory committee-approved course work is required, of which 18 credit hours must be at or above the 700 level and the balance of 6 credit hours must be at or above the 300 level from other departments or 400 level elective courses from this department. **At least 15 of the 24 credit hours must be from this Department.** Credit will be given for approved course work completed at the M.Sc. level.
- For all other categories of students, a minimum of 18 credit hours of advisory committee-approved course work is required, of which 12 credit hours must be at or above the 700 level and the balance of 6 credit hours must be at or above the 300 level from other departments or 400 level elective courses from this department. **At least 12 of the 18 credit hours must be from this Department.**

A Ph.D. thesis, which is based on research work normally carried out at this university, is required. All full-time Ph.D. students are also required to present a paper every year during their program at the department's annual graduate student conference, as outlined at the website: www.ee.umanitoba.ca/~gradcon

For complete supplemental regulations on the Ph.D. program in Electrical and Computer Engineering, refer to the website www.ee.umanitoba.ca

Second language reading requirement: none
Expected time to graduation: 3.5 years

Course Descriptions

For the list of courses being offered in the current year, refer to the department website at www.ee.umanitoba.ca Below is a complete list of developed courses: not all courses are offered each year.

024.701 High Voltage Techniques and Insulation Design Criteria (3) Laboratory generation and measurement techniques related to ac and dc high voltages, conventional and steep front high voltage pulses, composite voltages and pulsed currents. Charge measurements. Test techniques for assessing insulation quality and life.

024.702 Power Transmission Lines: Phenomenon and Insulation Design (3) High voltage dc, ac and hybrid transmission line corona modes, electrostatic and ionized field calculations, field effects of overhead transmission lines. Surge propagation including corona effect. Transmission line insulation design to withstand normal/abnormal voltages and conditions. Modern and conventional arrestors. Principles and practice of insulation co-ordination.

024.704 Signal and Data Compression (3) The course presents the theory of signal and data compression with their applications in engineering, including lossless compression (Shannon-Fano, Huffman, arithmetic and dictionary) and lossy compression, including scalar and vector quantization. References to sub-band and transform coding (wavelets and fractal) and analysis-synthesis coding will be made.

024.705 Switching and Automata Theory (3) The course presents basic material in discrete mathematics and the theory of switching circuits. It provides electrical and computer engineering students with a firm basis in the modern theory of logic design, and illustrates some applications through formal characterization of combinational functions and sequential machines, using contemporary techniques for the automatic synthesis and diagnosis of digital systems.

024.706 Power System Protection (3) History and philosophy of power system protection; typical protection schemes; instrument transformers; protection hardware and application; hardware testing techniques; software models and their use in simulation studies.

024.718 Embedded Systems Engineering (3) A Structured approach to the design of modern digital systems is presented with specific emphasis on embedding computer applications. Topics will include the formal methodology of digital design together with selected topics from the current research literature.

024.719 Micromachining and MEMS Technology (3) The course focuses on micromachining and micro-electro-mechanical systems (MEMS). Topics include microfabrication technologies, microactuators, and microsensors. Applications to optical, electrical, mechanical, chemical, and biological systems are discussed.

024.720 Advanced Wireless Communication (3) The course covers several advanced issues in wireless communication networks. Topics of study will include trends and future of mobile computing, advanced wireless technologies, multimedia wireless LANs, wireless ad hoc networks, energy mgmt, channel coding, privacy issues in wireless networking. Prerequisite: Either 024.425 or 024.470.

024.721 Fractal and Chaos Engineering (3) This course presents the general theory of fractals and their applications in engineering, including fractal modelling of complex phenomena, such as dielectric discharges, and fractal image compression. It also relates fractals to chaos and dynamics.

024.722 Topics in VLSI Test and Fault Tolerance (3) Faults and fault models for VLSI. Test generation algorithms. Design for testability: scan design for sequential circuits; built-in test; testable PLA design. Totally self-checking logic. Fault tolerance in VLSI: yield and performance enhancement through redundancy. System level diagnosis: applications to VLSI processor arrays.

024.723 Artificial Neural Circuits and Networks (3) Examination of electronic neural networks and related computational systems, both from a circuit theory and from a system-theory perspective. Digital and analog VLSI implementations of neural systems are presented and compared. Connections with other systems from physics, biology and computer science are made.

024.724 Signal Theory (3) Representation and analysis of deterministic signals: Continuous and Discrete; Random processes and spectral analysis; Band-limited signals and systems.

024.725 Information Theory and Applications (3) Development of information theory and the engineering implications for the design of communication systems and other information handling systems.

024.727 Scattering and Diffraction of Electromagnetic Waves (6) Formulation and analysis of scattering problems by classical methods. Radar cross section of smooth bodies by geometrical and physical optics. Diffraction by edges. Impedance and Leontovitch boundary conditions.

024.728 Static Compensation in Power Systems (3) Requirements for Static Compensation in Power Systems. The thyristor controlled reactor (TCR) and thyristor switched capacitor (TSC). Advanced GTO thyristor compensators. Operation and control of compensators. Load Compensation, filter design and specifications.

024.731 Power System Transient Simulation (3) Methods of Network Equation Formulation; Modeling of network nonlinearities and transmission lines; Modeling of electrical machines and controls.

024.732 Sampled-Data Control Systems (3) Analysis and design of discrete-time systems, compensation to improve stability and performance, introduction to digital logic control. Note: Credit not to be held with 024.442.

024.733 Experimental Methods for Electronic Materials (3) Methods for growing and analyzing electronic materials. Growth will include chemical vapour deposition, diffusion, and plasma processing. Analysis will include capacitance, voltage and current voltage techniques.

024.737 Memory Devices and Systems (3) Review of computing system architectures. Memory structures and implementations: static, dynamic, synchronous, asynchronous, single and multiport. Testability of memories. Smart memories. Memories for VLSI: configurable and reconfigurable. Case study of a CMOS self-synchronizing RAM.

024.740 Neural Nets and Neurocomputing (3) Foundations of neural networks. Basic architecture and different structures. Associative networks. Mapping networks. Spatio-temporal networks. Learning and adaptability. Supervised and unsupervised learning. Stability. Adaptive resonance networks. Self-organization. Examples of existing systems. Applications.

024.741 Phased Array Antennas (3) Linear and Planar Arrays Theory; Pattern Synthesis Techniques, Analysis and Design of Radiating elements, Phase Shifters and Beam-Forming Network; Scanning Techniques; Effect of phase, amplitude and mechanical errors on Array Performance.

024.743 Experimental Methods of Microwave Engineering (3) Methods for determining: scattering parameters; insertion, mismatch and return loss; cavity parameters. Detector and mixer performance characteristics. Power measurement. System noise determination. Antenna radiation pattern and gain measurements.

024.744 Current Research Issues in Electrical Engineering (3) Presentation of important research developments in the area of Electrical Engineering, selected to complement other established graduate courses. Approval of the head of the department is required to register for this course.

024.745 High Frequency Integrated Circuit Design and Analysis (3) Monolithic microwave integrated circuit fabrication and circuit design techniques. Analysis and modeling of microwave passive components and GaAs active devices. High frequency circuit simulation techniques. Basic circuit examples.

024.746 Real time Process Engineering (3) Identification, description, and analysis of the behaviour of systems of real-time communicating processes, and the application of real-time process algebras in the design of hardware and software systems. *Prerequisite*: 074.343

024.749 Verification Tools (?) Study of automated reasoning systems useful in describing and reasoning about properties of hardware and software systems. Investigate mechanizations of process algebras, representations of communicating processes, time-critical process constructors, time-outs, communication constructs, sequential and parallel computation. *Prerequisite*: 074.343.

024.754 Selected Topics of Solid State Electronics (3) Homojunction and heterojunction phenomena; Gunn effect, organic semiconductors, properties of thin films, quantum electronic devices, space charge limited current devices, and newly developed solid state electronic devices.

024.759 Telecommunication Networking (3) This course will cover issues in the design and analysis of telecommunication networks and systems in terms of physical implementation, protocols, routing algorithms, management, software interfaces, and applications. Focus will be on high speed LAN, WAN and Telecommunication networks using a systems engineering perspective. *Prerequisites***:** although no prerequisites are required, either course 024.425 or 074.430 would be recommended.

024.760 System Protection (3) The fundamentals of fault detection for transmission lines, generators and buses, especially using digital microchip realizations.

024.765 Current Research in Computer Engineering (3) Presentation of important research developments in the area of Computer Engineering, selected to complement other established graduate courses in this area.

024.766 Logic Problem Solving (3) Introduction to declarative techniques in symbolic problem solving with emphasis on relational representations, query construction, and recursive formulations of knowledge structures in engineering.

024.767 Optimization Methods for Computer-aided Design (3) Constrained optimization of functions of several variables. Optimization methods suitable for the solution of engineering problems by modern digital computers. Both gradient and direct search methods are included.

024.768 Dielectric Properties and Phenomena (3) Elementary structure of matter, polarization, response of dielectrics to static and periodic fields, ionization and decay processes, electrical breakdown of gases, liquids, and solids.

024.770 Nonlinear Systems Analysis 1 (3) Introduction to nonlinear phenomena; linearization; state-space methods -- quantitative and qualitative; introduction to the principal methods of determining stability.

024.772 Optimal Control 1 (3) Introduction to optimal control systems; topics will include statement of the control problem, controllability, calculus of variations, Pontryagin's Maximum Principle, and design of optimal controls.

024.775 Physical Electronics 2 (3) Properties of materials. Semiconductors, junction phenomena; ferroelectrics, magnetic materials, superconductivity, optical processes, effects of radiation. *Prerequisite*: 024.360 and 024.419 or equivalent.

024.778 Microwave Circuits (3) Circuit properties of microwave transmission systems. Matrix representation and analysis of microwave networks, microwave junctions, resonators, and impedance matching networks.

024.781 Solution of Fields by Numerical Methods 1 (3) Numerical integration, differentiation. Finite-difference solutions of the Poisson, Laplace and Helmholtz equations. Initial-value problems. The eigen problem. Examples chosen from electromagnetic, thermal, fluid-flow, stress, and other fields.

024.792 Human Physiology for Engineers (3) The analysis and measurements of human physiological systems. Anatomical descriptions are limited to those required to support the functional analysis. Mathematical modeling is reinforced by analog and digital computer models.

024.799 HVDC Transmission 1 (3) Rectifier-inverter fundamentals. Compounding and regulation. Grid firing control systems. Reactive power requirements. Ground return and electrode design. Transmission lines. Economics and efficiency.

024.800 HVDC Transmission 2 (3) Protection. Harmonics: telephone interference. Corona: radio and television interference. Analytical methods. Conversion equipment, the use of solid devices. Selected topics from current literature. *Prerequisite*: 024.799.

024.805 Topics in Microelectronics (3) Equilibrium and non-equilibrium processes in semiconductors, properties of junctions and thin films, carrier transport phenomena, effects of traps, and selected topics pertinent to recent literature in microelectronics.

024.811 Digital Systems Design (3) Fixed-instruction-set microprocessor design; microprogramming, bit-slice based design; parallel processing and multiprocessing; applications to data acquisition, data logging, and data communications.

024.813 Statistical Communication Theory (3) Representations of random processes; signal detection and estimation techniques.

024.814 Digital Communications and Coding (3) Fundamentals of information theory; source and channel coding; digital modulation techniques.

024.815 Digital Signal Processing (3) Discrete-time linear system theory, digital filter design techniques, discrete Fourier transforms including FFT, discrete Hilbert transform, Walsh-Hadamard transforms high-speed convolution and correlation techniques.

024.819 Topics in Antenna Theory and Design (3) Antennas as a boundary value problem, antenna parameters, analysis and synthesis methods, antenna measure-

ments.

024.820 Advanced Engineering Electromagnetics (3) Solution of wave equation; special theorems and concepts, computer aided analysis.

024.821 Power Electronic Circuits (3) Thyristor properties, ac controllers, controlled rectifiers, dc to dc converters (choppers), and inverters. Permission of instructor required. Credit not to be held with 024.437.

024.822 Digital Image Processing (3) Digital representation of images. Two-dimensional operations and transforms. Image enhancement, restoration, and coding. Reconstruction from projections. *Prerequisite*: 024.358 or equivalent desirable.

024.823 Pattern Recognition and Scene Analysis (3) Supervised and unsupervised learning techniques. Linear discriminant analysis. Scene analysis methods.

024.824 Parallel Processing Architecture (3) Abstract parallel processing system (APPS), Flynn's classification, pipelining, crossbar switches, associative parallel processors, Bene's network, multistage interconnection networks (MIN), alternating sequential parallel processing.

024.827 Computer Communication Networks (3) Overview of existing computer networks. Elements of queueing theory. Error, delay, cost and capacity analysis. Fixed assignment schemes. Packet and switched networks. Random access. Satellite networks. Hybrid protocols.

024.828 Electromagnetic Field Modelling (3) Coulombian and amperian models for polarized media and magnetized media; uniqueness theorems, formulation and classical methods of analysis of static, stationary and quasistationary field problems; modelling of electromagnetic fields in the presence of moving solid conductors; elements of relativistic electrodynamics.

024.830 Computer Vision (3) This course is an extension of 024.822 "Digital Image Processing". Techniques of image modelling, segmentation, texture analysis, matching and inference will be studied.

024.831 Computer-Aided Design in Biomedical Engineering Not currently offered.

024.832 Advanced Topics in Power Systems (3) Study of selected topics of recent advances in electrical power systems.

024.836 VLSI Design Methodology (3) Design of custom and semi-custom Very Large Scale Integrated (VLSI) circuits and systems including design for testability. Static and dynamic VLSI circuits; software design tools, layout, logic and timing simulation. *Prerequisites*: 024.222, 024.424 or equivalent.

024.837 Topics in Biomedical Engineering (3) A discussion of current topics in biomedical engineering. The latest in instrumentation, procedures and practices relevant both to clinical engineering and ongoing research are covered. *Prerequisite*: 024.440 or consent of instructor.

024.840 Intelligent Systems (3) Continuation of 024.766 "Resolution Problem Solving", plan formation, default and temporal reasoning as applicable to engineering.

SECTION 20: English

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Academic Staff

Distinguished Professor Emeritus

Kroetsch, R.P., B.A. (Alberta), M.A. (Middlebury), Ph.D. (Iowa), F.R.S.C.

Professors Emeriti

Saunders, D.B., B.A., M.A. (Manitoba), M.Litt. (Oxford), L.L.D. (UBC); **Shields**, C., B.A. (Hanover), M.A. (Ottawa), D.U. (Honorary; Ottawa); **Teunissen**, J. J., B.A. (Hons.), M.A. (Saskatchewan), Ph.D. (Rochester).

Senior Scholars

Amabile, G.N., A.B. (Amherst), M.A. (Minnesota), Ph.D. (Connecticut); **Hoople**, R.P., B.A., M.A. (Syracuse), Ph.D. (Minnesota); **Weil**, H.S., B.A. (Tulane), M.A., Ph.D. (Stanford); **Weil**, J.R., B.A. (Middlebury), M.A., Ph.D. (Stanford).

Professors

Arnason, D.E., B.A., Cert.Ed., M.A. (Manitoba), Ph.D. (New Brunswick); **Cooley**, D.O., B.Ed., B.A. (Hons.), M.A. (Saskatchewan), Ph.D. (Rochester); **de Toro**, F., B.A., M.A. (Carleton), Ph.D. (Toronto), (Montreal); **Finnegan**, R.E., B.A. (St. Peter's), M.A., Ph.D. (Notre Dame); **Johnson**, C.G., B.A., M.A. (UBC), Ph.D. (Leeds); **O'Kell**, R.P., B.A. (Hons.) (Carleton), A.M., Cert.Vict.Studies, Ph.D. (Indiana); **Snyder**, W.S., B.A.O., M.A. (Idaho), Ph.D. (Florida); **Toles**, G.E., B.A. (New York), M.A., Ph.D. (Virginia); **Walz**, E.P., B.A. (St. John Fisher), M.A. (Indiana), Ph.D. (Massachusetts); **Williams**, D.L., B.A.(Hons.) (Saskatchewan), M.A., Ph.D. (Massachusetts).

Associate Professors

Lenoski, D.S., B.A. (Hons.), M.A. (Manitoba), Ph.D. (Queen's); **Ogden**, J.T., A.B. (Princeton), M.A.T. (Johns Hopkins), Ph.D. (Illinois); **Perkins**, P., B.A. (Utah); M.A., Ph.D. (Dalhousie); **Rempel**, W.J., B.A. (UBC), Ph.D. (Texas); **Young**, A.D., B.A., M.A. (Manitoba), M.A., Ph.D. (Cornell).

Assistant Professors

Austin-Smith, B.L., B.A. (Acadia), M.A. (Victoria), Ph.D. (Manitoba); **Calder**, A.C., B.A. (Saskatchewan), M.A., Ph.D. (Western Ontario); **Cariou**, W., B.A. (Hons.) (Saskatchewan), M.A., Ph.D. (Toronto); **Clark**, G., B.A. (UBC), M.A., Ph.D. (Chicago); **Kerr**, W.R., B.A. (Saskatchewan), M.A. (Toronto), Ph.D. (Alberta); **Libin**, M.I., B.A. (Calgary), M.A. (Toronto), Ph.D. (Manitoba); **Medoro**, D., B.A. (Toronto), M.A. (Queen's), B.Ed. (Western Ontario), Ph.D. (Queen's); **Groome**, M., B.A., M.A., Ph.D. (McGill); **Muller**, A., B.A. (Calgary), M.A. (Alberta), Ph.D. (McGill); **Owens**, J.M.C., B.A., M.A., Ph.D., (Manitoba); **Warne**, V.K., B.A., M.A., Ph.D. (Queen's).

Adjunct Professors

Bucknell, B., B.A., M.A. (Alberta), Ph.D. (Toronto).

Program Information

As a moderate-sized department, English is able to offer M.A. and Ph.D. programs covering a wide range of periods, genres, media, and theoretical approaches. Both scholarly and creative thesis options are offered for the M.A. In addition to teaching (at all levels), publishing, writing, editing, advertising, arts management, acting and entertainment, English graduates have worked in small businesses, corporations, government, the foreign service, research and development, public relations, fund-raising, filmmaking, the National Film Board, and many other areas.

One of the major strengths of the faculty is its commitment to teaching excellence, with three of its current members having been honoured with the University's highest teaching award, and several others having been honoured with Merit Awards, Graduate Teaching Awards, and UMSU Certificates of Teaching Excellence. In keeping with this record, graduate student teachers have also won a majority of the Teaching Excellence Awards offered by the Faculty of Arts since 1994.

Fields of Research

Students are welcome to consider all areas of literary specialization: Canadian literature, American literature, prairie literature, 20th-century literature, 19th-century literature, 18th-century literature, Milton, medieval literature, film, drama, theatre, post-colonial literature and theory, modern and post-modern literature, literary and critical theory, cultural and media studies, women's writing, and creative writing.

Research Facilities

University of Manitoba Libraries have extensive holdings in literature, film studies, and theatre. The Libraries provide access to both local and remote databases. Of note are the University of Manitoba Department of Archives and Special Collections and St. John's College Library. The Department of Archives and Special Collections has an extensive holding in Canadian literature. It is particularly good in Canadian prairie literature, the Archives' holdings including a large and growing collection of prairie literary manuscripts.

The Canadian Literature Archive, a project of the Department of English, is an internet site which serves as a repository for information about Canadian writers, novelists, poets, playwrights, essayists, Canadian literary organizations, magazines, publications, texts, and library archives. The Archive has been online since 1994.

Students are invited to join the Association of Graduate English Students (AGES). The association, which has recently been dramatically reanimated, organizes student publications, graduate colloquia, and other events. The department also operates a media lab and provides a reading room for student and faculty use.

M.A. in English

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this Calendar. Students with

other degrees or backgrounds may be eligible for admission to a pre-Master's program to the satisfaction of the department. Contact the English Department for further information.

Application Deadlines

Applications of Canadian/U.S. students are to be received in the Department of English, complete with all supporting documentation, by January 5th. International students should submit their applications to the Department of English, complete with all supporting documentation, by November 1st.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar. Requirements for the M.A. degree in English include either a thesis and 18 credit hours of course work, 12 credit hours of which should normally be graduate English seminars, or a major paper and 30 credit hours of course work. To students not proceeding to the Ph.D., a creative thesis option is available, in which the thesis takes the form of poetry, fiction, or a play.

Second language reading requirement: Yes
Expected time to graduate: 2 years

Ph.D. in English

Admission

In addition to the minimum admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, applicants must normally hold an M.A. degree in English with a GPA of at least 3.5 in their work at the M.A. level.

Application Deadlines

Applications of Canadian/U.S. students are to be received in the Department of English, complete with all supporting documentation, by January 5th. International students should submit their applications to the Department of English, complete with all supporting documentation, by November 1st.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar. The first year of full-time Ph.D. study will normally include 18 credit hours, at least 12 credit hours of which should be graduate seminars in English literature. This program of studies will be arranged in consultation with the student's advisory committee. The student will have an exploratory conference with the chair and at least two other members of the Graduate Studies Committee not later than one week before classes to assess the student's strengths and weaknesses and to advise the student if further preparation is necessary.

Candidacy examinations, consisting of a paper on the student's period of specialization and a paper on the research area, will normally be written in the second year of Ph.D. study. Each paper will be followed by a one-hour oral examination.

Second language requirement: yes
Expected time to graduation: 4 years

Course Descriptions

004.701	Reading for Thesis	6
004.712	Drama	6
004.713	Novel	6
004.718	Studies in Old English Poetry	6
004.720	English Literature of the Twelfth and Thirteenth Centuries	6
004.721	Middle English Romance Literature	6
004.722	Spenser	6
004.723	Studies in Shakespeare	6
004.724	Studies in Renaissance Humanism	6
004.726	Studies in Renaissance Prose	6
004.727	Studies in Major Seventeeth-Century Writers	6
004.728	Studies in the Eighteenth-Century Novel	6
004.732	The Johnson Circle	6
004.733	Origins of Romanticism	6
004.734	Studies in the Literature of Romanticism	6
004.735	Studies in Victorian Poetry	6
004.736	Studies in Victorian Prose	6
004.737	Studies in Early Twentieth-Century Literature	6
004.738	Studies in Later Twentieth-Century Literature	6
004.739	Studies in Early American Literature	6
004.740	Studies in American Romanticism	6
004.741	Studies in American Realist and Naturalist Literature	6
004.744	Studies in Modern American Prose	6
004.745	Canadian Poetry since Confederation	6
004.746	Studies in the Canadian Novel	6
004.747	The Experimental Novel	6
004.748	Restoration and Eighteenth-Century Drama	6
004.750	The Comic Spirit in English Literature	6
004.751	The Concept of Tragedy in English Literature	6
004.752	Studies in English Critical Theory	6
004.753	Milton	6
004.754	Special Topics	6
004.755	Expressionism and the Absurd in Modern Drama	6
004.756	The Lyric	6
004.757	Canadian Letters Between Two Wars (1920-40)	6
004.758	Studies in American Poetry	6
004.759	Teaching Literature at University	0
004.760	Bibliography	3
004.761	Nondramatic Elizabethan Literature	6
004.762	Victorian Prose Fiction	6
004.763	Studies in Modern Anglo-Irish Literature	6
004.764	Literature of the Late Seventeenth and Early Eighteenth Centuries	6
004.767	Myths and Literature	3
004.769	Special Topics in Literary Periods 1	3
004.770	Special Topics in Literary Periods 2	3
004.771	Special Topics in Literary Genres 1	3
004.772	Special Topics in Literary Genres 2	3
004.773	Special Topics in Critical Theory and Practice 1	3
004.774	Special Topics in Critical Theory and Practice 2	3
004.775	Directed Reading 1	3
004.776	Directed Reading 2	3

SECTION 21: Entomology

Head: N.J. Holliday
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Academic Staff

Professors Emeriti

Brust, R.A., B.S.A., M.Sc. (Manitoba), Ph.D. (Illinois); **Jay**, S.C., B.A. (McMaster), B.S.A. (Manitoba), M.S.A. (Toronto), Ph.D. (London).

Senior Scholar

MacKay, P.A., B.Sc., M.Sc. (Toronto), Ph.D. (UBC)

Professors

Galloway, T.D., B.Sc.Agr. (Guelph), Ph.D. (Manitoba); **Holliday**, N.J., B.Sc.(Hons.) (London), Ph.D. (Bristol); **Roughley**, R.E., B.Sc. Agr., M.Sc. (Guelph), Ph.D. (Alberta).

Associate Professor

Currie, R.W., B.Sc., M.Sc., Ph.D. (Manitoba).

Adjunct Professors

Anderson, G., B.Sc. (Manchester), M.P.M., Ph.D. (Simon Fraser); **Anderson**, R.A., B.Sc. (Brandon), M.Sc. (Massachusetts), Ph.D. (Manitoba); **Broadbent**, A.B., B.Sc. (McGill), B.Sc.(Hons.) (Victoria, Wellington), M.Sc. (McGill), Ph.D. (Guelph); **Fields**, P.G., B.Sc. (McMaster), Ph.D. (Laval); **Kuhlmann**, U., Diploma U., Ph.D. (Kiel); **Lamb**, R.J., B.Sc., M.Sc. (Toronto), Ph.D. (UBC); **Lindsay**, L.R.. B.Sc. (Winnipeg), M.Sc. (Manitoba), Ph.D.

(Guelph); **Mason**, P.G., B.Sc. (Hons.) (Guelph), M.Sc., Ph.D. (Saskatchewan); **Paterson**, M.J., B.Sc. (Hons) (Manitoba), M.A. (Indiana), Ph.D. (Dalhousie); **Podemski**, C.L., B.Sc. (Alberta), M.Sc. (Western Ontario), Ph.D. (Saskatchewn); **Rosenberg**, D.M., B.Sc.(Hons.) (Alberta), Ph.D. (Alberta); **Vanderwel**, D., B.Sc. (Hons.) (Victoria.), Ph.D. (Simon Fraser); **Westwood**, A.R., B.Sc., M.Sc. (Manitoba), Ph.D. (Guelph); **White**, N.D.G., B.Sc. (Agr.), M.Sc. (Guelph), Ph.D. (Manitoba).

Program Information

The Department of Entomology is the only such in Canada. The department has strong links with agricultural and environmental research organizations in Winnipeg and across Canada, and is uniquely positioned to provide comprehensive graduate training in entomological research. The department offers both M.Sc. and Ph.D. degrees. In both M.Sc. and Ph.D. programs, students must achieve a high standard in a research project and in a thesis reporting their results. Students must also take some course work, including a course intended to develop written and oral communications skills, to promote critical thinking and to provide exposure to diverse fields of entomology and related sciences.

Graduates of the Ph.D. from the Department of Entomology occupy academic positions in a number of universities in Canada and elsewhere, others occupy senior scientist positions with Agriculture Canada, Environment Canada, or other government research and regulatory agencies. Graduates of the M.Sc. programme have proceeded to Ph.D. programs elsewhere, while others have entered the workforce following their M.Sc. degree. A high proportion of insect extension specialists in provincial governments in western Canada are graduates of the department's M.Sc. program. Other recent graduates have positions as forest and prairie management ecologists, careers in agribusiness, producer organizations or pesticide companies, or technical positions in research organizations.

Fields of Research

The research of the department is about equally divided between basic studies and applied studies. The department has faculty in the areas of apiculture and pollination biology; physiological, population and community ecology of insects; insect systematics; insect-vertebrate interactions and aquatic entomology. Particular areas of focus include honey bee parasite management, insects as agents of biological control, crop and livestock entomology, arthropod ectoparasites of mammals and birds, and the study of insect bio-diversity in response to forest and prairie management. Adjunct professors associated with the department provide additional depth and breadth in the areas of forest entomology, pheromone chemistry, crop protection entomology, stored product entomology, forensic entomology, and the role of insects in aquatic ecosystems.

Research Facilities

Departmental research facilities include the J.B. Wallis Museum of Entomology, controlled environment chambers and an area for apiculture. Other accessible facilities include a scanning electron microscope, pesticide analysis laboratories, livestock, field plots and commercial scale fields, and greenhouse space.

M.Sc. in Entomology

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

The Department of Entomology allows students to begin their program on either 1 September, 1 January or 1 May. For admission for each of these start dates, Canadian and U.S. students should send their applications with complete supporting documentation to arrive in the Department of Entomology at least three (3) months before the intended start date. International students should send their applications with complete supporting documentation to arrive in the Department of Entomology at least seven months (7) before the intended start date.

Program Requirements

The minimum course requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar. As part of their academic program, students are required to take 038.715 Advanced Entomology 1.

Second language reading requirement: none
Expected time to graduation: 2 - 3 years

Ph.D. in Entomology

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

The Department of Entomology allows students to begin their program on either 1 September, 1 January or 1 May. For admission for each of these start dates, Canadian and U.S. students should send their applications with complete supporting documentation to arrive in the Department of Entomology at least three (3) months before the intended start date. International students should send their applications with complete supporting documentation to arrive in the Department of Entomology at least seven months (7) before the intended start date.

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. As part of their academic program, students are required to take 038.722 Advanced Entomology.

Second language reading requirement: yes
Expected time to graduation: approximately 3 - 5 years

Course Descriptions

Undergraduate Courses

038.316	Veterinary and Wildlife Entomology	3
038.425	Pesticide Toxicology	3
038.428	Aquatic Entomology	3
038.431	Insect Pests of Crops	3
038.432	Pollination Biology	3
038.436	Principles of Pest Management	3
038.450	Insect Taxonomy and Morphology	3
038.452	Physiological Ecology of Insects	3
038.454	Pesticides and Toxicology	3

Graduate Courses

038.712 Insect Population Management (3-0:0-0) 3 Term papers, tutorials and workshops to study systems of managing populations of injurious and useful insects based upon models of the processes of insect population dynamics. *Prerequisite:* consent of instructor. Offered 2003-2004 and alternate years.

038.715 Advanced Entomology 1 (3) Students must submit essays and seminars in areas chosen to fit the requirements of their program. They are required to prepare for and participate actively in discussion sessions and other class meetings. Not available for credit in a Ph.D. program.

038.720 Advanced Insect Taxonomy (3-0:0-0) 3 Tutorials, laboratory periods and discussion of classification and evolution of insects. Offered 2003-2004 and alternate years thereafter.

038.721 Special Topics in Entomology (3) Content of this course will deal with specific topics of entomology at an advanced level.

038.722 Advanced Entomology (3) Students must submit essays and present seminars in areas chosen to fit the requirements of their program. They are required to prepare for and participate actively in discussion sessions and other class meetings. Not available for credit in a M.Sc. program.

038.723 Advanced Pollination Biology (0-0:3-0) 3 Tutorials, assignments and discussion periods of current topics relating to the physiology and life history of insect pollinators and their ecological interactions with entomophilous plants. Subjects studied may be selected to fit the interests of individual students. *Prerequisite:* Consent of instructor.

038.724 Advances in Physiological Ecology of Insects (0-0:3-L) 3 The effect of environmental factors such as temperature, moisture, light and other organisms on the physiology and ecology of insects. *Prerequisite:* 038.205 or consent of instructor. Not to be held for credit with 038.452. Not offered in 2003-2004.

SECTION 22: Faculty of Environment

Dean: Dr. Wendy Dahlgren
Graduate Chair: Dr. Richard Baydack
General Office: 215 Sinnott Building
Telephone: (204) 474-7252
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E-mail: Environment@umanitoba.ca
Website: www.umanitoba.ca/faculties/environment

Program Information

The environment has been of growing concern to governments, non-government agencies, industry, academia, and the general public for most of the last century. In response to this trend, the University of Manitoba has established a variety of courses related to natural resources and the environment. These program and course developments were paralleled by tremendous growth in environmental research and service.

The newly established Faculty of Environment will offer graduate training in both disciplinary and interdisciplinary formats. Many of these programs have been offered in the past through other academic units, and bring with them well funded, established researchers. Master's and Ph.D. programs will continue to be available in Geography (Master of Arts, Ph.D.), Geological Sciences (Master of Science, Ph.D.), Geophysics (Master of Science, Ph.D.) and Natural Resources Management (Master of Natural Resources Management). (Each of these programs is listed alphabetically in this *Calendar*). A PhD program in Natural Resources and Environmental Management is available to those wishing to pursue a PhD in this field. Advisors may be chosen from among eligible faculty members within the Faculty of Environment. For a more complete description of this program consult the Section 48 in this calendar. In addition, the Faculty is actively developing an interdisciplinary Master's program in Environment.

The new Master of Environment program will draw not only on Faculty of Environment members, but also on the expertise of academic staff from such Faculties as Agriculture and Food Sciences, Architecture, Arts, Engineering, Medicine, Physical Education and Recreation Studies, Science and the Natural Resources Institute. The working model for this degree is to provide a research based program consisting of 12 credit hours of coursework, including a required course examining interdisciplinary perspectives, and a thesis. Students will consult with their academic advisor to construct an appropriate program, choosing from over 80 graduate level courses (depending on qualifications and course availability).

SECTION 23: Family Studies

Head: J. Durrant
General Office: 211 Human Ecology Building
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E-mail: family_studies@umanitoba.ca
Website: www.umanitoba.ca/human_ecology/grad_fs.html

Academic Staff

Dean Emeritus and Professor

Berry, R.E., B.H.E. (UBC), M.S. (Pennsylvania State), Ph.D. (Purdue).

Professors

Bond, J.B., B.Sc. (Illinois), M.S., Ph.D. (Purdue); **Harvey**, C.D.H., B.Sc. (H.Ec.) (Idaho), M.Sc., Ph.D. (Washington State).

Associate Professors

Durrant, J.E., B.A., M.A., Ph.D. (Windsor); **Duncan**, K.A., B.S.H.Ec. (Saskatchewan), M.S., Ph.D. (Ohio State); **Higgitt**, N., B.H.Ecol., M.Sc., Ph.D. (Manitoba); **Mills**, R.S.L., B.A. (Concordia), M.A. (Memorial), Ph.D. (Toronto); **Piotrowski**, C.C., B.A., M.A. (Waterloo), Ph.D. (Pennsylvania State).

Assistant Professors

Brown, J. D., B. A. (Kings College), BSW (Calgary), M.Ed., Ph. D. (Alberta); **Brownridge**, D.A., B.A. (Brandon), M.A., Ph.D., (Manitoba).

Program Information

The Department of Family Studies offers a Master of Science (MSc) degree in Family Studies. Our multidisciplinary approach allows students to apply knowledge from a variety of fields to study families across the life course. We emphasize the interrelationships among family well-being and neighbourhoods, communities, cultures, and economic and political environments. Students are exposed to a broad range of family theoretical perspectives and are equipped with strong research skills upon completion of the degree.

The program permits flexibility and individualized plans of family study. Courses taught in the MSc program in Family Studies include, but are not limited to: lifespan personality development; conflict and mediation in the family; management of family stress; family and decision making; family in the Canadian economy; Canadian consumer protection and policy; family finance; families and aging; families and shelter environments; community interventions with adolescents.

Fields of Research

Research interests of the faculty include: abuse and neglect of elderly, family support of elderly, death and dying, ethnicity, parent-child and adult-child interactions; family resource management, work and family, time use, household production, home-based work, consumer economics, consumer and family economic behaviour, consumer credit, financial counselling, economic value of household production, consumer bankruptcy, gambling; children's and parents' belief systems, child abuse, parental discipline; cross-cultural comparisons; family shelter, neighbourhoods and communities, housing policy, feminist approaches to studying shelter; parent-child relationships, socio-emotional development, shame, developmental psychopathology, social withdrawal, parent-child and sibling relationships; socio-cognitive, affective and behavioural aspects of conflict management and resolution, exposure to conflict and violence and children's adjustment; family violence, cohabitation and marriage; coping strategies of foster families.

Research Facilities

Laboratory facilities include a computer laboratory and the Child Development Centre, which houses a nursery school and an infant centre. Desks are also available for graduate students in the graduate student study room.

M.Sc. in Family Studies

Admission

In addition to the minimum admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, a grade point average of 3.25 in the last 60 credit hours of undergraduate study is required for entry to the program.

Students who have completed a four-year undergraduate degree in a related field will be considered for entry at the Master's level. Students with a three-year degree will be required to enter at the Pre-Master's level. Contact the department for information.

Application Deadlines

Students may begin on 1 September, 1 January, or 1 May each year. For admission, complete applications from Canadian/U.S. students should be received in the department 1 June for September start, 1 October for January start or 1 April for May start. International complete applications should be received in the department 15 December for September start, 15 May for January start and 15 October for May start.

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students are required to complete: 3 credit hours of theory (either 062.709 or 062.716); 3 credit hours of statistics/research methods from the department-approved list; 9 credit hours at the 700 level in the Department of Family Studies; 3 additional credit hours at the 700 level within the department or 600 level (or higher) outside the department; thesis.

As the content of some courses may vary and not all courses may be scheduled in a given year, students should consult the department for more specific details. Supplementary regulations can be obtained from the department.

Second language reading requirement: none
Expected time to graduate: two years.

Ph.D.

The Department of Family Studies does not offer a Ph.D. program.

Course Descriptions

062.701 Seminar in Family Finance (3) A review of literature in the field with special emphasis upon personal and household financial problems in the light of changing economic conditions. *Prerequisite:* 445.

062.709 Seminar in Human Development 1 (3) An intensive discussion of selected areas of human development.

062.710 Seminar in Human Development 2 (3) A continuation of 062.709.

062.711 Readings in Human Development 1 (3) An arranged program of study and/or research in selected, specific areas of human development.

062.712 Readings in Human Development 2 (3) Community Interventions with Adolescents: Recent literature on prevention programming for at-risk youth is reviewed. Intervention strategies are discussed, and local initiatives described. Students will identify the characteristics and assets/needs of a group of youth and prepare a proposal for a program designed to meet their needs.

062.715 Readings in the Family (3) An arranged, individual or group program of study and/or research in selected, specific areas of the family.

062.716 Seminar in the Family (3) Family Theories: Intensive study of various core theoretical approaches to understanding families and their key variants. The focus is on understanding the theories along with their strengths, weaknesses and limitations, as well as applying theories to a topic of interest in Family Studies.

062.718 Family in the Canadian Economy (3) Advanced study of the interrelationship of family and economy considering the economic functions of the family including production, consumption and distribution.

062.719 Canadian Consumer Protection and Policy (3) A study of the current problems of consumer interest; the programs and policies of education, business, and government as they bear upon consumer decision-making in the market.

062.721 The Family and Decision Making (3) Advanced study of conceptual frameworks of the family. Examination of current research in the areas of decision making, implementation and resource management within the context of these frameworks.

062.722 Management of Family Stress (3) Examination of stresses impacting on family resources. Solutions and coping/managerial skills to deal with these stresses.

062.728 Seminar in Child Studies (3) Critical study of current theoretical and research issues in the area of child development in the family context.

062.731 Topics in Child Studies (3) Selected topics in normal and exceptional development in the infant and pre-school child. *Prerequisite:* consent of Instructor.

SECTION 24: Food Science

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Academic Staff

Professor Emeritus

Bushuk, W., B.Sc., M.Sc. (Manitoba), Ph.D. (McGill), F.R.S.C., F.C.I.C., F.A.I.C.

Professors

Arntfield, S.D., B.Sc., M.Sc. (McGill), Ph.D. (Manitoba); **Blank**, G., B.Sc., M.Sc., Ph.D. (Manitoba); **Holley**, R.A., B.Sc., M.Sc. (McGill), Ph.D. (Guelph). **Scanlon**, M.G., B.Sc.(Hons.), Ph.D. (Leeds).

Associate Professor

Sapirstein, H.D., B.Sc. (Michigan), B.Sc.Ag. (Alberta), Ph.D. (Manitoba).

Assistant Professors

Beta, T., B.Sc. (Zimbabwe), M.Sc. (Texas A & M), Ph.D. (Pretoria); **Han**, J.H., B.Sc., M.Sc. (Korea), Ph.D. (Purdue).

Adjunct Professors

Dexter, J.E., B.Sc., M.Sc., Ph.D. (Manitoba); **Dubois**, J., B.Sc. (Laval), M.Sc., Ph.D. (McGill); **Gannon**, V.P.J., M.Sc. (Regina), D.V.M. (Saskatchewan), Ph.D. (Guelph); **Hatcher**, D., B.Sc. (Winnipeg), M.Sc., Ph.D. (Manitoba); **Hydamaka**, AW., B.Sc., M. Sc. (Manitoba), Ph.D. (Reading); **Izydorczyzk**, M., B.Sc. (Ryerson), M.Sc., Ph.D. (Manitoba); **Kovacs**, M.I.P., B.Ag.Eng., B.F.S. (Hungary), M.Sc. (Guelph), Ph.D. (Manitoba); **MacGregor**, A.W., B.Sc., Ph.D. (Edinburgh); **Marchylo**, B., B.Sc.(Hons.), M.Sc., Ph.D. (Manitoba.); **Mazza**, G., Dip.Agr. (Italy), B.Sc., M.Sc. (Manitoba), Ph.D. (Alberta); **Ryu**, G-H., (GNU, Korea), M.Sc. (Korea), Ph.D. (Kansas).

Program Information

A graduate degree program at the Master's level is offered in the Department of Food Science. Programs at the doctorate level, however, are administered through the Interdepartmental Ph.D. program in Food and Nutritional Sciences involving the departments of Human Nutritional Sciences, Food Science, and Animal Science. The general program in Food Science involves studying some aspect of the physical, chemical or biological characteristics of food during all phases of manufacturing and processing - starting with the raw materials and ending in presentation to consumers. Uniquely positioned in the Faculty of Agricultural and Food Sciences, the Department of Food Science leads in research to develop and evaluate value-added opportunities for agricultural food products. Interest in new product development and food process improvement is high both nationally and internationally and the department will continue its commitment to the training of highly qualified personnel in these areas.

Students graduating with an M.Sc. or Ph.D. degree in Food Science are readily employable in industry, government or academic positions. In fact, many students have acquired jobs prior to completion of their graduate degree requirements. Recent graduates have gone onto key research positions (e.g., biotechnology companies), administrative positions (e.g., research co-ordinator for commodity agencies) and industry management positions (e.g., quality assurance and product development technologists). Because food is a universal necessity, the study of its various properties promises to flourish in the foreseeable future.

Fields of Research

Expertise in the Department of Food Science is established in five major areas of study: protein, carbohydrate and cereal chemistries, food processing, packaging and food microbiology. Chemistry projects investigate the functional role played by major food constituents, how these properties translate into final food character, quality and potential new use. Key projects examine proteins in canola meal and wheat flour plus carbohydrates in a variety of crops. Work to explore factors influencing performance of raw potatoes during processing for optimized production of frozen french fries and to examine options for gas-fired infra-red pre-treatment (micronization) of pulses to shorten cooking time in the home are multidisciplinary in nature. Interest in membrane technology for food processing and treatment of waste effluents continues. Studies utilising dairy processing products to generate edible films for food preservation have been initiated. Microbiological studies examine food safety issues (survival of bacterial pathogens like *E.coli* 0157:H7 and chemical toxicants) as well as food preservation technology to inhibit spoilage organisms in fresh and cured meat products.

Research Facilities

The Food Science houses up-to-date laboratory facilities for chemical, textural and microbiological analyses of food (agricultural materials) or food products (jam, yoghurt, etc). In addition, the department has two pilot plants, one being used primarily for vegetable, fruit and pulse studies, while the other is dedicated to dairy product research. These pilot plants permit studies on a more practical basis.

M.Sc. in Food Science

Admission

In addition to the admission requirements of the Faculty of Graduate Studies (found in the regulations section of this *Calendar*), entrance into the M.Sc. programs requires a bachelor's degree from a recognised food science department or the equivalent. Applicants with a four-year bachelor's degree from a non-food science department or the equivalent may be required to complete a pre-M.Sc. program in the Food Science Department

(usually of one academic year) or take additional food science courses in their M.Sc. program in order to develop suitable knowledge in food science.

Admission Deadlines

The Department recommends that Canadian/U.S. students should submit their application and supporting documentation to the Department at least 6 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

There are two types of Master's Programs in the Department of Food Science:

Thesis

Thesis projects may be of a basic research type or of an applied or practical nature relating to the chemistry or microbiology of food raw materials, processes and/or products.

The thesis program requires a minimum of 15 credit hours of coursework, this to include at least 12 credit hours in Food Science 700 level courses and at least three credit hours in ancillary courses at the 700, 600, 400 or 300 levels. The thesis research topic shall be assigned within an area of interest to the student and pertinent to departmental research objectives. All M.Sc. students are required to take 078.713 Food Science Seminar.

Non-thesis

Additional coursework plus practical work terms and comprehensive examinations are substituted for a research project and written thesis.

The non-thesis program requires a minimum of 30 credit hours of coursework beyond the basic requirement for admission. Of this total, a minimum of 12 to 18 credit hours must be at the 700 level in Food Science with a minimum of 6 to 12 credit hours in approved ancillary courses.

Second language reading requirement: none
Expected time to graduation: two years

Interdepartmental Ph.D. in Food Science

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this Calendar.

Admission Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 6 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Requirements for the Interdepartmental Ph.D. program in Food and Nutritional Sciences are given in the Interdepartmental Section (Section 34.2) and in the Academic Guide Section 5.

Course Descriptions

078.709 Unit Process Operations (0-0:3-0) 3 A study of unit operations which are commonly utilised in the food industry with emphasis on separation processes, particle size reduction and heat transfers. *Prerequisite or co-requisite:* 034.329 or equivalent. Offered in 2003-2004 and alternate years.

078.713 Food Science Seminar (3) Verbal and written presentation of selected topics in Food Science. This is a required course for all M.Sc. candidates in the Food Science department.

078.715 Food Proteins (3-L:0-0) 3 An examination of the structural and functional properties of proteins in foods. Laboratory sessions will emphasize experimental approaches to study proteins in foods, including topics such as surface characterization, thermal properties, rheological behaviour, and chemical modification. Offered in 2003-2004 and alternate years.

078.716 Food Carbohydrates (0-0:3-L) 3 A study of the chemical properties and functionality of food carbohydrates. Laboratory sessions will focus on quantitation, structural characterization, thermal properties and rheological behaviour of carbohydrates. Offered in 2004-2005 and alternate years.

078.718 Food Science of Cereal Grains (0-0:3-0) 3 The course deals with cereal grains used for human food, the structure of constituents, and the relationship of constituent structure to functionality in the processing of the grains into food products. Emphasis will be on constituents and properties that contribute to optimum processing of wheat. *Prerequisites:* 002.235, 078.453 or permission of instructor. Offered in 2004-2005 and alternate years.

078.720 Advanced Food Microbiology (0-0:3-0) 3 Detection and quantitation of foodborne micro-organisms and related toxins using developing methodology, including rapid microbiological assays with a comprehensive account of basic principles and advanced techniques. *Prerequisites:* 060.201, 078.415 or consent of instructor. Offered in 2004-2005 and alternate years.

078.724 Topics in Food Science (3) An in-depth study of selected topics of current relevance in Food Science. Available to students in the M.Sc. programs and in the Interdepartmental Ph.D. in Food and Nutritional Sciences. *Prerequisite:* written consent of department head.

078.725 Advanced Food Packaging (3-0:0-0) Advanced course for the principles, materials, design and development of packaging with emphasis on chemical and physical nature of packaging materials, food products and new technologies. Offered in 2003-4 and alternate years thereafter.

078.726 Advanced Meat Science (0-0:3-0) Builds on fundamental aspects of muscle biochemistry and function to explain how pre- and post-harvest technology affect meat quality and safety. Issues of current concern, their resolution as well as recent advances will be discussed. *Prerequisite:* Consent of instructor. Offered in 2003-4 and alternate years thereafter.

078.727 Food Rheology (3-0:0-0) Evaluation of the textural properties of foods provides critical information in the development of quality food products. This course deals with the principles and methodologies in food rheology and includes and examination of the rheological properties of selected food systems. Offered in 2004-5 and alternate years thereafter.

SECTION 25: French, Spanish and Italian

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Academic Staff

Distinguished Professor

Fortier, P., B.A. (Toronto), D.E.S. (Strasbourg), M.A., Ph.D. (Wisconsin).

Professor Emeritus

Jensen, C.A. E., B.A. (Western Ontario), M.A. (Toronto), Ph.D. (Chicago), Officier Ordre Palmes Acad.

Senior Scholars

Annandale, E.T., B.A. (Manitoba), Ph.D. (London); **Balcaen**, H.L., B.A., Cert. Ed., M.A. (Manitoba); **Gordon**, A.L., M.A.(Hons.) (Aberdeen), Docteur de l'Université (Paris), Chevalier Ordre Palmes Acad.; **Gordon**, D.K., B.A., M.A., Ph.D. (Toronto); **Joubert**, A., L.ès-L., D.E.S. (Sorbonne), C.A.P.E.S.philos., Chevalier Ordre Palmes Acad.; **Marantz**, E.G., B.A.(Hons.) (Manitoba), Docteur de l'Université (Paris); **Martinez**, A., Lic. Phil. (Angelicum, Rome), Lic.Fil.y Let., Dr.Fil.y Let. (Madrid); **Norell**, D., B.Comm., B.A., M.A., Ph.D. (Manitoba); **Padgett**, G., B.A.(Hons.), M.A. (Nottingham), Docteur de l'Université (Paris); **Strong**, I.R., B.A., M.A., Ph.D. (Toronto).

Professor

Boutin, F., B.F.A. (Ottawa), B.Ed. (Montreal), M.A. (New York), Ph.D. (Ohio State).

Associate Professors

Allen, J., B.A. (SUNY Buffalo), M.A. (Syracuse), Ph.D. (Michigan); **Clark**, P.F., B.A. (Toronto), M.A., Ph.D. (Western Ontario); **Renée**, L., B.A., M.A., Ph.D. (Manitoba).

Assistant Professors

Cartmill, C., B.A. (Toronto), M.A., Ph.D. (Queen's); **Fernandez**, E., Lic. (Oviedo), M.A. (Calgary), Ph.D. (Princeton); **La Charité**, C., B.A. (McGill), M.A., D.E.A., Ph.D. (Paris IV) **Laporte**, D., B.A., M.A., Ph.D. (Laval); **MacDonell**, A., B.A. (Lakehead), M.A., Ph.D. (Manitoba).

Program Information

For over 50 years the Department of French, Spanish and Italian has offered M.A. and Ph.D. programs in French. Graduates have become department heads and professors in Canadian and American universities. They have also become entrepreneurs, administrators, teachers, and translators. Their success in post-graduate endeavours is a testimony to the quality of the programs.

Fields of Research

The department specializes in all literary areas, especially the 19th and 20th centuries, Québécois literature and Canadian francophone literature.

Research Facilities

The University of Manitoba subscribes to the ARTFL database (Project for American and French Research on the Treasury of the French Language, University of Chicago). The Faculty of Arts boasts a multi-media language laboratory, one of the most modern in the country.

M.A. in French

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this Calendar. Students with other degrees or backgrounds may be eligible for admission to a pre-Master's program to the satisfaction of the department. Contact Department for further information.

Admission Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 4 months prior to their intended start date (for example, by May 1 for a start date of September 1). International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date (for example, by February 1 for a start date of September 1).

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students are required to complete 18 credit hours of coursework at the 700 level and a thesis. As part of the required coursework, students must take 044.760 Approches et méthodes critiques (3).

Second language reading requirement: Yes

Expected time to graduation: One to two years

Ph.D. in French

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*, applicants to the Ph.D. program must normally hold an M.A. degree in French with a GPA of at least 3.5 in their M.A. courses.

Admission Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 4 months prior to their intended start date (for example, by May 1 for a start date of September 1). International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date (for example, by February 1 for a start date of September 1).

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Candidates must complete 15 credit hours of coursework at the 700 level, including a compulsory component of three credit hours of literary theory.

Candidacy examinations consist of papers in: textual analysis; major field; first minor field; and second minor field. These examinations should normally be completed by the end of the second year of study.

All candidates for the Ph.D. must demonstrate a reading knowledge of two of German, Spanish and Italian, or any language deemed suitable by the candidate and the advisory committee.

Second language requirement: Two languages, usually chosen from Spanish, Italian and German

Expected time to graduation: Four to Five Years

Course Descriptions

Not all courses are offered annually. Special Topics courses will vary from year to year, depending on the needs and interests of professors and students. Details of courses given in a specific year may be obtained from the Graduate Chair, Department of French, Spanish and Italian.

044.600 French Reading Test (0) For graduate students in other departments requiring a reading knowledge of French.

044.601 Spanish Reading Test (0)

044.603 Italian Reading Test (0)

044.752 Topics in Literary Periods 1 (3)

044.753 Topics in Literary Periods 2 (3)

044.754 Topics in Literary Genres 1 (3)

044.755 Topics in Literary Genres 2 (3)

044.756 Topics in Critical Theory and Practice 1 (3)

044.757 Topics in Critical Theory and Practice 2 (3)

044.758 Special Topics 1 (3)

044.759 Special Topics 2 (3)

044.760 Approches et méthodes critiques (3) Introduction générale aux tendances de la critique actuelle. Cours obligatoire pour les étudiant-e-s de Maîtrise.

044.761 L'Épopée médiévale française (3) La littérature du moyen âge, conservée dans de nombreuses chansons de geste, décrit des conflits entre deux sociétés. Ce cours examinera au moins une épopée de chacune des trois familles de chanson de geste: la geste du roi, la geste de Guillaume, et la geste des barons féodaux.

044.762 Le Roman français médiéval (3) Une des plus grandes contributions de la littérature médiévale française à la littérature mondiale se trouve dans le roman (long poème narratif) consacré à l'amour courtois et au conflit entre l'amour et les règles de la société.

044.763 Études sur Rabelais (3) Études de divers aspects de l'oeuvre de Rabelais. L'accent sera placé surtout sur le Tiers Livre et le Quart Livre où Rabelais aborde les grandes question de la foi religieuse, de l'épistémologie, de l'origine des langues et du rôle de l'art.

044.764 Études sur Montaigne (3) Étude de la philosophie de Montaigne. La question du bien-être social et du bonheur personnel, et les problèmes d'épistémologie et d'écriture que posent les Essais seront examinés à la lumière de la critique contemporaine.

044.765 Études sur Voltaire (3) Ce cours comprendra une étude d'aspects choisis de l'oeuvre et de la pensée de Voltaire.

044.766 Études sur Diderot (3) Ce cours comprendra une étude d'aspects choisis de l'oeuvre et de la pensée de Diderot.

044.767 Études sur Balzac (3) Études de quelques-uns des romans de Balzac. Ce cours portera sur l'apport de Balzac au développement du genre romanesque en France. Les étudiants seront encouragés à lire les textes à la lumière de certains exemples de la théorie critique récente.

044.768 Études sur Victor Hugo (3) Ce cours portera soit sur l'oeuvre romanesque de Victor Hugo, soit sur sa poésie. Bien qu'on étudie des poèmes représentatifs des différentes étapes de la longue carrière du poète, l'accent sera mis sur les textes écrits après 1850.

044.769 Le Drame romantique français (3) Étude des théories du drame et des pièces de théâtre les plus marquantes de l'époque romantique en France. Les principaux auteurs étudiés seront Victor Hugo, Alfred de Vigny et Alfred de Musset.

044.770 La Poésie romantique française (3) Ce cours portera sur la poésie française de la période 1815-1850. Cette poésie sera abordée à la fois comme le témoignage d'une crise et d'une grande libération littéraire.

044.771 Études sur Flaubert (3) Études des oeuvres maîtresses de Gustave Flaubert dans l'optique des centres d'intérêt surtout narratologiques et génétiques. Discussion d'un certain nombre de sujets connexes (l'érudition, l'ironie de Flaubert) permettant d'arriver à une définition de sa conception du roman.

044.772 Études sur Mallarmé (3) Étude analytique et synthétique des poèmes de Mallarmé. Situation de Mallarmé dans le contexte du mouvement symboliste. Mallarmé selon la perspective de la critique contemporaine.

044.773 Études sur Colette (3) Étude intensive d'un choix d'oeuvres de Colette. Ce cours portera sur un genre, une série d'ouvrages, une tendance intellectuelle ou l'écriture de Colette.

044.774 Études sur Beauvoir (3) Une sélection d'oeuvres de Simone de Beauvoir étudiées selon la perspective de la critique féministe contemporaine.

044.775 Études sur la poésie contemporaine (3) Études de quelques poètes représentatifs du XXe siècle. L'accent sera placé surtout sur la poésie innovatrice. Parmi les poètes étudiés: Reverdy, Ponge, Michaux, Bonnefoy, Jaccottet, Deguy.

044.776 La Critique littéraire féministe (3) Une sélection de textes littéraires et théoriques analysés selon la perspective de la critique féministe contemporaine.

044.777 Tendances nouvelles du roman (3) Une étude de romans publiés depuis vingt ans selon la perspective de la critique contemporaine.

044.778 Révolution et roman québécois (3) La Révolution tranquille a transformé la société québécoise. Cette transformation fut en grande partie disséminée par des romanciers comme Hubert Aquin et Jacques Godbout, et par des précurseurs, comme Albert Memmi et Gaston Miron, qui ont jeté les bases d'une psychologie et d'une esthétique de la révolution.

044.779 Hubert Aquin (3) Le roman aquinien est une lutte constante contre le roman

conventionnel. Celui-ci représente pour Aquin un lieu d'évasion pour l'intellectuel colonisé. Le refus de toute tradition romanesque a mené à la création de romans qui exigent du lecteur une réflexion critique soutenue.

044.780 Le Roman de la belle époque en France (3) Période d'expansion du pouvoir économique, politique et culturel français et apogée de l'idéologie bourgeoise, les dernières années du 19e siècle et la première décennie du vingtième ont également produit un nombre non négligeable de textes romanesques de première ordre qui seront examinés dans ce cours.

044.781 Le Roman d'entre-deux-guerres en France (3) La première guerre mondiale mit fin à la belle époque et provoqua de profonds remous tant socio-économiques que culturels en France. Le roman sembla servir de champ d'élection pour l'expression de ce bouleversement. Ce cours examinera les réactions tant implicites qu'explicites d'un nombre de grands romanciers vis-à-vis des nouvelles conditions en France.

044.782 Le Roman de l'après-guerre en France (3) Période de l'essor, et de la mort de l'existentialisme, et des expériences formalistes communément désignées collectivement par l'étiquette "nouveau roman", les années après 1945 sont particulièrement importantes pour la compréhension des formes contemporaines du genre romanesque. Ce cours examinera au moins un auteur de chaque tendance.

044.783 Le Cycle oriental dans les romans de Malraux (3) La Tentation de l'Occident débute chez le grand mythomane de la vie culturelle et politique de la France une suite de textes, qui aboutit au chef-d'oeuvre génial qu'est la Condition humaine. Ce cours examinera le bizarre mélange d'individualisme nietzschéen et de rhétorique gauchisante qui a permis à Malraux de forger un genre romanesque sui generis.

044.786 Molière (3) Ce cours sera consacré à l'étude du théâtre de Molière. On examinera la pertinence des approches critiques contemporaines, en comparant différentes interprétations qui visent à rendre compte du plus grand nombre de pièces.

044.787 Le roman du XVIIe siècle (3) L'étude de quelques textes permettra de saisir un tournant dans l'histoire du roman français. On cherchera à établir l'apport critique des textes parodiques qui signalent l'émergence d'un nouveau discours romanesque. Il s'agit de suivre le passage du roman héroïque et pastoral à la "nouvelle classique".

044.788 Littérature épistolaire du XVIIe siècle (3) Pour ce cours on propose une étude du texte épistolaire dans différents contextes: la correspondance, le roman et le théâtre. On mettra l'accent sur la théorie de la communication et la problématique de la destination afin de mieux dégager une définition de l'écriture au XVIIe siècle.

044.789 Racine (3) Le débat suscité par la "nouvelle critique" servira de point de départ à une réflexion sur les théories contemporaines qui s'adonnent à l'interprétation d'une oeuvre - le théâtre de Racine - ayant toujours servi de contrefort aux définitions poussiéreuses du classicisme.

044.790 Baudelaire: critique et traducteur (3) Une étude de Baudelaire, critique de la littérature, de la peinture et de la musique de son époque. Une étude de Baudelaire traducteur de Poe: les affinités et la qualité de la traduction sous l'optique de quelques théoriciens contemporains de la traduction.

044.791 Baudelaire: poésie (3) Une étude de la poésie et de la poésie en prose de Baudelaire. Une étude de l'évolution poétique des Lesbiennes aux Limbes aux éditions de 1857 et de 1861 des Fleurs du mal. Une étude des Petits poèmes en prose et de leur contribution au genre.

SECTION 26: Geography

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Academic Staff

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Senior Scholars

Brown, W.J., B.Sc. (Hons.), Ph.D. (London); **Catchpole**, A.J.W., B.Sc.(Hons.), Ph.D. (Durham); **Foster**, R.H., B.A. (U.C.-Berkeley), M.A. (San Francisco State), Ph.D. (U.C.-Berkeley); **Kaye**, B., B.A. (London), M.A. (Manitoba), Ph.D. (London); **Romanowski**, J.I., B.A.(Hons.) (McGill), Ph.D. (Washington); **Stene**, L.P., B.Sc., M.Sc. (Alberta), Ph.D. (Western Ontario); **Tiwari**, R.C., M.A. (Agra), Ph.D. (Reading).

Professors

Barber, D.G., B.P.E., M.N.R.M. (Manitoba), Ph.D. (Waterloo); **Brierley**, J.S., B.A. (Victoria), Dip.Ed. (Oxford), M.A. (Alberta), Ph.D. (Edinburgh); **Gardner**, J.S., B.Sc. (Hons.) (Alberta), M.Sc., Ph.D. (McGill); **Norton**, W., B.A.(Hons.), Dip.Ed.(Hull), M.A. (Queen's), Ph.D. (McMaster);.; **Smith**, G.C., B.A.(Hons.), M.A. (Reading), Ph.D. (McMaster); **Todd**, D., B.A.(Hons.), Cert. Ed. (Leeds), M.A. (Queen's), Ph.D. (London School of Economics).

Associate Professors

Baydack, R.K., B.Sc. (Hons.), M.N.R.M. (Manitoba), Ph.D. (Colorado State); **Benbow**, S.M.P., B.A.(Hons.), Ph.D. (Liverpool); **Sawatzky**, H.L., B.A.(Hons.) (Manitoba), M.A., Ph.D. (Berkeley).

Assistant Professors

De Verteuil, G.P., B.A. (McGill), M.A. (British Columbia), Ph.D. (Southern California); **Hallman, B.C.**, B.A., M.A., Ph.D. (Guelph); **Hanesiak, J.M.**, B.Sc. (Winnipeg), M.Sc. (York), Ph.D. (Manitoba); **Papakyriakou**, T.N., B.Sc. (McMaster), M.Sc. (Queen's), Ph.D. (Waterloo).

Adjunct Professors

Belcher, M.B., B.Sc., M.N.S.M. (Manitoba), Ph.D. (Minnesota); **Blair**, D.E., B.Sc. (Regina), Ph.D. (Manitoba); **Brown**, R.J., B.Sc., M.S., Ph.D. (Manitoba); **Everitt**, J.C., B.A. (Leicester), M.A. (Simon Fraser), Ph.D. (UCLA); **Hecky,** R., B.Sc. (Kent State), Ph.D. (Duke); **Michel**, C., B.Sc., M.Sc., Ph.D. (Laval); **Tiefelsdorf, M**., B.A., M.A., (Free U. Berlin), Ph.D. (W. Laurier); **Wight**, I., M.A. (Aberdeen), M.Sc. (Alberta), Ph.D. (Aberdeen).

Program Information

While graduate research opportunities are available in several aspects of physical geography and human geography, particular emphasis is placed on geomatics and applied geography. With regard to career opportunities, there is an extremely heavy demand for specialists with training in these subfields.

Research and Environmental Planning: Government departments of the environment recognize the need for geographical training in such fields as resources analysis and management, regional development, city planning, recreational planning, etc. In private business, many consulting firms employ geographers as regional and resource analysts. The application of geographical theory in marketing, industrial and retail location, transportation, and environmental management has led to rewarding employment for some geographers.

Public Service: By combining geographical studies with other social studies and the physical sciences, geographers have found a challenge in serving Canada abroad. Canadian scientists are much in demand to work on teams assisting developing countries.

Technical Services: Geographers have found employment in such fields as cartography and remote sensing, where the application of mapping techniques and GIS (Geographic Information Systems) is of prime concern.

Education: A Master's degree coupled with teacher training can lead to a rewarding career in education at the high school level. In addition, holders of University of Manitoba Ph.D. degrees currently occupy positions in universities around the world.

Fields of Research

In relation to human geography, departmental research interests focus on agricultural, cultural, population, rural settlement, urban and industrial geographies, resource management, energy and environment, regional development, geography of aging, and environmental cognition. In physical geography research interests focus on climatology, geomorphology, hydrology, and associated studies of natural hazards and disasters. Emphasis is placed on both human and physical applications of geomatics which include methodology for observation (e.g. remote sensing), and for the analysis and display of data (e.g. computer modelling, computer cartography, and GIS). Research projects are conducted internationally, but focus particularly on the Arctic, Western Canada, Malawi, China, Brazil, Taiwan, India, the Carribean, California, and Europe.

Research Facilities

Geomatics within the department utilizes three computer labs for teaching and research. One research laboratory contains fully integrated PC and UNIX (IBM RS/6000 and PEC Alpha) work stations, with two calcomp digitizers, slide-output device and plotter. The second research laboratory is NT based with 8 work stations and a server. Available software includes Arc/Info, PCI Ease/Pace, ER Mapper, Idrisi, ArcView, Adobe Illustrator and Photoshop. Field research equipment includes a Trimble GPS base station, 3 hand-held GPS units, two VIS/NIR spectrometers, a ceilometer, laser

range finder, all-sky camera system, climate monitoring measurement equipment and data loggers.

The Centre for Earth Observation Science (CEOS) housed within the Geography Department, participates in a number of research projects focussing on high latitude climate change. One project, initiated by and in collaboration with Laval University, has resulted in funding to purchase and retrofit a Canadian Coast Guard icebreaker that will serve as a platform for multidisciplinary polar research over the next 15 years.

M.A. in Geography

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, graduates with an Honours degree or an advanced major must obtain a Grade Point Average of at least 3.25 in the last 60 credit hours of undergraduate study.

Admission Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 5 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 9 months prior to their intended start date.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Master students in Geography are required to complete at least 12 credit hours as follows: 6 credit hours of Geography from the 700 group; 3 credit hours of ancillary; and 3 credit hours of any other course at the 300-level or higher. Students are expected to participate in and are required to give one formal presentation in the seminar series for graduate students. In addition, a thesis is required. An oral defence of the thesis is an integral part of the M.A. examination.

Second Language Reading Requirement: none
Expected Time to Graduate: two years

Ph.D. in Geography

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this Calendar.

Admission Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 5 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 9 months prior to their intended start date.

Program Requirements

In addition to the minimum 12 credit four course requirement of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, students are required to give two presentations in the Department's graduate student seminar series and are expected to attend and participate in this series. These minimum course requirements may be increased on the recommendation of the student's advisory committee or the departmental Graduate Studies Committee. Students are also required to pass a candidacy exam, and complete and successfully defend a dissertation. The dissertation is to be a distinctive contribution to the field of geography and must be of publishable quality.

Second language requirement: none
Expected time to graduation: four years

Course Descriptions

053.701 Selected Topics in Geography (3) Advanced study of a selected topic from any one of the department's fields of specialization.

053.703 Regional Analysis (3) A seminar course reviewing theories of regional development which have planning applications. Further, it assesses government policy aimed at regional intervention and notes procedures of evaluation.

053.704 Seminar in Population Geography (3) Examination of the spatial and temporal character of demographic controls. Special emphasis will be placed upon the problems faced by developing areas in their attempts to deal with population growth.

053.705 Seminar in Land Settlement (3) Three hours per week, one term. The emphasis of this course is on research methods and techniques that are applicable to the study of settlement.

053.706 Urban Land Use (3) An analytical study of the location patterns of various city land uses, in terms of their geographic, economic, social, and political determinants. Includes field research in Winnipeg.

053.708 Quantitative Methods (3) A discussion of analysis and model construction in the study of urban and rural systems; analysis of socio-economic and demographic data, construction of measures, and testing of models.

053.714 Historical Geography (3) The course is designed to provide a critical understanding of the development, philosophy, and methodology of historical geography.

053.716 Hydroclimatology (3) Special consideration is given to storm models, temporal and spatial variations of precipitation, and the estimation of precipitation. Literature and instrumentation are reviewed.

053.718 Methodology of Agricultural Geography (3) The course first provides an understanding of social and economic concepts in agricultural geography, and then examines methods of data collection, sampling techniques, and analysis with relevance to specific research topics.

053.720 Environment, Resources, and Population (3) This course discusses the contemporary imbalance between population and resources. The consequences of resource exploitation upon the natural environment are also examined.

053.724 Industrial Location and Analysis (3) The course will critically examine theories that help to explain the location of industrial activity. Consideration will be given to normative, behavioural, and predictive methodologies.

053.725 Geomorphology (3) A study of field, laboratory, and other analytical techniques in selected aspects of geomorphology.

053.726 Selected Regional Issues in Geography (3) Advanced study of specific issues and problems in selected world regions.

053.727 Physical and Synoptic Climatology (6) A survey of advances in climatology providing a foundation for climatic research. An examination is made of principles and problems in physical and synoptic climatology. Two hour lectures and three hour laboratory per week both terms.

053.728 Geographic Approaches to Land Resource Conflict Resolution (3) A survey of the ecologic, environmental and regional approaches to the resolution of land resource conflicts and the planned enhancement of land-related utilities.

053.729 Energy Analysis (3) A survey of origins, methods and applications of energy analysis, a new technique of system energetics designed to provide information for a more efficient use of scarce natural resources.

053.730 Urban Transportation Geography (3) Current issues and problems in urban transportation are analyzed within several geographic contexts (e.g., spatial, environmental, economic, social, political). Students are encouraged to focus research on Winnipeg.

053.731 Geographic Theory and Methodology (3) A discussion of the meaning of explanation in human geography, the status of geography as a science and the construction of theory.

053.735 Techniques in Cognitive-Behavioural Geography (3) An examination of the methods used to elicit and analyze the human's cognitive-behavioural responses to geographic phenomena.

SECTION 27: Geological Sciences

Head: N.M. Halden
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Academic Staff

Distinguished Professor and Canada Research Chair

Hawthorne, F.C., B.Sc. (Spec.) (Imperial College), A.R.S.M. (Royal School of Mines), Ph.D. (McMaster), F.R.S.C., F.G.A.C., F.M.S.A., Killam Fellow.

Professors Emeriti

Brisbin, W.C., B.Sc. (Geol.Eng.) (Manitoba), Ph.D. (UCLA); **Cerny**, P., B.Sc., M.Sc. (Brno), Ph.D. (Czechoslovak Academy of Sciences), F.R.S.C.; **Ferguson**, R.B., B.A., M.A., Ph.D. (Toronto), F.R.S.C.; **Hall**, D.H., B.Sc. (Alberta) , M.Sc. (Toronto), Ph.D. (UBC).

Senior Scholars

Moon, W., B.Sc. (Seoul), B.A.Sc. (Elec.Eng.) (Toronto), M.Sc. (Columbia), Ph.D. (UBC), F.R.A.S.; **Turnock**, A.C., B.Sc., M.Sc. (Manitoba), Ph.D. (Johns Hopkins).

Professors

Chow, N., B.Sc. (Alberta), Ph.D. (Memorial); **Clark**, G.S., B.Sc., M.Sc. (New Brunswick), Ph.D. (Columbia); **Elias**, R.J., B.Sc. (Manitoba), M.Sc., Ph.D. (Cincinnati); **Halden**, N.M., B.Sc., Ph.D. (Glasgow); **Last**, W.M., B.Sc. (Wisconsin), M.Sc., Ph.D. (Manitoba), F.G.S.A.; **Sherriff**, B.L., B.Sc. (Leicester), M.Sc. (Brock), Ph.D. (McMaster); **Teller**, J.T., B.Sc. (Cincinnati), M.Sc. (Ohio State), Ph.D. (Cincinnati).

Associate Professors

Ferguson, I.J., B.Sc., Ph.D. (Australian National); **Larocque**, A.C., B.Sc.(Hons.) (Carleton), M.Sc. (Western), Ph.D. (Queen's).

Assistant Professors

Chakhmouradian, A., M.Sc., Ph.D. (St. Petersburg); **Frederiksen**, A., B.Sc. (McGill), M.Sc., Ph.D. (UBC).

Adjunct Professors

Fedikow, M., B.Sc., M.Sc. (Windsor), Ph.D. (New South Wales); **Gardner**, J., B.Sc.(Hons.) (Alberta), M.Sc., Ph.D. (McGill); **Grice**, J.D., B.Sc.(Hons.) (Toronto), M.Sc., Ph.D. (Manitoba); **Peck**, D., B.Sc., M.Sc. (Windsor), Ph.D. (Melbourne); **Scoates**, R.F.J., B.Sc.(Queens) M.Sc., Ph.D. (Manitoba); **Thorliefson**, H., B.A.(Winnipeg), M.Sc. (Manitoba), Ph.D. (Colorado); **Young**, G.A., B.Sc.(Hons.) (New Brunswick), M.Sc. (Toronto), Ph.D. (New Brunswick).

Program Information

The department consists of a dynamic group interested in a wide variety of topics in the geological sciences. Research is focused on understanding Earth materials and materials analysis. The department is recognized internationally for minerals research. The department has developed numerous multidisciplinary approaches in the assessment of surface and near-surface environments. Furthermore, on-going research programs in past surface environments have regional and world-wide implications. Research programs have a significant component of international collaboration and a substantial partnership with industry. To support these research efforts, the department maintains well-equipped state-of-the-art analytical facilities and has ready access to other regional and national facilities outside the department. Students regularly receive NSERC, Commonwealth and University of Manitoba Graduate Fellowships and Scholarships.

The department offers a wide variety of research programs leading to degrees of Master of Science (M.Sc.) and Doctor of Philosophy (Ph.D.). Support for research projects is received from NSERC, Manitoba Industry Trade and Mines, the Geological Survey of Canada, the University of Manitoba and industry sources such as CAMIRO (Canadian Mining Research Organization), INCO, Falconbridge and Hudson Bay Mining and Smelting.

Fields of Research

The fields of research of the department include: mineral spectroscopy and analysis; crystal chemistry and structural crystallography of minerals; crystallization dynamics and geochemical evolution of minerals in magmas and low temperature fluids; sedimentology and geochemistry of salt lakes; mineral reactions in surface environments; petrology of granitic pegmatites; Ti, Zr and REE minerals in kimberlites; paleoenvironmental reconstruction from Paleozoic corals, reefs and associated faunas; sedimentology and environmental reconstruction of glacial Lake Agassiz and the impact of its overflow on the paleohydrology of North America, global oceans, and climate change; geoliminology of lakes and arid regions; paleolimnology of lakes in southern Australia; sedimentology of Paleozoic carbonates in Manitoba, Alberta and Australia; petroleum geology and source rock geochemistry of selected Mesozoic units in western Canada; seismic imaging of deep continental structure using earthquake recordings; magmatic and subsolidus processes in silicocarbonatites; and magnetotelluric and electromagnetic methods applied to crustal dynamics and near-surface environments.

Research Facilities

The department is equipped for a variety of field and lab-based research projects. In addition, the department maintains the research equipment and services listed below. Access to use of these facilities is coordinated through the student's thesis advisor.

X-Ray Laboratories

- Two fully automated Bruker P4 four-circle single-crystal diffractometers; one with CCD detector.
- Two Philips PW1729 X-ray generators; one with fully-automated PW 1710 X-ray powder diffraction (XRPD) system, graphite monochromator and PC based operating system (MDI Datascan).
- Siemens D5000 automated XRPD system with incident beam monochromator and Kevex PSI-II solid state detector, using DIFFRAC-AT software.
- Gandolfi and Debye-Sherrer powder cameras; two Beurger precession single-crystal instruments; spindle stage, two Nikon binocular microscopes; optical microscope.
- Mössbauer spectrometer for ^{57}Fe spectroscopy.
- Two controlled- atmosphere quench furnaces for 1600°C, and a cool-seal hydrothermal bench with water pressures up to 3 kilobars.
- Extensive mineralogy crystallography software: MDI Jade 5+ including Search-Match option, Rietveld structure refinement routines, molecular mechanics and molecular dynamics software.

Geochemistry Laboratory

- A wet chemical laboratory fully equipped for sediment, rock and mineral analyses.
- Varian AA spectrometer and Varian ICP-OES with robotic sample handling.
- IOMASS element-2 HiRes LAM-ICP-MS.
- Mitsubishi CA-06 moisture meter with a VA-21 high temperature furnace.
- Leco induction furnace sulphur analyzer.
- Accumet 950 specific ion analyzer.

Microbeam and Image Analysis Laboratory

- CAMECA SX100 electron microprobe.
- Zeiss-Kontron image analysis system (IAS) with high definition colour monitors and extensive software. The IAS is linked to all cameras, optical microscopes, SEM and electron microprobe.
- Cambridge Stereoscan 120 Scanning Electron Microscope with back scattered electron detector and energy dispersive X-ray detector.
- Technosyn cold cathode luminescence system.
- Fluid inclusion stage.

Sedimentological Laboratories

- Automated size analyzers (Sedigraph and Galai PSA Laser 2010), RoTap sieve shaker, Soil-Test sieve shaker, drying ovens, muffle furnaces.
- Nikon epi-fluorescence microscope.
- Mettler analytical balances, Fisher Accumet pH-Eh meters, carbonate analyzer, centrifuges, water chemistry field analytical kits, conductivity meters, specific ion electrodes.
- Galai Image Analysis system (IAS) with colour and monochrome monitors, video camera, digitizing tablet, and statistical and GIS software.
- Complete, fully-equipped clean room for microfossil and sedimentological sample preparation.
- Two complete Livingston piston sediment corers, including 80 m of Mg-alloy connecting rods and 6 extra core barrels.
- Vibracorer and associated sampling equipment.
- Complete Acker sediment sampling system, including 3 m tripod derrick, motorized cathead hoist, 60 kg drive weight, split tube sampler, solid tube sampler, connecting rods, and a variety of bits and augers.
- Extensive subsurface well log library for all of western Canada, including all hard copy logs for Alberta, Saskatchewan, and British Columbia, and a microfilm/reader-printer system for all logs in Manitoba and Saskatchewan and subsurface well cuttings and cores from Manitoba and Saskatchewan.

Invertebrate Paleontology Laboratory

- Complete Nikon stereoscopic plus petrographic microscope/ photomicrographic systems, and photography facilities with Minolta camera system.
- Adjacent sample preparation room/darkroom with various saws, grinders, plus a Hillquist thin section machine.
- Complete Beseler photographic enlarger system.

Geophysical Laboratories

- Exploranium gamma-ray spectrometer.
- Geonics Protem-47 TEM system.
- Scintrex proton-precession magnetometer and VLF-EM system.
- Hammer seismic system.
- Gravimeter.
- Bison DC resistivity.
- Computer systems for (a) interactive modelling with two high resolution graphics terminals for 3-D geophysical modeling and interpretation; and (b) analysis of EM data using GEOTOOLS software.
- Seismic observatory (3 component short period, 3 component long period and 1 tidal gravity) facility in the Wallace Building, one Geotech seven-track analog tape recorder for observatory seismology, three Willmore Mark II Seismometers.
- Lithoprobe remote seismic data processing facility (IT and A software) and direct satellite link to LSPF (Lithoprobe Seismic Processing Facility) in Calgary.

Other Equipment and Facilities

- Star Lake Field Station, southeast Manitoba.
- R.B. Ferguson Museum of Mineralogy.
- Ed Leith Cretaceous Menagerie.
- Geological Sciences reading room.
- Access to the Prairie Regional NMR Centre at the University of Manitoba which has a Brüker AMX500 narrow bore spectrometer with solid state probes including a DOTY magic angle spinning probe and a DOTY single crystal probe.
- Access to the Provincial Core Storage Laboratory.
- A geomagnetic and seismographic observatory is maintained at Glenlea, 25 km south of the University.

M.Sc. in Geological Sciences

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. An Honours B.Sc. degree in geological sciences or a B.Sc. degree in geological engineering from the University of Manitoba, or equivalent, is a prerequisite for entering a program leading to the graduate degrees. Students with Honours degrees in physics, mathematics, engineering physics, or electrical engineering may take graduate work in geophysics provided they make up certain deficiencies in undergraduate geology and geophysics. Please contact the Department for details.

Students graduating with honours degrees from disciplines other than geology or geophysics may wish to consider the Individual Interdisciplinary Program.

Application deadlines

The Department of Geological Sciences allows students to begin their program on either September 1, January 1, or May 1. For admission for each of these start dates, Canadian/U.S. students should send their applications with complete supporting documentation to the Department of Geological Sciences no less than three (3) months before the intended start date. Non-Canadian students should send their applications with complete supporting documentation to the Department of Geological Sciences no less than seven (7) months before the intended start date.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Course 007.776 plus a minimum of two full-course equivalents must be selected to fulfil the course requirements of the M.Sc. thesis in Geological Sciences. For the M.Sc. in Geophysics, 007.727 and 007.776 are required in addition to the two full-course equivalents and the thesis.

The M.Sc. (Comprehensive) requires 007.776 plus a minimum of four full-course equivalents to fulfil the course requirements, plus a comprehensive examination.

Reports (proposals, results and timetable of thesis work) in writing must be submitted to the Head on October 31 and February 1.

Second language reading requirement: none
Expected time to graduate: three years

Ph.D. in Geological Sciences

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application deadlines

The Department of Geological Sciences allows students to begin their program on either September 1, January 1, or May 1. For admission for each of these start dates, Canadian/U.S. students should send their applications with complete supporting documentation to the Department of Geological Sciences no less than three (3) months before the intended start date. Non-Canadian students should send their applications with complete supporting documentation to the Department of Geological Sciences no less than seven (7) months before the intended start date.

Program Requirements

Program requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Reports (proposals, results and timetable of thesis work) in writing must be submitted to the Head on October 31 and February 1.

Second language requirement: none
Expected time to graduation: five years

Course Descriptions

007.723 Geophysics of the Earth's Crust and Mantle (3) Processes in crust-mantle evolution and geophysical methods used to study this region of the earth. *Prerequisite:* 007.481 or 007.432 and 007.433.

007.726 Geophysical Information (3) The application of the Fourier approach in geophysics and information theory to geophysical interpretation. Offered every year. *Prerequisites:* 007.481 or 007.432 and 007.433 or equivalent and third-year standing in Mathematics.

007.731 Quaternary Geology (3) Seminars and lectures on sedimentary aspects of the Quaternary Epoch with emphasis on glaciation. The glacial and interglacial stratigraphic record on the continents and in the ocean basins. Three-day field trip in mid-September. *Prerequisites:* 007.349 and 007.390.

007.735 Remote Sensing in the Earth and Planetary Sciences (3) Selected topics in remote sensing with emphasis on geophysical and geologic problems. Offered every year. *Prerequisite:* B.Sc. (Honours Geology, Geophysics, or Geological Engineering) or consent of instructor for graduates of other disciplines.

007.744 Principles of Paleoclimatic Reconstruction (3) An interdisciplinary course which examines the sedimentological, biological, and human response to climatic change; the history of Quaternary climate and its stratigraphic expression. *Prerequisite:* permission of instructor.

007.747 Advanced Petroleum Geology and Geochemistry (3) Lectures and seminars examining the four major components of petroleum geology: source and migration, reservoir, trap, and economics. Major emphasis on the origin and generation of petroleum and source rock geology. Field trip and core logging required.

007.748 Advanced Seismology 1 (3) Theory of wave propagation; source mechanisms; other selected topics. *Prerequisite:* 007.726.

007.749 Advanced Seismology 2 (3) Seismic surface waves and normal modes of Earth, Earth tides and dynamic evolution. *Prerequisite:* 007.748 or equivalent.

007.752 Advanced X-Ray Crystallography (3) Seminar and laboratory course covering symmetry theory, point groups and space groups, X-ray diffraction theory, the powder method, single-crystal precession photography, derivation of unit cell dimensions and space group. *Prerequisite:* 007.428

007.753 Structural Crystallography (3) Seminar and laboratory course covering course data collection and reduction methods, crystal structure solution by Patterson and Fournier synthesis, and by direct methods, crystal structure refinement, analysis of errors, and crystal-chemical topics of interest to the participants. *Prerequisite:* 007.752.

007.754 Isotope Geology and Geochronology (3) The principles and methods of isotopic age determination and the measurement of geological rate processes using certain radioactive nuclides and the variations of the isotopic compositions of their daughter products. The evolution of the earth's mantle, continental and oceanic crust. The application of light, stable isotope fractionation to understanding geological processes.

007.755 Hydrothermal Petrochemistry (3) The chemistry, mineralogy, and petrology of mineral deposits and alteration zones of the hydrothermal type, and their association with igneous and tectonic events. Theory and experimental data on metasomatic processes.

007.757 Advanced Mineralogy 1 (3) Detailed seminar study of important rock-forming and ore minerals based on current research publications, covering crystal structure and chemistry, origin and paragenesis. Lab introduction to principal chemical and physical methods of analyzing minerals.

007.758 Advanced Mineralogy 2 (3) Detailed seminar study of selected minerals related to students' interests based on current research publications, covering crystal structure and chemistry, origin and paragenesis. Lab assignments to examine diverse properties of the discussed species.

007.759 Advanced Paleontology 1 (3) Topics in paleobiology of the invertebrates, and principles of paleontology. Upon request, course may be adapted to individual requirements of students in other disciplines (for example, specific groups of invertebrates, paleoecology, trace fossils, etc.). *Prerequisite:* 007.331 and 007.431 or permission of instructor.

007.760 Advanced Paleontology 2 (3) Topics in paleobiology of the invertebrates, and principles of paleontology. Upon request, course may be adapted to individual requirements of students in other disciplines (for example, specific groups of invertebrates, paleoecology, trace fossils, etc.). *Prerequisite:* 007.331 or 007.431 or permission of instructor.

007.761 Advanced Igneous Petrology (3) The origin of magmas, and their association with tectonic regimes, and earth structure. Crystallization and differentiation of magmas, and the distribution of elements and isotopes.

007.762 Advanced Metamorphic Petrology (3) Natural mineral assemblages and their association with igneous and tectonic events. Theory of variable physchem regimes, heterogeneous equilibrium, and reaction processes.

007.763 Ductile Strain in Geologic Minerals (3) The theory, mechanics and interpretation of naturally occurring ductile strain in consolidated and semi-consolidated rocks. Applications of analysis to engineering geology and structural geology.

007.764 Folding of Rocks (3) Ideal fold theory and mechanisms; experimental folding; fold geometry and styles; fold families; interference folding; interpretation of areas that have undergone folding.

007.765 Fracturing of Rocks (3) Experiments on, theory and properties of, fractures ranging in scale from micro-rocks to large scale fault zones; mechanisms of fracturing; interpretation of stress conditions leading to fracturing.

007.768 Physical Volcanology (3) Forms and environments of lava extrusion and flow; mechanics of pyroclastic eruptions and transport; nature of pyroclastic deposits; magma chambers; volcano development and destruction.

007.769 Precambrian Geology (3) Examination of the major lithologic components of the Precambrian Shields of Canada, Australia, and South Africa. Emphasis will be on the origin of these components, discussion of early crustal development, and similarities and differences of Precambrian and younger processes.

007.770 Advanced Clastic Sedimentology (3) Lectures and seminars on clastic depositional environments. Critical evaluation of accepted facies models followed in each case by examination of the ancient record. One week field trip and core logging required. *Prerequisite:* 390 or permission of instructor.

007.772 Geophysical Imaging and Data Processing (3) Advanced frequency filter design; deconvolution methods for seismogram; velocity and wavefield stacking; various digital methods for potential field data; principles of tomography and geophysical imaging techniques. *Prerequisite:* 007.374 or equivalent, and 007.726 or consent of instructor.

007.774 Workshop in the Geological Sciences 1 (3) Critical, in-depth group study of problems and new concepts in the geological sciences; discussion of current research by staff and visiting scientists; students will pursue individual research interests and will work with staff on specific topics.

007.775 Workshop in the Geological Sciences 2 (3) Critical, in-depth group study of problems and new concepts in the geological sciences; discussion of current research by staff and visiting scientists; students will pursue individual research interests and will work with staff on specific topics.

007.776 Seminar in Geological Sciences (3) A discussion of topics of current interest from the whole spectrum of geological sciences to inform students on research work outside their specialty. Required of all graduate students. For ancillary credit only.

007.777 Distribution of Ores: Metallogeny (3) Distribution of geological metal accumulations in space and time. Brief introduction to existing organizational frameworks, followed by a systematic review of metalliferous environments and associations. Offered in alternate years. *Prerequisite:* 007.430 or consent of instructor.

007.778 Advanced Carbonate Sedimentology (3) Lectures and seminars on selected topics of carbonate sedimentology, including depositional environments, lithofacies sequences and diagenesis. Offered in alternate years. *Prerequisite:* 007.390 or permission of instructor.

007.779 Advanced Instrumental Techniques in Geology (3) Lectures and laboratory course covering the application of microbeam, mass spectrometer, diffraction and wet geochemical analytical techniques in mineralogy and geochemistry. Includes coverage of ICP, PIXE, powder and single crystal diffraction and electron microprobe analysis.

007.780 Evaporite Sedimentology (3) Lectures and seminars on evaporite sedimentology, including depositional environments, diagenesis and stratigraphy of evaporitic sequences. One week field trip immediately before or during fall term required.

007.781 Electromagnetic Methods in Geophysics (3) Examination of the theory and application of electromagnetic methods in geophysics. Topics include: electrical properties of earth materials, review of EM methods, Em theory for layered media, EM responses of simple structures and case studies.

007.782 Environmental Geophysics (3) Examination of the application of geophysics to environmental targets. Topics will vary according to student interest and may include aspects of new-surface geophysics, engineering geophysics, geophysics of global climate change and geophysical risk assessment.

Geological Sciences Colloquium. Weekly discussion of topics of current interest. Presentation of recent research from geological literature, the department, and visitors. Required of all graduate students who have received credit for 007.776.

SECTION 28: German and Slavic Studies

Acting Head: Myroslav Shkandrij
General Office: 327 Fletcher Argue Building
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Website: www.umanitoba.ca/arts/german&slavic

Academic Staff

Professors Emeriti

Doerksen, V., M.A. (Manitoba), Ph.D. (Zurich); **Glendinning**, R.J., Dr.Phil. (Freiburg).

Senior Scholar

Rozumnyj, J., M.A. , Ph.D. (Ottawa).

Professor

Shkandrij, M., M.A., Ph.D. (Toronto).

Associate Professor

Aponiuk, N., M.A., Ph.D. (Toronto).

Assistant Professors

Heberger, A., M.A. (Waterloo), M.A./Staatsexamen (Mannheim), Ph.D. (Waterloo); **Nazarenko**, T., M.A., Kandydat Fil. Nauk (Kyiv National), Ph.D. (Alberta); **Paterson**, C., M.A., D. Phil. (Kiel).

Adjunct Professor

Divay, G. M.A. (Manitoba), Ph.D. (Laval).

Program Information

The department offers programs of study leading to the Master of Arts degree in the fields of German Language and Literature and Ukrainian Language and Literature. Programs must be arranged in consultation with the department head.

Pre-Master's Year

Students without a four-year degree or without an undergraduate major in the discipline to be studied must complete a pre-Master's year as approved by the chair of the appropriate graduate studies committee or his/her delegate before they can enter the Master's program. This year is intended to bring the student's standing to approximately the level of a four-year degree with a major in the appropriate discipline. It will normally consist of 24 credit hours of coursework, of which at least 12 are in the major discipline. At most, one grade of "C+" or lower in a course of six credit hours, or two grades of "C+" or lower in courses of three credit hours, will be permitted.

Master of Arts

Students may fulfil the requirements for the Master's degree by electing either of two possible programs of study: Coursework and thesis, or Coursework and comprehensive examination.

Coursework and thesis: a minimum of 15 credit hours of coursework is required. This shall include 12 credit hours, designated as major credit, in courses offered by the appropriate section of the department at the 700 level. The remaining three credit hours, designated as ancillary credit, may be taken at the 700, 400, 300 (or in exceptional circumstances the 200) level and may be in courses in the student's major discipline, or in another program or department, at the discretion of the chair of the Graduate Studies Committee.

Completion of a thesis as outlined in the faculty and department regulations.

Coursework and comprehensive examination: A total of 24 credit hours of coursework is required. This shall include a major credit and an ancillary credit. The major credit comprises 18 credit hours of coursework in the major discipline, of which at least 12 shall be at the 700 level, with no courses lower than the 400 level. The ancillary credit shall comprise six credit hours of coursework at the 700, 400, 300 (or in exceptional circum-

stances the 200) level, and may be in the major discipline or in another program or department, at the discretion of the chair of the Graduate Studies committee. Completion of the comprehensive examination.

Application Deadlines

The Department of German and Slavic Studies allows students to begin their program on either 1 September or 1 January. For admission for each of these start dates, Canadian/U.S. students should send their applications with complete supporting documentation to the Department of German and Slavic Studies no less than three (3) months before the intended start date. International students should send their applications with complete supporting documentation to the Department of German and Slavic Studies to arrive no later than seven (7) months before the intended start date.

Course Offerings

German

008.742 Colloquium in German Literature 3

008.754 Eighteenth-Century Seminar 6

008.760 Twentieth-Century Seminar 6

008.763 Seminar in German Literature 6

Slavic Studies

Russian

052.601 Basic Russian for Scientists (3-0:3-0) 6 Essentials of Russian grammar; translation of Russian scientific literature; discussions of ways of facilitating understanding of terminological difficulties; Russian terminological dictionaries.

Ukrainian

052.730 Selected Topics in Ukrainian Literature (3) Seminar discussions of various problems in Ukrainian literature relevant to candidates' dissertations.

052.736 Seminar in Contemporary Ukrainian Literature (3) Selected problems in contemporary Ukrainian literature as related to the student's field of research.

052.737 Studies in Ukrainian Literary Criticism (3) A study of sociological, formalistic, Marxist, and recent trends in Ukrainian literary criticism.

052.750 Studies in Ukrainian Modernism (3) Seminar on leading trends and ideas in twentieth-century Ukrainian literature.

052.753 Special Topics in Ukrainian Studies (3) An independent study course in Ukrainian literature, culture or folklore. Topics will be selected to meet student's research or study interests.

SECTION 29: History

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Fax: 204 474 7579
E-mail: history@umanitoba.ca
Website: www.umanitoba.ca/arts/history

Academic Staff

Distinguished Professors

Anna, T.E., B.A., M.A., Ph.D. (Duke), F.R.S.C.; **Friesen**, G.A., B.A.(Hons.) (Saskatchewan), M.A., Ph.D. (Toronto), F.R.S.C.

Professors Emeriti

Carroll, F.M., B.A., M.A. (Minnesota), Ph.D. (Dublin); **Lebrun**, R.A., B.A. (St. John's), M.A., Ph.D. (Minnesota); **Sandiford**, K.A.P., B.A.(Hons.) (University College of the West Indies), M.A., Ph.D. (Toronto); **Wortley**, J.T., B.A., M.A. D.D. (Durham), Ph.D. (London), F.R.Hist.S.

Senior Scholars

Kendle, J.E., B.A. (Manitoba), Ph.D. (London), F.R.Hist.S.; **Kerr**, I.J., B.A. (Pennsylvania), Ph.D. (Minnesota); **Moulton**, E.C., B.A.(Ed.), M.A. (Memorial), Ph.D. (London); **Steiman**, L.B., B.A.(Hons.) (Manitoba), M.A., Ph.D.(Pennsylvania); **Vadney**, T.E., B.A.(Hons.) (Toronto), M.A., Ph.D. (Wisconsin).

Professors

Bailey, P.C., B.A.(Hons.), M.A. (Oxford), Ed.Cert. (Manchester), Ph.D. (UBC); **Bumsted**, J.M., B.A. (Tufts), Ph.D. (Brown); **Ferguson**, B.G., B.A.(Hons.) (UBC), M.A. Carleton), Ph.D. (York); **Finlay**, J.L., B.A., M.A. (Cambridge), Ed.Cert. (Nottingham), Ph.D. (Manitoba); **Gerus**, O.W., B.A., M.A. (Manitoba), Ph.D. (Toronto); **Heller**, H., B.A. (Michigan), Ph.D. (Cornell); **Kinnear**, E.M., B.A. (Hons.), Dip.Ed., M.A. (Oxford), Ph.D. (Oregon), F.R.S.C.; **Kinnear**, M.S.R., B.A. (Saskatchewan), M.A. (Oregon), D.Phil. (Oxford); F.R.Hist.S.; **Rea**, J.E., B.A., M.A. (Manitoba), Ph.D. (Queen's); **Stambrook**, F.G., B.A.(Hons.) (Oxford), B.Sc.(Econ.)(Hons.), Ph.D. (London).

Associate Professors

Friesen, J., B.A. (McGill), Ph.D. (UBC); **Gabbert**, M.A., B.A. (Lewis and Clark), M.A., Ph.D. (California); **Nesmith**, T.C., B.A.(Hons.), M.A. (Queen's), Ph.D. (Carleton).

Assistant Professors

Brownlie, R., B.A., M.A., Ph.D. (Toronto); **Chen**, T.M., B.A. (Toronto), M.A., Ph.D. (Wisconsin); **Churchill**, D., B.A. (Trent), M.A. (OISE), Ph.D. (Chicago); **Cossar**, R., B.A.(Hons.) (McGill), M.A., Ph.D. (Toronto); **Elvins**, S., B.A.(Hons.) (Queen's), M.A., Ph.D. (York); **Perry**, A., B.A. (Simon Fraser), M.A., Ph.D. (York); **Ravindiran**, V., B.Sc. (Calgary), M.A., Ph.D. (Toronto); **Smith**, G., B.A.(Hons.) (UBC), M.A., Ph.D. (Toronto).

Adjunct Professor

Cook, T., B.A., M.A. (Alberta), Ph.D. (Queen's).

University of Winnipeg Department of History

Professors

Bailey, D., Ph.D. (Minnesota); **Brown**, J.S.H., Ph.D. (Chicago); **Burbank**, G., Ph.D. (Berkeley); **Burley**, D., (Ph.D. (McMaster); **Loewen**, R., Ph.D. (Manitoba); **McCormack**, A.R., Ph.D. (Western Ontario); **Reilly**, N., Ph.D. (Dalhousie); **Stone**, D.Z., Ph.D. (Indiana); **Topper**, D., Ph.D. (Case Western); **Young**, R.J., Ph.D. (London).

Associate Professors

Abreu-Ferreira, D., Ph.D. (Memorial); **Meyers**, T., Ph.D. (McGill).

Assistant Professors

Freund, A., Ph.D. (Bremer); **Hanley**, J., Ph.D. (Yale); **Hele**, K., M.A. (Toronto); **Keshavjee**, S., Ph.D. (Toronto); **Majzels**, C., Ph.D. (Pennsylvania).

Program Information

The department offers programs leading to both the Master of Arts and Doctor of Philosophy Degrees. The MA program is a joint degree program offered by the History departments of the University of Manitoba and the University of Winnipeg. Students have available the educational and financial resources of both institutions.

Fields of Research

Research interests of faculty are reflected in the fields offered for graduate study in the department. These include: The Americas, Britain and the Commonwealth, Canada, Medieval European, Modern Europe, Asia as well as in Social History, Modern World, History of Science and Archival Studies.

Research Facilities

There are excellent archival and library facilities in Winnipeg. The most important research libraries are located at The University of Manitoba and the Manitoba Legislative Library, both of which are official repositories for Canadian publications and which support original research in most areas of Canadian history. The Hudson Bay Company Archives is a world-renowned institution for the study of imperialism, first nations and western and northern North America. Other major archival facilities include: The Provincial Archives of Manitoba, The University of Manitoba Archives and Special Collections, The Manitoba Office of the National Archives, United Church Archives, Western Canada Pictorial Index, the Centre du Patrimoine and the City of Winnipeg Archives.

M.A. in History

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

Students are required to submit their applications to the department by January 1 for International students and June 1 for Canadian/U.S. students. Applications are only accepted for September admission.

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students may choose among three versions of the program. These are, first, a course-based M.A., second, a thesis-based M.A and, third, an M.A. in Archival Studies. The course-based M.A. requires four courses, three of which should be 700/7000-level History courses. In addition, the student is required to select a major field, and must pass both a written and oral comprehensive examination in that field. The thesis-based M.A. requires two 700/7000-level courses and the presentation of a thesis. The Archival Studies M.A. requires three graduate courses, an Internship and a thesis.

Second Language Reading Requirement: All graduate students in History are required to demonstrate a reading knowledge of a second language. Candidates who specialize in Canadian History must display a reading knowledge of French and English. Texts for translations are chosen by the History department. Examinations are conducted by faculty in the language departments at the University of Manitoba.

Expected Time to Graduate: All requirements for the degree of M.A. in History must be fulfilled within five years of the original date of entry to the Program.

Ph.D. in History

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

Students are required to submit their applications to the department by January 1 for International students and June 1 for Canadian/U.S. students. Applications are only accepted for September admission.

Program Requirements

The minimum course requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Second Language Requirement: All graduate students in History are required to demonstrate a reading knowledge of a second language. Candidates who specialize in Canadian History must display a reading knowledge of French and English. Texts for translations are chosen by the History department. Examinations are conducted by faculty in the language departments at the University of Manitoba.

Expected time to graduation: All requirements for the degree of Ph.D. in History must be completed within seven years of the original date of entry to the program.

Course Descriptions

NOTE: Courses numbered in the 011.7xx-series are offered at the University of Manitoba; the 029.7xxx-series designates courses offered by the University of Winnipeg.

African and Asian

011.728/029.7708-1 Tropical Africa in the 19th and 20th Centuries (6) Emphasis will be placed on the development of the European-African relationship from the need of the slave trade to independence. Specific topics considered will be imperialism, African nationalism, colonialism, independence movements, revolutionary wars, and the European legacy in Africa.

011.782 Issues in Modern Asian History : Selected Topics (3) The content of this course will vary. Emphasis will be on analysis of important issues and recent developments in the history and historiography of modern Asia. Consult the History Department for particulars.

American

011.718/029.7608-1 Studies in American History to 1877 (6) An examination of selected topics in American history from colonial beginnings to Reconstruction. Particular topics will be announced each year.

011.719/029.7609-1 Studies in American History since 1877 (6) An examination of selected topics in American history from Reconstruction to the present. Particular topics will be announced each year.

011.765/029.7605-1 American Diplomatic History (6) An examination of selected topics in American foreign relations.

011.773/029.7701-1 Modern Latin America (6) An examination of selected themes such as economic and social change, political modernization, and external influences and intervention in Latin America during the 19th and 20th centuries.

Archival Studies

011.737 History of Recorded Communication (6) An examination of aspects of the history of recorded communication from antiquity to the present. The aim of the course is better understanding of the nature of archival records. Emphasis is placed on Canadian examples from the 19th and 20th centuries.

011.738 Selected Problems in Archival Studies (6) An examination of selected problems in archival theory and administration. The aim of the course is better understanding of the administration of records in archival institutes. Archival theory and administration are studied in relation to the history of recorded communication and records keeping. Emphasis is placed on Canadian examples from the 19th and 20th centuries.

011.739 Internship in Archival Studies (3) The internship provides an introductory work experience in a Canadian archives to students who have successfully completed the first year of archival studies. The internship will be no less than three months in duration. It is done in the summer after the first year of study.

British and Commonwealth

011.723/029.7304-1 Nineteenth-Century Britain (6) A study of British culture, politics, and diplomacy, 1830-1900.

011.774 England in the Long Eighteenth Century (6) Selected themes in the history of England's long eighteenth century, from 1660-1840. Specific topics will vary from year to year, but will generally include the transformation of political culture, the consequences of war, the question of national identities, the emergence of commercial society and the changes in social structure.

Canadian

011.729/029.7509-1 Reading Seminar in Canadian History, 1860 to the Present (6) While the specific content may vary from year to year, the general approach shall be to ensure a broad sampling of the secondary literature in Canadian history. Political, social and economic themes will be emphasized and particular concern shall be taken with historiographical controversy.

011.733/029.7503-1 History of Western Canada (6) A research course in western Canadian history. The range of subjects will vary from year to year depending on the interests of the students. The subjects range from the fur trade to modern political, social, and economic issues.

011.736/029.7506-1 Canadian-American Relations (6) A historical survey in which the student may concentrate on such periods and aspects (political, economic, cultural, diplomatic, etc.) as may be of particular interest.

011.760/029.7510-1 Northern Historical Studies (6) This course is based upon a number of studies of various aspects of the North. Particular emphasis is given to the North in relation to the fur trade, exploration, and Canadian development.

011.767/029.7517-1 Studies in Canadian History, 1870-1919 (6) This seminar will focus on social, intellectual, political, and economic themes, with particular emphasis on the western experience. Specific topics will vary from year to year depending upon the interests of students and instructors.

011.775 Gender History in Canada (6) Gender history explores the roles, images, and experiences of masculinity and femininity in the past. This course will familiarize students with the changing theoretical and historiographical terrain of gender history. It will draw on the international literature but focus on the history of gender in Canada, examining how historians analyse masculinity, femininity, the family, sexuality, politics, race/ethnicity, moral regulation, class, nation, and colonialism.

011.781/029.7511-1 Studies in the Social History of British North America, 1760-1867 (6) Themes may include the fur trade, Euro-Aboriginal relations, immigration, rural and urban social patterns, the instruments of culture (religion, education, the family, etc.), and the social implications of political and economic development.

Medieval

011.741/029.7201-1 The Crusades (6) An inquiry into the origins of the Crusading movement in the West and into its impact in the East, with special reference to the role it played in hastening the end of the East Roman Empire.

011.742/029.7202-1 Medieval Monasticism (6) Reading and research assignments in the history of Western monasticism.

011.744/029.7204-1 Europe in the Fourteenth Century (6) Reading and research assignments in the principal developments of the 14th century.

011.746/029.7901-1 Scientific Studies in the Middle Ages (6) The seven liberal arts in Greek, Roman, and European school literature and practice will be reviewed with emphasis on arithmetic, geometry, astronomy, and harmonics, and the development of experimental science.

011.747/029.7207-1 The Later Middle Ages (6) Selected topics in economics, social, cultural, art and religious history of the later medieval world. Students may not hold credit for both 011.747 and the former 011.743.

011.748/029.7208-1 The Early Middle Ages (6) A detailed examination of selected aspects of the early medieval world during the period 313-800 A.D.

Modern East European

011.756/029.7210-1 The Russian Revolution (6) The events constituting the Revolution proper (1917-21) will be studied in relation to their historical background and in the light of their subsequent impact both nationally and globally.

011.768/029.7318-1 Modern East Central Europe (6) A study of nationalism and communism in the 19th and 20th centuries. "Western" attitudes towards the area will also be discussed. Excludes the Soviet Union.

011.780/029.7310-1 Imperial Russia (6) A study of selected problems in Russian Imperial history covering the 18th and 19th centuries.

Modern European

011.751/029.7210-1 Early Modern European History (6) A seminar which studies early modern Europe from the perspective of new approaches to historiography.

011.752/029.7302-1 The Age of Enlightenment (6) Emphasis on 18th century French intellectual history and its relationship to the origins and course of the French Revolution. Some reading knowledge of French is almost essential.

011.755/029.7305-1 Twentieth-Century Europe (6) An analysis of selected problems in the recent history of Europe.

011.766/029.7306-1 Nineteenth Century Europe (6) An analysis of selected problems in 19th century European history.

011.769/029.7902-1 Post-Newtonian Scientific Thought (6) Selected topics in the history of the physical, geological and biological sciences from the time of Newton through to the early 20th century. The relationships of scientific ideas to other philosophical, religious and social developments will be emphasized throughout.

Modern World

011.791/029.7108-1 Studies in Modern World History (6) A seminar emphasizing the period since 1945. With the agreement of the instructor and depending on the needs of their degree programs, students may select a reading or research option.

011.792/029.7106-1 Popular Radicalism in the Modern World (6) Selected topics in the history of popular movements of social and political protest in the modern world. The course considers problems such as the conditions and motivations that give rise to social movements, the development of radical theory and political practice, and the culture of dissent. Students may not hold credit for both 792 and the former 726.

Social

011.727/029.7004-1 Special Studies in Social History (6) A seminar course, the content of which will vary from year to year.

011.761/029.7101-1 National States and National Minorities (6) A historical approach to the development of nationalism in Canada and Europe. Special attention paid to the treatment of minority groups in the 19th and 20th centuries in educational and cultural fields.

011.771/029.7107 - History and Cultural Studies (6) A working guide to interdisciplinary approaches of the new field of Cultural Studies, examining its principal theoretical bases and existing and potential applications for the historian.

General

011.770/029.7005-1 Historical Method (6) A seminar and workshop in historical method. The topics covered will encompass conventional research, analysis and writing, as well as the application of social science techniques to the analysis of historical problems, the fundamentals of data processing, and computer applications.

011.790/029.7090-1 Introduction to Documentary Editing (6) Examination of the major problems of editing documents, including transcription procedures, paleography, textual collation, editorial apparatus, computer text processing, permissions and copyrights, and publications.

Other

011.777/029.7003-1 Selected Topics (6) A program of independent reading and/or research on selected topics, undertaken and arranged by a student in consultation with his prospective instructor, upon the approval of the Graduate Chair.

NOTE: Master's students have the option of a History of Science area by combining 029.7901-1 and 029.7902-1.

SECTION 30: Human Anatomy and Cell Science

Head: J. Thliveris
General Office: 130 Basic Medical Sciences Building,
730 William Avenue
Telephone: (204) 789 3652
Fax: (204) 789 3920
E-mail: anatomycellsci@umanitoba.ca
Website: www.umanitoba.ca/medicine/anatomy

Academic Staff

Professor Emeritus

Persaud, T., M.D., D.Sc. (Rostock), Ph.D. (West Indies), F.R.C.P. (London), F.R.C.P.I.

Senior Scholar

Nathaniel, E., M.B.B.S. (Madras), M.S., Ph.D. (UCLA).

Professors

Anderson, J., B.Sc.(Med.), Ph.D. (Manitoba); **Bruni**, J., B.Sc. (Prince Edward Island), M.Sc., Ph.D. (Western Ontario); **Kardami**, E., D.B. (Athens), Ph.D. (London); **Paterson**, J., M.Sc., Ph.D. (McGill); **Thliveris**, J., B.A. (Colorado), M.S. (Utah), Ph.D. (Oregon); **Vriend**, J., B.A. (Calvin), M.Sc. (Alberta) Ph.D. (San Antonio).

Associate Professors

Bergen, H., B.Sc. (Hons.) Ph.D. (UBC); **Birek**, C., D.D.S. (Tirgu-Mures), Ph.D. D. O.P. (Toronto); **Karim**, A., M.Sc., Ph.D. (McGill); **Lyons**, E., B.Sc., M.D., B.Sc.(Med.), F.R.C.P.C.; **Scott**, J., B.Sc. (Brandon), M.Sc.; Ph.D. (Manitoba); **Vrontakis-Lautatzis**, M., M.D. Ph.D. (Athens).

Assistant Professors

Cooper, J., Dip.P., O.T. (Toronto); B.O.T., M.Sc., Ph.D. (Manitoba); **Del Bigio**, M., M.D., B.Sc.(Med.), Ph.D.; **Eisenstat**, D., M.D., M.A., F.R.C.P.C., F.A.A.P.; Kong, J., M.D., Ph.D. (China); **McCoshen**, J., B.Sc. (N.S.), M.S. (New York), Ph.D. (McMaster).

Adjunct Professor

Orr, F., M.D. (Alberta), F.R.C.P.C., Dip. A.B.(Path)

Program Information

The Department of Human Anatomy and Cell Science offers graduate training at both the M.Sc. and Ph.D. levels. The purpose is to prepare students for careers in biomedical research, for teaching in selective areas of anatomy and admission to clinical programs. It is the only department to offer basic and advanced courses in gross, microscopic and developmental anatomy. It also offers courses in neuroscience, cell biology, electron microscopy and cardiac lipids. These have now become particularly important tools in assessing outcomes associated with use of transgenic and gene knockout animals as models of human disease. Graduate students are also provided with opportunities to teach in various sub-disciplines of anatomy. In addition to transmitting knowledge, they must also generate new knowledge by undertaking meaningful research. The department also provides a fine milieu for cross-fertilization of ideas, and more personalized attention; benefits of a smaller department. The department offers a multidisciplinary program in biomedical applications of imaging and spectroscopy in conjunction with Institute for Biodiagnostics – National Research Council. Various members of the department are affiliated with the Faculty of Dentistry, School of Medical Rehabilitation, University of Winnipeg, and St. Boniface General Hospital Research Centre. The department also provides continuing medical education to the allied health science community.

Fields of Research

The Department consists of a number of faculty, each of which are experts in one or more sub-disciplines of anatomy. Quality teaching programs are enriched by scholarly pursuits of department members who are engaged in research of the highest quality in the following areas: muscle repair, developmental anatomy and biology, cardiology, neuroendocrinology, cell and molecular biology and neuroscience. Graduate students are provided with the opportunity to use a variety of contemporary techniques such as autoradiography, light and electron microscopy, morphometrics, tissue culture and transplantation, high performance liquid chromatography, immunocytochemistry, in situ hybridization, radioimmunoassay, electrophoresis, transgenics, molecular biology, magnetic resonance imaging and spectroscopy.

Research Facilities

The department is spacious, has excellent facilities and is well equipped for research. The department houses an electron microscopy suite equipped with scanning and electron microscopes, a communal tissue culture, histology, and autoradiography facility, and a satellite animal facility. Individual research laboratories are equipped with microscopes (fluorescence, transmitted light, dissecting), photomicrography apparati, high performance liquid chromatography, and radioimmunoassay capabilities, polymerase chain reaction (PCR), DNA sequencing, genomic cloning and other molecular biology facilities. Personnel also have access to magnetic resonance imaging and MR spectroscopy facilities.

M.Sc. in Human Anatomy and Cell Science

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. The following categories of students may be accepted for graduate study in this department:

- 4-year undergraduate Science degree with a minimum GPA of 3.0.
- Students who have completed a 3-year general undergraduate degree may be admitted following completion of the required pre-Master's courses. Contact the Department for details.
- Graduates in medicine or dentistry holding M.D., D.M.D. (D.D.S.), or equivalent degrees.
- Other suitable graduates will be considered.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students are required to take Methodology of Research (080.709) and one of Cell Biology (165.709), Human Microscopic (Histology) Anatomy (080.736); Human Macroscopic (Gross) Anatomy (080.737); Neuroscience 1 (080.727) or Human Developmental (Embryology) Anatomy (080.738) plus an appropriate course in statistics (Biostatistics 1, 093.747) or equivalent. Students must then complete a thesis.

For supplementary regulations and other information please contact the Department of Human Anatomy and Cell Science.

Second language reading requirement: none
Expected time to graduate: three years

Ph.D. in Human Anatomy and Cell Science

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students are required to take Readings in Anatomy (080.733) and one of Cell Biology (165.709), Human Microscopic (Histology) Anatomy (080.736); Human Macroscopic (Gross) Anatomy (080.737); Neuroscience 1 (080.727) or Human Developmental (Embryology) Anatomy (080.738) not already completed at the Master's level. Before receiving the Ph.D. degree, students must have taken an appropriate statistics course (Biostatistics 1 093.747 or equivalent) if not already completed.

For supplementary regulations and other information please contact the Department of Human Anatomy and Cell Science.

Second language requirement: none
Expected time to graduation: five years

Course Descriptions

The enrolment in these courses is limited, therefore students must receive authorization from the Department of Human Anatomy and Cell Science before registering. Not all courses are offered each year.

165.709 Cell Biology (6) Comprehensive introduction to the structure and function of cells. *Prerequisite:* consent of instructor.

080.706 Advanced Human Macroscopic (Gross) Anatomy (6) Dissection and presentations on special anatomical relationships of of bidy regions with particular importance relative to the research projects and interests of students concerned. Both terms. *Prerequisite:* 080.737 or equivalent; consent of instructor.

080.709 Methodology of Research (3) Theoretical and practical instruction in scientific investigation, research design, data analysis and presentation, and writing research proposals.

080.725 Experimental Teratology (3) Basic principles of experimental teratology in lectures, seminars, and practical work. The causes, embryological basis, and mechanisms of developmental defects will be covered.

080.727 Neuroscience 1 (6) Basic anatomical and clinical aspects of the nervous system.

080.728 Neuroscience 2 (6) Application of basic neurological sciences to the general practice of medicine. Lectures, seminars, clinics. *Prerequisite:* 080.727.

080.732 Introduction to Scanning and Transmission Electron Microscopy (3) Designed to provide general theoretical aspects of electron microscopy and practical knowledge of electron microscopic laboratory procedures. 3 hours lecture/lab per week, one term. Minimum enrollment: 5 students. *Prerequisite:* written consent of instructors.

080.733 Readings in Anatomy (3) Regular tutorials on selected topics in Anatomy and research related to student's research work. The tutorials will be incorporated into the Department's seminar program.

080.735 Cardiac Lipids and Membrane Function (3) Provides detailed account of the role of cardiac bioactive lipids on membrane properties and functions. Two hour tutorials per week, one term. *Prerequisite:* written consent of instructor.

080.736 Human Microscopic Anatomy (Histology) (6) Microscopic structure correlated to function, of tissues and organs of the human body. Lecture and laboratory course.

080.737 Human Macroscopic Anatomy (Gross) (8) Dissection, living anatomy, and radiographic anatomy.

080.738 Human Developmental Anatomy (Embryology) (3) Human development as it is of practical application to medical subjects.

080.739 Structural Organization in Human Anatomy (3) A course for students participating in physics, chemistry, computer science, engineering, architecture, and mathematics (non-biological areas). A conceptual approach to Human Anatomy, for direct application to information obtained with current and developing techniques for detection, diagnosis, treatment and management of human lifestyle and disease. *Prerequisite:* consent of instructor(s). Minimum enrollment: 3

080.740 Morphological Techniques (3) Designed to develop advanced morphological techniques such as immunohistochemistry, in situ hybridization, immunogold, in situ PCR, cell culture, autoradiography, antero- and retro-grade tracing techniques.

090.738 Cardiovascular Cell Biology (3) A comprehensive lecture course on morphology, biochemical composition and function of the cardiac and smooth muscle cell, with particular emphasis on developmental and injury-related issues. Topics include the description of various cardiac cells and their immediate extracellular environment, intercellular communication, cardiac development, control of cell cycle, hyperplasia and hypertrophy, cardiac growth factors, mechanism of injury and cell death, regeneration, heat shock proteins and cardioprotection. **NOTE**: Students must register through the Department of Physiology for this course.

SECTION 31: Human Nutritional Sciences

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Website: www.umanitoba.ca/human_ecology/foods/gradprogram.shtml

Academic Staff

Professor Emeritus and Senior Scholar

McDonald, B.E., B.Sc., M.Sc. (Alberta), Ph.D. (Wisconsin).

Senior Scholar

Vaisey-Genser, F.M., B.Sc. (H.Ec.) (Manitoba), M.Sc. (McGill).

Professors

Bird, R.P., B.Sc. (Waterloo), M.Sc., Ph.D. (Guelph); **Eskin**, N.A.M., B.Sc., Ph.D. (Birmingham); **Friel**, J.K., B.Sc. (Loyola), M.Sc. (Saskatchewan), Ph.D. (Guelph); **Ogborn**, M.R., M.B.B.S., C.R.C.P.C., F.R.C.P.C. (Adelaide).

Associate Professors

Aukema, H.M., B.Sc., M.Sc., Ph.D. (Guelph); **Przybylski,** R., B.Sc. (Wroclaw), M.Sc., Ph.D. (Poznan); **Sevenhuysen**, G.P., B.Sc., Ph.D. (London); **Taylor**, C.G., B.H.Ecol. (Manitoba), Ph.D. (Guelph); **Watts**, B.M., B.Sc. (H.Ec.), M.Sc., Ph.D. (Manitoba); **Weiler**, H.A., B.A.Sc. (Guelph), Ph.D. (McMaster).

Assistant Professors

Aluko, R., B.Sc. (Lagos), Ph.D. (Guelph); **House,** J.D., B.Sc. (Agr), Ph.D. (Guelph); **Marchessault**, G.D., B.H.Ec., M.Sc., Ph.D. (Manitoba); **Tappia,** P.S., B.Sc. Pharmacology (Hons.) (Sunderland), Ph.D. (Wolverhampton).

Adjunct Professors

Ames, N., B.Sc., M.Sc. (Manitoba), Ph.D. (Guelph); **Corby**, L., B.Sc., Dietetic Internship (Alberta), M.Sc. (U of Alberta Hospital), M.Educ. (Manitoba); **Daun** J.K., B.Sc., M.Sc., Ph.D. (Manitoba) **Fitzpatrick**, D.W., B.A. (Queen's), B.Sc., M.Sc. (Guelph), Ph.D. (Rutgers); **Lukow**, O.M., B.Sc., M.Sc., Ph.D. (Manitoba); **Malcolmson**, L.J., B.H.Ec., M.Sc., Ph.D. (Manitoba); **Murphy**, P.S., B.H.Ec., M.Ed. (Manitoba), Diploma Dietetics (Alberta).

Program Information

The University of Manitoba is the only university in the province to offer graduate programs leading to the degrees of Master of Science and Doctor of Philosophy in the area of foods and nutrition, and the Department of Human Nutritional Sciences is one of the largest in Canada. Graduate programs in Human Nutritional Sciences focus on the role of nutrients and foods in metabolism and human health. Research in experimental nutrition explores the role of foods and nutrition in basic biological processes from the whole organism to the cellular level. Community and clinical nutrition research focuses on policy development, food choice behavior and novel approaches to disease management. Research related to foods includes investigations of the quality and stability of ingredients, development of functional and nutraceutical components from grains, oilseeds and legumes, and consumer preference and sensory characteristics of foods.

A multidisciplinary approach to research is common, with linkages to medicine, agricultural and food sciences, management, dentistry, nursing and physical education and recreation studies.

Courses offered in nutrition and metabolism address topics in phytochemicals, proteins, energy and carbohydrates, lipids, vitamins, minerals and trace elements. Community nutrition courses include topics in qualitative research, epidemiology, public policy and theoretical approaches to dietary change interventions. Topics related to food research include nutraceuticals, functional foods, lipids, flavour chemistry and sensory properties of foods.

An informal atmosphere exists with free interaction between faculty and graduate students. The department attracts local, national and international students, many of them holders of prestigious scholarships. Graduate student training in the Department of Human Nutritional Sciences has led to careers as: research scientists, technical specialists and research supervisors in food and pharmaceutical industries, food and nutrition policy analysts, food service managers, health and wellness specialists and educators, nutrition consultants, university and government employees, food quality assessment and research supervisors in government and agricultural laboratories.

Graduates of the M.Sc. program are qualified to meet the demands of the public, industry and government for food and nutrition specialists skilled in planning, administering and evaluating programs. The program also includes training in biochemical and analytical methods.

A practicum in clinical dietetics, in conjunction with the Master of Science program, is offered on a competitive basis for students who wish to meet the membership requirements of Dietitians of Canada.

Training at the Ph.D. level is offered as an Interdepartmental Ph.D. in Food and Nutritional Sciences. It is designed for individuals who will teach in the nutrition or foods areas, train other researchers, design and execute major research projects, and serve as senior advisors and consultants in health, social or economic policy and planning.

Fields of Research

Specific areas of research interests include the following: role of diet in health and disease, including cancer, diabetes, renal disease, bone diseases and inflammatory bowel diseases; community nutrition, including nutritional assessment, the study of consumer perceptions and food choices, and evaluation of nutrition education and programs; identification and development of functional foods and nutraceuticals, and evaluation of their health benefits; effect of nutrients on body defence and immune systems including those involved in cell damage and repair and detoxification of environmental pollutants; nutritional biochemistry and nutrient-gene interactions; functional and health aspects of nutrients and foods in pediatric and geriatric populations; application of the knowledge of functional foods and nutraceuticals in the design of food products for the general population and specific groups of individuals; effects of modification and processing of oilseeds and oils on quality, stability and performance of foods; relationship of sensory and chemical flavour properties of foods; food security and policy development, cultural and social aspects of food choice behaviours.

Research Facilities

Human Nutritional Sciences houses laboratories for basic as well as applied research. These are equipped with modern analytical instrumentation designed to carry out studies of complex materials. Laboratories such as the Canada Foundation for Innovation Nutritional Sciences Research Facility are equipped with the tools to carry out research at the cellular and molecular levels, such as fluorescent and chemiluminescent imaging, gene amplification, phosphorimaging, high pressure liquid and gas chromatography equipment and cell culture facilities. The George Weston Ltd. Sensory and Food Research Laboratory, with controlled ventilation and lighting and a computerized sensory analysis system, provides a controlled setting for testing of food products. This facility is used to evaluate the effects of food ingredients and nutraceuticals, storage conditions and preservation on food quality and consumer acceptance as well as on the commercial viability of a food or food products.

M.Sc. in Human Nutritional Sciences

Admission

To be admitted to the Master of Science program in the Department of Human Nutritional Sciences, a student must have a relevant undergraduate degree with a GPA of at least 3.0. An undergraduate degree from the Department OR another undergraduate degree with three credits of physiology, three credits of biochemistry and six credits in upper level (300 or 400) foods and nutrition courses are required for unconditional admittance.

Students with a three-year undergraduate degree will be required to enter at the Pre-Master's level. Contact the department for details.

Application Deadlines

Canadian and U.S. students should send their application and all supporting documentation to the Department of Human Nutritional Sciences, **at least three months** prior to their intended start date. International students should send their application and all supporting documentation to the Department of Human Nutritional Sciences, **at least six months** prior to their intended start date.

Program Requirements

As part of the minimum 12 credit hrs required in the program, all students are required to take 30.720 as well as 6 credit hours in Human Nutritional Sciences at the 700 level. These 6 credit hours must comprise courses from at least two of the following three general subject areas: Foods (Flavour Chemistry and Sensory Properties of Food, Chemistry and Function of Food Lipids, Nutraceuticals in Human Health, Advanced Problems in Foods), Community Nutrition (Qualitative Research in Nutrition, Nutrition in Public Policy, Theoretical Approaches to Dietary Change Interventions, Nutritional Epidemiology, Advanced Problems in Nutrition) and Metabolic Nutrition (Vitamin Nutrition and Metabolism, Mineral and Trace Element Nutrition and Metabolism, Lipid Nutrition and Metabolism, Protein Nutrition and Metabolism, Phytochemical Nutrition and Metabolism, Energy and Carbohydrate Nutrition and Metabolism).

Note that in addition to the required courses in the M.Sc. program, if a student's background is weak in specific areas related to his/her area of research, additional courses may be required. Any additional course requirements beyond the minimum stated above and subject to the Faculty of Graduate Studies' maximum of 24 credit hrs will be determined by the student's thesis advisory committee and may include courses in statistics, communications, research methods or specialized courses in foods or nutrition. Students must also complete a thesis project in food and/or nutrition research.

Second language reading requirement: none, unless specified in program of study.

Expected time to graduate: two years.

Ph.D. in Food and Nutritional Sciences

Requirements for the Interdepartmental Ph.D. program in Food and Nutritional Sciences are given in the Interdisciplinary Programs Section (Section 34.2) and in the Regulations Section (Section 5).

Candidates for the Interdepartmental Ph.D. program will take courses in both the food sciences and nutritional sciences areas, and additional courses appropriate to the candidate's area of study and research.

Course Descriptions

030.707 Advanced Problems in Foods (3) Selected topics related to consumer acceptability of foods.

030.711 Advanced Problems in Nutrition (3) Studies of selected problems and programs in community nutrition emphasizing program planning and evaluation.

030.720 Seminar in Food and Nutrition Research (3) A critical study of selected topics in food and nutrition research involving oral presentations and discussions. This is a required course for all M.Sc. students in the Department of Human Nutritional Sciences.

030.744 Protein Nutrition and Metabolism (1.5) Lectures and critical reviews will be used to discuss recent/significant research advances in the fields of protein nutrition and metabolism, pertinent to mammalian physiology. Also offered as 035.744 by the Department of Animal Science. Offered in 2003-04 and alternate years thereafter.

030.745 Energy and Carbohydrate Nutrition and Metabolism (1.5) Lectures and critical reviews will be used to discuss recent/significant research advances in the field of energy/carbohydrate nutrition and metabolism, pertinent to mammalian physiology. Also offered as 035.745 by the Department of Animal Science. Offered in 2003-04 and alternate years thereafter.

030.746 Lipid Nutrition and Metabolism (1.5) Lectures and critical reviews will be used to discuss recent/significant research advances in the field of lipid nutrition and metabolism, pertinent to mammalian physiology. Also offered as 035.746 by the Department of Animal Science. Offered in 2004-05 and alternate years thereafter.

030.747 Vitamin Nutrition and Metabolism (1.5) Lectures and critical reviews will be used to discuss recent/significant research advances in the field of vitamin nutrition and metabolism, pertinent to mammalian physiology. Also offered as 035.747 by the Department of Animal Science. Offered in 2004-05 and alternate years thereafter.

030.748 Mineral and Trace Element Nutrition and Metabolism (1.5) Lectures and critical reviews will be used to discuss recent/significant research advances in the field of mineral nutrition and metabolism, pertinent to mammalian physiology. Also offered as 035.748 by the Department of Animal Science. Offered in 2004-05 and alternate years thereafter.

030.749 Phytochemical Nutrition and Metabolism (1.5) Lectures and critical reviews will be used to discuss recent/significant research advances in the field of photochemical nutrition and metabolism, pertinent to mammalian physiology. Also offered as 035.749 by the Department of Animal Science. Offered in 2003-04 and alternate years thereafter.

030.750 Chemistry and Function of Food Lipids (1.5) Lectures and critical reviews will be used to discuss recent/significant research advances in the field of food lipid development, processing, analysis and function. Offered in 2004-05 and alternate years thereafter.

030.751 Flavour Chemistry and Sensory Properties of Foods (1.5) Lectures and critical reviews will be used to discuss recent/significant research advances in the field of food flavour and off-flavour chemistry and in the mechanics of sensory assessment. Offered in 2004-05 and alternate years thereafter.

030.752 Nutraceuticals in Human Health (1.5) Lectures and critical reviews will be used to discuss recent/significant research advances in the field of nutraceuticals and the impact of food and raw materials on nutrition and human health. Offered in 2003-04 and alternate years thereafter.

030.753 Nutrition in Public Policy (1.5) Focus on public policy related to the nutrition and health status of Canadians, including food and nutrition policies, health public policy, influence of trade regulations, context of health systems, social and economic environments. Offered in 2004-05 and alternate years thereafter.

030.754 Nutritional Epidemiology (1.5) Focus on epidemiology principles and survey techniques for assessing and predicting individual nutritional status, assessing relevant community resources and reporting results to granting agencies and decision makers. Offered in 2003-04 and alternate years thereafter.

030.755 Qualitative Research in Nutrition (1.5) A critical examination of methodological, analytical and interpretative issues in qualitative research as applied to nutrition and food-related issues. Offered in 2003-04 and alternate years thereafter.

030.756 Current Topics in Human Nutrition (1.5) Lectures and critical reviews will be used to discuss recent/significant research advances in nutrition and foods research.

030.757 Theoretical Approaches to Dietary Change Interventions (1.5) Theoretical approaches to dietary behaviour change and critical analysis of their application in nutrition intervention programs for individuals and populations.

030.758 Applied Nutrition (6) Experience in the application of nutrition theory to the management of nutrition related disease in a clinical setting supervised by registered dietitians. *Prerequisites:* Undergraduate coursework which meets the requirements for admission to Dietitians of Canada. An application is required for limited enrolment. Not to be used toward the fulfillment of the minimum 12 credit hours required in the program. Not to be held with the former 030.719.

Ancillary Courses

Ancillary courses may be selected from the following departments: Biochemistry, Statistics, Physiology, Microbiology, Psychology, Sociology or from other areas related to the student's research.

SECTION 32: Icelandic

Head: David Arnason
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Telephone: (204) 474 8487
Fax: (204) 474 7591
E-mail: uctyp@cc.umanitoba.ca
Website: www.umanitoba.ca/arts/icelandic

Program Information

The Department of Icelandic offers innovative and challenging programs of study leading up to the M.A. degree. The aim of the program is to develop student knowledge of Modern and Old Icelandic language and literature and to train students in the methods of scholarship. Graduate courses are offered on demand and can often be tailored to particular interests. Courses in Old Icelandic language and literature allow students access to the fascinating world of medieval Icelandic culture, and constitute an important addition to the study of medieval, religious, literary and linguistic history of Western Europe. Iceland's size, geographical isolation, relatively homogeneous population, and history of documentation has made it a popular area for comparative research in a wide range of disciplines. Modern Icelandic provides access to the wealth of sources recorded in Iceland and North America relating to the realms of medicine, social sciences, law and politics, biology, geology and culture, that allow for such comparative studies. Courses which focus on North American-Icelandic history, culture and literature provide unique insights into Canadian culture and history from a minority point of view, and allow access to sources which enable students to do comparative research in the field of minority groups in Canada. These courses also form a part of the University of Manitoba's interdisciplinary degree program in Canadian studies.

Fields of Research

The department actively pursues and promotes the study of North American-Icelandic culture. Research activities in the department have served to examine the role of North American Icelanders as a cultural minority group in Canada and to highlight the contribution of Icelandic Canadians to Canadian and Icelandic culture and literature through publications, translations and conferences. Scholarship in the department has also focused on translations, text editions and studies of medieval Icelandic literature, such as the law books of early Iceland and Icelandic saints' lives. The department supports a strong program of scholarly publications, of which the Icelandic Studies Series of the University of Manitoba Press is an example. Publications include: *The Book of Settlements: Landnámabók* (1972); *A History of the Old Icelandic Commonwealth* (1974); *Edda: A Collection of Essays* (1983); and *Laws of Early Iceland: Grágás I & II* (1980, 2000). Within the field of Icelandic-Canadian literature, the following publications may be mentioned: *Western Icelandic Short Stories*, trans. K. Wolf and A. Hjaltadóttir (1992), *Western Icelandic Women Writers*, trans. K. Wolf (1997), and *The Icelandic Voice in Canadian Letters,* D. Neijmann (1997).

Research Facilities

The department of Icelandic is complemented by the Libraries Icelandic Collection, founded in 1936. It has been designated a selective depository by the Government of Iceland, receiving a limited number of the more important publications to come out in Iceland each year. This collection is the largest of its kind in North America excepting the Fiske collection at Cornell University, and includes books, periodicals, newspapers, manuscripts, microfilms and audio-visual materials. It has also acquired available Icelandic Canadian and is the main research facility for research on Icelanders in North America.

M.A. in Icelandic

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this Calendar. Students with other degrees or backgrounds may be eligible for admission to a pre-Master's program to the satisfaction of the department. Contact the Icelandic Department for further information.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

In addition to the minimum course requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*, requirements for the M.A. degree include a thesis and three courses (18 credit hours) at the 700 level in the Icelandic Department.

Second Language Reading Requirement: Yes
Expected Time to Graduate: Two years

Ph.D.

There is no Ph.D. Program in Icelandic.

Course Descriptions

012.704 Advanced Icelandic (6) Advanced modern Icelandic usage through translation (English-Icelandic/Icelandic-English), practical exercises, and free composition. Study of fictional and non-fictional texts.

012.705 Individual Modern Authors (6) Icelandic literature in the 20th century. Study of modern and contemporary Icelandic literature focusing on a major author.

012.706 Old Icelandic Prose: Seminar (6) Study of Old Norse-Icelandic sagas focusing on a specific genre or theme.

012.707 Old Icelandic Poetry: Seminar (6) Study of Old Norse-Icelandic poetry focusing on a specific genre or theme.

012.708 Palaeography and Philology (6) A history of writing in Iceland 1150-1550 on the basis of manuscripts as principal sources of evidence for Old Icelandic.

SECTION 33: Immunology

Head: Dr. Kent T. HayGlass
General Office: 603 Basic Medical Sciences Building,
730 William Avenue
Telephone: (204) 789 3509
Fax: (204) 789 3921
E-mail: immunology@umanitoba.ca
Website: www.umanitoba.ca/medicine/units/immunology/

Academic Staff

Professor Emeritus

Froese, A., B.Sc. (Western Ontario), Ph.D. (McGill).

Distinguished Professor

Sehon, A., B.Sc., M.Sc., Ph.D., D.Sc. (Manchester), F.R.S.C.

Professors

Berczi, I., D.V.M. (Budapest), Ph.D. (Manitoba); **Chow**, D., M.Sc. (Toronto), Ph.D. (Manitoba); F.R.C.P.C.; **Gartner**, J., B.A., M.D., C.M. (McGill); **HayGlass**, K. , B.Sc. (Queen's), Ph.D. (Western Ontario); **Simons**, F.E.R., B.Sc., M.D. (Manitoba), F.R.C.P.C.; **Warrington**, R., M.B.B.S. (London), Ph.D. (Memorial); **Wilkins**, J.A., B.Sc., M.Sc. (Waterloo), Ph.D. (Manitoba)

Associate Professor

Peng, Z., M.D., M.Sc. (Shanghai).

Assistant Professors

Becker, A., M.D. (Manitoba), F.R.C.P.C.; **Marshall**, A., B.Sc.(Hons.) (Saskatchewan), Ph.D. (Toronto); **Nickerson**, P., B.Sc.(Med.), M.D., F.R.C.P.C.; **Rector**, E., B.Sc., M.Sc., Ph.D. (Manitoba); **Rempel,** J.D. , B.Sc., (Calgary) Ph.D. (Manitoba); **Soussi-Gounni,** A., B.Sc., M.Sc. (Paul Sabatier), Ph.D. (Institut Pasteur); **Yang**, X., M.D., M.Sc. (China), Ph.D. (Manitoba)

Adjunct Professor

Jones, S. M, B.Sc., Ph.D. (Plymouth).

Program Information

A diversified program of graduate studies and research in the main areas of Immunology, leading to MSc and PhD degrees, provides the research experience suitable for research careers in basic science, industrial research or clinical medicine. The department has the equipment and laboratory facilities for active interdisciplinary research in relation to: isolation and characterization of antibodies, antigens, cytokines, adhesion molecules, cell receptors and their functions: cell differentiation; development of hybridomas for the production of monoclonal antibodies and T cell clones; analysis of intracellular signalling in B lymphocytes; recombinant DNA methodology; flow cytometry; molecular, cellular and neuroendocrine aspects of the regulation of immune responses; development of immunodiagnostic procedures. Due to the interdisciplinary character of modern immunology and the varied background of students entering this area from different biological and physical disciplines, no rigidly defined and uniform set of courses are prescribed for all graduate students. A program of courses is selected from Immunology and cognate fields for each graduate student by their research supervisor in consultation with the student's advisory committee and the Head of the department. Departmental MSc or PhD graduates have gone on to successful careers in basic research (ie Fellowships at M.I.T., Harvard, Stanford, Scripps Institute, etc.,) and faculty positions in clinical medicine, in government, hospital or university research labs, or clinical service labs in research and development and/or managerial positions in industry and in teaching. Detailed information is available on the website.

Fields of Research

The research program of the 18 Faculty members who participate in the Program in Immunology was supported by funding in excess of $6 million in peer-reviewed external funding from international, national and local sources last year. This funding included awards from the Canadian Institutes of Health Research, the Canadian Foundation for Innovation, the Canada Research Chairs Program and a wide variety of public sector, volunteer and industrial sources. Utilizing molecular, cellular and *in vivo* approaches in animal models and humans, members of the department have as their main research interests: allergy and asthma; immune regulation; lymphocyte receptors and adhesion molecules; molecular biology; natural immunity; inflammation; transplant immunology; tumor immunology; and intracellular signalling pathways and neuroendocrino-immunology.

Numerous collaborations between those interested in fundamental and clinical immunology are in place, providing opportunities for translational research. Two established research groups ("Immune Regulation of Allergy Research Group" with eight faculty and "Group on Cellular and Molecular Basis of Inflammatory Diseases" with six faculty members) as well as an emerging research group in "Neuroendocrine Immunoregulation" integrate basic and clinical sciences, providing excellent opportunities for advanced graduate training.

Research Facilities

Immunology graduate studies are based in the Faculty of Medicine. The program offers extensive modern facilities and instrumentation for research in contemporary immunology. These include basic and clinical immunology research laboratories, core equipment for a broad range of molecular and cellular immunology techniques, housing for small animals (both conventional SPF and for creation of transgenic mice), instrumentation for flow cytometry analysis and high speed sorting, confocal microscopy, a proteomics centre, a student computer laboratory and access to departmental and University wide libraries.

M.Sc. in Immunology

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Program requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this Calendar. Students must take 072.707 then 072.711 and 072.702.

Students whose first language is not English must contact the University of Manitoba English Language to register for the Canadian Test of English for Scholars and Trainees (CanTEST). This test must be taken while the student is in the first year of his/her graduate program.

Second language reading requirement: none

Expected time to graduate: typically 2 - 3 years.

The Department of Immunology Supplemental Regulations are available from the general office, or may be printed from website: www.umanitoba.ca/medicine/units/immunology/supregs.htm

Ph.D. in Immunology

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Program requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. The candidacy examination required of all students in the Ph.D. program will be in the form of a research proposal. Details on this examination can be obtained from the departmental office.

Students whose first language is not English must contact the University of Manitoba English Language to register for the Canadian Test of English for Scholars and Trainees (CanTEST). This test must be taken while the student is in the first year of his/her graduate program.

Second language requirement: none

Expected time to graduation: 4 - 5 years

The Department of Immunology Supplemental Regulations are available from the general office, or may be printed from website: www.umanitoba.ca/medicine/units/immunology/supregs.htm

Course Descriptions

In addition to offering or contributing towards immunology training at the undergraduate levels, and in Medicine and Pharmacy professional programs, the department offers the most extensive selection of graduate courses in immunology in Canada. These include:

165.719 Medical Immunology (3) This interdisciplinary course deals with the molecular and cellular mechanisms underlying immunologically mediated human diseases. *Prerequisites:* 072.707 plus cognate courses in human biology or by consent of instructors.

072.702 Immunobiology (6) This course provides a broad perspective of the evolving concepts of the mechanisms underlying the regulation of the immune response. Students admitted to this course will be expected to have sufficient background knowledge of general biology. *Prerequisites:* 072.707 plus cognate courses in molecular biology, or by consent of instructors.

072.703 Seminars in Immunology (3) Presented by senior graduate students on advanced research topics not directly related to the student's thesis subject. The purpose of this course is to test the student's ability to evaluate critically a specialized topic both orally and in an essay form. *Prerequisites:* 072.711 or 072.702, or by consent of instructors.

072.704 Immunological Methodology (3) This lecture course is designed to provide an understanding of modern methods used for basic research in Immunology or other biomedical disciplines utilizing immunological techniques. *Prerequisite:* 072.707, or by consent of instructors.

072.707 Introductory Immunology (3) This course provides a broad survey of modern immunology for graduate students, residents and postdoctoral fellows from allied sciences. It covers such topics as molecular concepts of antigenic specificity, chemistry of antibodies and their interactions with antigens and cells, regulation of the immune response, transplantation and tumor immunology. *Prerequisites:* general courses in chemistry, biochemistry, and biology, or by consent of instructors.

072.708 Immunological Methodology (Laboratory) (3) This laboratory course is designed to provide familiarity with a variety of modern techniques used for basic research in immunology or other biomedical disciplines. *Prerequisites:* 072.704 or by consent of instructors.

072.709 Selected Topics in Immunology (3) Lectures, tutorials and assigned reading on topics not normally covered in other courses such as 072.701 and 072.702 or 165.719. Course content will vary depending on the advances in the field and research interests of the department. *Prerequisites:* consent of instructors.

072.710 Advanced Topics in Immunology (3) Lectures, tutorials and assigned reading at an advanced level on topics which may have been covered in other courses offered by the department and which require treatment at a higher level either due to advances in the field or changes in the research interests of the department. *Prerequisites:* 072.701 and/or 072.702, or by consent of instructors.

072.711 Molecular Immunology (6) This course covers in depth the structure, molecular biology and function of immunoglobulins, histocompatibility antigens, regulatory factors receptors and adhesion molecules on cells of the immune systems; mechanisms of immunochemical reactions and the immunogenicity of antigens. Prerequisites: 072.707 plus basic courses in organic chemistry, physical chemistry and biochemistry, or by consent of instructors.

SECTION 34: Interdisiplinary Graduate Programs and Courses

SECTION 34.1 Faculty of Architecture

The following courses are offered as interdisciplinary courses in the Faculty of Architecture

031.619 Field Studies in Landscape Architecture (3) A foreign study course offered annually on topics of historic or contemporary interest. (Offered by the departments of Architecture, City Planning and Landscape Architecture.)

073.748 Urbanization and Shelter in Developing Countries (3) Explores a variety of issues relative to urbanization, planning and shelter design in developing countries.

073.749 Planning and Design in Developing Countries (3) A workshop/studio seminar course dealing with small and/or large scale interventions in urban/rural planning and shelter design. Testing and evaluating alternative plans and programs using real work situations and case studies.

166.707 Topics in Environmental Processes I - Environmental Horticulture (3) Management principles involved in the production of ornamental perennial plants in the nursery and their establishment and maintenance in the urban environment, with an emphasis on arboriculture. Includes a number of tutorials to allow for guest speakers, discussions and tour. Instructor consent required (Plant Science 039.337).

166.707 Topics in Environmental Processes I - History of Japanese Architecture and Gardens before the 18th Century (3)

166.708 Topics in Environmental Processes II - Woody Plants in the Prairie Landscape (3) Classification, identification, ecological characteristics, landscape characteristics and use of native and introduced woody plants found in the prairie landscape. The course will include the preparation of a landscape plan incorporating a selection of the plants studied. Offered alternate years. Instructor consent required (Plant Science 039.453).

SECTION 34.2 Interdepartmental Ph.D. in Food and Nutritional Sciences

Head: R.A. Holley
General Office: 250 Ellis Building
Telephone: (204) 474 9621
Fax: (204) 474 7630
E-mail: foodcas@ms.umanitoba.ca

Website: /www.umanitoba.ca/afs/food_science

Academic Staff

See the academic staff lists in departments of Animal Science, Food Science and Human Nutritional Sciences.

Program Information

Programs at the doctorate level are administered through the Interdepartmental Ph.D. program in Food and Nutritional Sciences involving the departments of Human Nutritional Sciences, Food Science, and Animal Science. Admission usually requires a research Master's degree in an appropriate discipline (food science, human nutrition, biochemistry, microbiology, etc.)

Fields of Research and Research Facilities

See information in this *Calendar* under the three participating departments

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*, a research Master's degree in the general areas of food or nutritional sciences is required.

Application Deadlines

Students may begin their program on either Sept 1, January 1, May 1 or July 1. For admission on each of these start dates, Canadian/U.S. students should send their application forms with complete supporting documentation to Department of Food Science no less than six (6) months before the intended start date. Non-Canadian/US students should send their applications with complete supporting documentation to the Department of Food Science no less than 7 months before the intended start date.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. All students are required to take a minimum of 15 credit hours of courses at the 700 level which will include 121.712 Advanced Seminar in Food and Nutritional Sciences and at least one 700 level course from each of the two participating food departments and complete a thesis research program. For additional information, candidates should contact the head of any of the three participating departments.

Second language reading requirement: none

Expected time to graduate: four years.

Course Descriptions

121.712 Advanced Seminar in Food and Nutritional Sciences (3) A critical review of selected topics in food and nutritional sciences presented in both verbal and written forms. This is a required course for all Ph.D. students in the interdepartmental food and nutritional sciences program and extends beyond the normal academic term.

Further course descriptions are available in the *Calendar* under Animal Science, Human Nutritional Science and Food Science. For additional information, candidates should contact the head of any of these participating departments.

SECTION 34.3 Interdepartmental Graduate Program in Genetics

Graduate Co-Chairs: Dan Gietz, Biochemistry and Medical Genetics, and Brian Fristensky, Plant Science

Program Office: 336 Basic Medical Sciences

Telephone: 204 789 3593

Fax: 204 789 3900

E-mail: ggp@umanitoba.ca

Website: www.umanitoba.ca/medicine/units/biochem/gradprogram.html

Academic Staff

See academic staff lists in the departments of: Animal Science, Plant Science, Biochemistry and Medical Genetics, Microbiology and Zoology.

Program Information

A broad knowledge in the field of genetics requires a study program of an interdisciplinary nature. Courses in genetics and directly related fields are currently offered in many different departments, and although the term "genetics" may not always appear as such in the course title, the subject matter is largely genetic in content.

To accommodate students wishing to do graduate work in genetics and in recognition of the multidisciplinary nature of genetics, an interfaculty graduate program in genetics has been established which is organized by the Genetics Program Committee comprising representatives from the faculties of Agricultural and Food Sciences, Medicine, and Science. The broad base of the Genetics Program Committee will provide the student with the best possible advice on program selection for a career in genetics. The Department of Biochemistry and Medical Genetics is administratively responsible for students registered in the human genetics component of the Genetics Graduate Program. Students wishing to undertake graduate studies in human genetics should seek advice directly from the chair of the graduate studies committee of the Department of Biochemistry and Medical Genetics.

Admission

The first step in the application process is for the applicant to contact directly the professor with whom he or she wishes to study. If a professor can be identified who is willing to supervise the student's research, and if funding for the student is available, a formal application should be submitted. Students wishing to undertake studies in human genetics should apply directly to the Department of Biochemistry and Medical Genetics. Students wishing to enter the Graduate Genetics Program in areas other than human genetics should apply to the chair of the Genetics Program Committee. Admission will be competitive and acceptance will be based on academic credentials and subject to availability of space and resources. The normal entrance requirements will be an Honours B.Sc. with emphasis on genetics. Students not fulfilling the entrance requirements will be required to undertake a pre-Master's program designed specifically to fulfil deficiencies in their background.

Application Deadlines

The Genetics Graduate Program allows students to begin their program on either 1 September, 1 January or 1 May. For admission for each of these start dates, Canadian students should send their applications with complete supporting documentation to the Program Office no less than four (4) months before the intended start date. Non-Canadian students should send their applications with complete supporting documentation to arrive no later than seven months (7) before the intended start date.

Interdepartmental M.Sc. in Genetics

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. A minimum of 12 credit hours exclusive to 165.713 Graduate Seminar in Genetics 1, will be required. A minimum of six credit hours must be obtained in courses listed in the Genetics course list. A thesis demonstrating proficiency in the field of study chosen by the student will be required.

Interdepartmental Ph.D. in Genetics

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. A minimum of 12 credit hours of coursework at the 700 level, exclusive of 165.714 Graduate Seminar in Genetics 2, beyond the Master's level will be required. At least six of the 12 credit hours must be obtained for courses in the Genetics course list.

A qualifying examination may be held upon the recommendation of the selection committee and/or supervisor and the advisory committee. The format of the examination will be determined by the examining committee and the student notified no less than three months before the date of the examination.

A candidacy examination will be required of all students registered for a Ph.D. examination as specified by the Faculty of Graduate Studies. The majority of members of the examination committee will be members of the Genetics Program Committee.

Course Descriptions

165.713 Graduate Seminar in Genetics 1 (3) Seminars covering areas of interest to faculty and students in the Graduate Genetics Program and current development in the broad field of genetics. Requirement for all students enrolled for Master's degrees in the Graduate Genetics Program. Open to other qualified students by permission of Graduate Genetics Program Committee.

165.714 Graduate Seminar in Genetics 2 (3) Seminars covering areas of interest to faculty and students in the Graduate Genetics Program and current developments in

the broad field of genetics. Requirement for all students while enrolled for Ph.D. degrees in the Graduate Genetics Program. Open to other qualified students by permission of Graduate Genetics Program Committee.

Faculty of Agricultural and Food Sciences

Animal Science

035.722 Genetic Principles of Animal Improvement
035.740 Quantitative Genetics in Animal Science
035.741 Advanced Animal Genetics
035.752 Special Topics in Animal Improvement

Plant Science

039.716 Advanced Genetics
039.767 Quantitative Genetics and Plant Breeding
039.768 Plant Molecular Genetics
039.769 Bioinformatics

Faculty of Medicine

Biochemistry and Medical Genetics

125.704 Seminars in Human Genetics
125.707 Special Topics in Human Genetics
125.709 Principles and Practice of Human Genetics
125.710 Mammalian and Human Cytogenetics
125.711 Human Biochemical and Molecular Variation
125.712 Laboratory Methods in Human and Medical Genetics
125.713 Genetics Epidemiology of Human Populations
125.714 Clinical Genetics
125.716 Theory and Practice of Genetic Counselling
125.717 History of Human Genetics

Faculty of Science

Microbiology

060.710 Advanced Concepts in Molecular. Biology
060.711 Advances in Microbial Genetics
060.717 Current Topics in Mammalian Cell Culture

Zoology

022.734 Problems in Developmental Zoology 1
022.735 Problems in Developmental Zoology 2

Interdepartmental

165.709 Cell Biology
165.724 Nucleic Acids: Manipulation, Structure and Function

SECTION 34.4 Individual Interdisciplinary Programs

The Faculty of Graduate Studies provides the special opportunity to students, with a proven track record, of registering in an Individual Interdisciplinary Program[1]. Such a program combines substantial aspects of the existing programs of at least two departments into a unique syllabus which lies outside of established department boundaries. Since the Individual Interdisciplinary Program places additional demands and responsibilities upon the student to assemble a committee, to formulate a research proposal in advance of admission and, to negotiate a program of studies with his/her committee, the eligibility requirements are more stringent than those for discipline based graduate programs. The regulations presented below and all general regulations of the Faculty of Graduate Studies (e.g., admission requirements, registration procedures, thesis regulations, minimum course requirements, advance and transfer credit, time limits, requirements for graduation, oral examinations, academic performance and the like) apply to Individual Interdisciplinary Programs. These regulations can be accessed in the IIP section of the Faculty of Graduate Studies web site: **www.umanitoba.ca/graduate_studies/programs/IIP/index.shtml**

Each department currently offering a discipline-based graduate level program is eligible to offer an individual interdisciplinary stream[2] in which the subject area of that department is the major focus[3] of the Individual Interdisciplinary Program[4]. The department is thus considered the "home" department of the IIP student[5]. Because of the individuality of each program and the need for special guidance, an Advisory Committee is required for all IIP students.

The "home" Department Head (or designate) will ensure that the student and the advisor receive information regarding scholarship and relevant Faculty procedures and the like (i.e., information that would normally be distributed to Department heads and/or Chairs of graduate programs).

Eligibility for Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, applicants for an Individual Interdisciplinary Program are required to have a superior academic record (3.5 GPA or equivalent) with a substantial grounding in at least one of the disciplines[6] of the proposed Individual Interdisciplinary Program. The application procedures and regulations, as determined by the Faculty of Graduate Studies, can be found on the Faculty of Graduate Studies web site at **www.umanitoba.ca/faculties/graduate_studies/programs/IIP/index.shtml** Please be aware that the home department may have additional application requirements and procedures and should be contacted directly for further information.

Application Deadlines

Contact the home department for applicable deadlines for submission of application materials.

Master's Individual Interdisciplinary Programs

Admission

Students should normally have an Honours Bachelor degree or equivalent in one of the disciplines of the proposed IIP.

Program Requirements

In addition to the minimum program requirements of the Faculty of Graduate Studies that are found in the Graduate Studies Regulations Section of this *Calendar*, please consult the IIP section of the Faculty of Graduate Studies web site at **www.umanitoba.ca/graduate_studies/programs/IIP/index.shtml**

Ph.D. Individual Interdisciplinary Programs

Admission

Students should normally[7] have a Master degree or equivalent in one of the disciplines of the proposed IIP.

Program Requirements

In addition to the minimum program requirements of the Faculty of Graduate Studies that are found in the Graduate Studies Regulations Section of this *Calendar*, please consult the web:
www.umanitoba.ca/graduate_studies/programs/IIP/index.shtml

[1] Where the word department appears, the word Faculty or Institute is to be assumed where appropriate.

[2] A department's eligibility to offer an Individual Interdisciplinary Program is limited to the level of the degree currently being offered by the department. For example, if only a Master's level program is offered by the department, then that department is eligible to be the home department for students in a Master's level Individual Interdisciplinary Program, only. Although this particular department may participate as a minor department in a Ph.D. IIP, it is not eligible to be the home department of a Ph.D. IIP student. A Faculty member in a department without a graduate program at the level he/she wishes to supervise an IIP student may do so providing that the Faculty member has an adjunct appointment in the Faculty of Graduate Studies through the department which the student has his/her major focus.

[3] "Major Focus" refers to the subject area/discipline of a department in which the credit hours of instruction to be taken are more than or equal to those to be taken in any other participating department. In a two-department combination, assuming a 15 credit hour program, 9 credit hours of course work would be taken in the major focus area, with a minimum of 6 to be at the 700 level.

[4] The intent of an IIP is to bring together existing discipline-based programs in such a way as to form a unique program tailored to an individual research project and/or study aim that cannot otherwise be accommodated by existing programs. Masters programs are used to construct a Masters level IIP and Ph.D. programs are the building blocks for a Ph.D. level IIP. While there is some flexibility in the actual programs used to construct an IIP, it is imperative that a Masters level IIP contain mostly existing Masters level programs, and Ph.D. programs must make up the majority if not all the component programs in a Ph.D. IIP.

[5] The "home" department counts this student as part of their complement for statistics purposes and would indicate them as "IIP Stream" students.

[6] It is anticipated that substantial grounding will be in the major focus area; if not, then justification must be given for consideration.

[7] Students who have completed an IIP Masters, may be considered for entry into an IIP PhD, provided that their proposed course work and research in the PhD program is a clear extension or follow up of the Masters program. The determination of the appropriateness of the masters work as a prerequisite to the proposed PhD study will be made by the PhD Selection (Admission) Committee. The Dean of Graduate Studies (or delegate) must be present at such meetings.

SECTION 34.5 Faculty of Medicine

The following courses are offered as interdisciplinary courses in the Faculty of Medicine

165.709 Cell Biology (6) Comprehensive introduction to the structure and function of cells. *Prerequisite:* consent of instructor.

165.713 Graduate Seminar in Genetics 1 (3) Seminars covering areas of interest to faculty and students in the Graduate Genetics Program and current development in the broad field of genetics. Requirement for all students enrolled for Master's degrees in the Graduate Genetics Program. Open to other qualified students by permission of Graduate Genetics Program Committee.

165.714 Graduate Seminar in Genetics 2 (3) Seminars covering areas of interest to faculty and students in the Graduate Genetics Program and current developments in the broad field of genetics. Requirement for all students while enrolled for Ph.D. degrees in the Graduate Genetics Program. Open to other qualified students by permission of Graduate Genetics Program Committee.

165.718 Molecular Approaches in Medical Research (3) For students who wish to understand advances made in medicine/biology through molecular and developmental approaches. Topics for discussion will be selected from the recent literature in consultation with participating students. The course will consist of lectures and discussions as well as written and oral presentation of papers by the students.

Prerequisite: consent of instructor. Offered 2004-2005 and alternate years.

165.719 Medical Immunology (3) This interdisciplinary course deals with the molecular and cellular mechanisms underlying immunologically mediated human diseases. *Prerequisites:* 072.707 plus cognate courses in human biology or by consent of instructors.

165.720 Cancer Biology (3) One hour per week on the basic (cellular and molecular) and clinical (diagnostic and treatment) aspects of cancer. Students will give one seminar and submit an essay on an assigned topic. *Prerequisite:* consent of instructor.

165.724 Nucleic Acids: Manipulation, Structure and Function Three hours per week, one term. DNA technology; nucleic acid metabolism, including DNA replication, DNA repair, transcription, and RNA processing; gene/chromosome structure and rearrangement; mutation detection; gene therapy; positional cloning; transgenic animals.

165.729 Developmental Biology (3) Emphasize current principles of organ system development and its application to transgenic approaches to gene function in the context of a whole, developing organism. *Prerequisite*: 165.709 or 022.215 and/or 022.307 or consent of instructor.

SECTION 35: Interior Design

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Professor Emeritus

Harland, J., B.Arch. (Manitoba), M.A. (Columbia), F.P.I.D.I.M., F.I.D.E.C.

Professor

Feduniw, L.O., B.I.D. (Manitoba), M.E.P. (Ariz.), P.I.D.I.M., I.D.C., S.E.S.C., I.S.E.S.

Associate Professors

Chalmers, L., Dip.Int.Des. (Royal Melbourne), M.Des., (South Australia) P.I.D.I.M., I.D.C., I.D.E.C.; **Hellner**, F., B.I.D., M.A. (Manitoba), P.I.D.I.M., I.D.C.; **Madill**, R., B.A.(Hons.) (Manitoba), M.A. (Berkeley), M.S.A., S.C.A. (Toronto), R.S.P.; **Maruca**, N.E., B.I.D. (Manitoba), P.I.D.I.M., I.D.C., A.C.I.D.; **Weselake**, F.J., B.Sc.Design (Institute of Design, Chicago), Des.Man. (Domus Academy, Milan), I.D.S.A., S.E.G.D.

Assistant Professors

Beaverford, K. B.I.D. (Manitoba). M. Arch. (Calgary); **Karpan**, C., B.I.D., M.Ed. (Manitoba); **Mallory-Hill**, S. B.E.S., M. Arch. (Manitoba); **Miyahara**, A., B.I.D., B.F.A. (Manitoba), P.I.D.I.M. I.D .C., I.D.E.C.

Program Information

The Department of Interior Design at the University of Manitoba has a long established reputation for excellence and leads Canada in the development of the first Master of Interior Design program.

Interior Design is uniquely placed in the Faculty of Architecture with professional Master programs in Landscape Architecture, City Planning and Architecture. The interdisciplinary nature of the faculty offers excellent opportunities for extending collaborative perspectives and theoretical understanding.

The department offers two streams within the Master of Interior Design:

- A post-professional program with a research orientation for those already holding a first professional degree in Interior Design (21 credit hours)
- A professional program with a focus on design, research and critical thinking (48 credit hours)

The interdisciplinary nature of the faculty enables students to draw from a wide range of expertise developing a focus specific to their area of interest.

Upon completion of the Master's course work, **all** students undertake a visual and/or written thesis or practicum as an independent work on an approved topic to demonstrate knowledge and skills culminating in an oral public presentation.

The research program is designed for individuals wishing to pursue a self-directed program with the opportunity for in-depth research based on a foundation of Research Methods. The research masters requires one and one half years of study for students holding a Bachelor of Interior Design or equivalent design degree.

The professional program will graduate Interior Designers qualified to work nationally and internationally at the forefront of their profession, with a skill set that includes strategic thinking, entrepreneurship, a research orientation and an ethical and environmentally responsible frame of reference. It integrates diverse knowledge both technical and theoretical through the Master's Studio. Professionalism and an understanding of contemporary practice form core curriculum. The program requires two years of study for students holding a Bachelor of Environmental Design (Interior Environment Option) degree. Applicants with other design degrees will be evaluated individually to determine entry level. Students holding a university degree from a non-design related discipline are required to successfully complete the pre-masters year. For details refer to the on-line Calendar: http:webapps.cc.umanitoba.ca/ calendar/faculties/architecture

Graduates from the department are providing leadership in the Interior Design profession nationally and internationally as principles of leading design firms, heads of professional interior design organizations, cutting edge designers and professors of design education. Many maintain an association with the department through the Partners Program or serve in an advisory role.

Fields of Research

Areas of expertise in the department include: Work Environments, Aesthetics and Ethical Theory, Universal Access, Human Comfort, Lighting and Colour, Design Education and Profession-based Research.

Research Facilities

The Faculty is housed in three buildings on the Fort Garry Campus: The John A. Russell Building, the Architecture 2 Building and the new space in the Continuing Education Division Facility. The Russell Building accommodates studios for all graduate programs plus studios for the students in ED3 Landscape Architecture Option, and Interior Environment Option. Architecture 2 building accommodates the foundation program in Environmental Design. The new facility in Continuing Education accommodates students in the ED3 Architecture option.

Architecture Fine Arts Library: The Architecture/Fine Arts Library serves the primary resource needs of all departments within the Faculty of Architecture and the School of Art. The collections of the Architecture/Fine Arts Library are currently housed in adjoining buildings. The main collection (books, journals, maps, plans, videos) and the Slide Collection are housed in the John A. Russell Building. The Product Catalogue Collection is housed in the Architecture 2 Building.

CAD Lab: Computer Laboratories, Operations and Maintenance: Two open area computer laboratories are located on the lower level of the Architecture 2 Building, along with a new media research area and a printer,

plotter resource room. Adequate equipment in the form of computers, printers, plotters, projectors, monitor/VCRs are available.

Workshop: Workshop Space: A wood workshop occupies the basement level of J.A. Russell Bldg.. Access to this area and the use of machines is monitored by workshop staff. An assembly room is adjacent for students and staff working on assembling components.

Master of Interior Design

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this Calendar. Applicants with degrees other than Interior/Environmental Design will be required to undertake a pre-Master's year of study. Please contact the Department of Interior Design for pre-Master's information or the undergraduate calendar for Interior Environment Option.

The Department of Interior Design has additional application requirements. Contact the department for details.

Application deadlines for International students-December 1; Canadian/ U.S. students-February 15.

Students should submit their application and supporting documentation to the Department by the dates indicated.

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar. The Department offers two streams within the Master of Interior Design:

Research

051.705	Graduate Seminar	3
051.717	Design Research Methods	3
051.718	Theory Seminar 1	3
051.719	Theory Seminar 2	3
	Electives	9
069.700/703	Thesis/Practicum	
Total Credit Hours		21

Professional

051.705	Graduate Seminar	3
051.717	Design Research Methods	3
051.718	Theory Seminar 1	3
051.719	Theory Seminar 2	3
051.720	Masters Studio 1	6
051.721	Masters Studio 2	6
051.722	Masters Studio 3	6
051.723	Sensory Technology 4	3
051.724	Sensory Technology 5	3
051.725	Professionalism and Practice	3
051.726	The Business of Interior Design	3
	Electives	6
069.700/703	Thesis/Practicum	
Total Credit Hours		48

Second language reading requirement: none

Expected time to graduation: Research Stream, 1.5 years; Professional Stream, 2 years

Ph.D.

A Ph.D. program is not offered in the Department of Interior Design

Course Descriptions

Courses required by **all** students in the Master of Interior Design program:

051.705 Graduate Seminar (3) - The seminar will include discussion of pertinent research and writing on topics under study in theses/practica. Guest lecturers appropriate to the topics under discussion will be included. Students will finalize their theses/ practica topics and their appropriate research design.

051.717 Design Research Methods (3) Building on 079.364 Design Inquiry, this course addresses the role of quantitative and qualitative research methods in interior design. The subject will address the principles of quantitative and qualitative research methodologies; focusing on the relationship between research and interior design. Specifically identifying gaps in existing research; critical analysis and interpretation of existing research; representation of research intentions, methodologies, and results.

051.718 Theory Seminar 1 - Contemporary Issues in Design (3) A theoretical exploration of contemporary design issues as they apply to Interior Design. Theory Seminar 1 introduces and supports the strategic interventions of the design studio. Historical precedent in relation to human activity, sensory stimulus, technological and social change, ecological awareness, and aesthetic judgement will form the context for discussion and debate.

051.719 Theory Seminar 2 - Critical Perspectives (3) An examination of theoretical and philosophical approaches to design. Examines the practice of interior design through a variety of critical and historical perspectives. Different modes of thought and manners of questioning will be used to debate issues which may include gender, ethics, diversity, materiality, technology & representation, and changing spatial typologies.

069.700 Thesis should show in general, that the student has mastery of the field and is fully conversant with relevant literature. The process, schedule, format, and style must meet the requirements of the Faculty of Graduate Studies. Thesis students must pass an oral examination on the subject of the thesis.

069.703 Practicum takes the form of a design exploration demonstrating advanced application of knowledge and skills, involving the careful definition of a theoretical standpoint and a paper discussing the results in a manner suitable for evaluation by an examining committee.

Courses required by Master of Interior Design professional stream students:

051.720 Masters Studio 1 - Strategic Issues (6) Master Studio 1 focuses on developing strategic approaches to design, which address complex contextual issues and adaptive reuse of large-scale public space. Studio explorations responding to a range of complex contextual design issues. The studio focuses on methods of strategic analysis such as mapping and scenario planning to inform the configuration and resolution of new interior spatial forms. Large scale public space and the changing nature of contemporary culture will form the basis for the design projects.

051.721 Masters Studio 2 - Events and Making (6) Master Studio 2 is focused on the Event: exploring the nature of temporary inhabitation through the creation of a unique place/installation as the site for cultural/community celebration. Design/build studio explorations focussed upon issues of temporality, technology, and design intention. Small-scale public places and cultural context will form the basis for design studio projects.

051.722 Masters Studio 3 – Research (6) Master Studio 3 focuses on the creation of specialized interior environments informed by traditional and emerging forms of research. Research into Practice: a research-focused, problem based studio bridging Studio 3 will examine specialized interior professional design issues and diverse research sources. Master projects in areas such as: work environments, healthcare, education or hospitality, through precedent and research. The studio may be run as a collaborative program and may be delivered as an International studio experience.

051.723 Sensory Technology 4 (3) Examination of the influences and effects of emerging communication systems and building technologies; building and furniture systems; in the context of human well being and environmental concerns. The study of the design consequences and environmental impact of interior services and systems; communication technologies; building regulations, codes and infrastructure; detailing and specification of projects drawn from design studio.

051.724 Sensory Technology 5 (3) A self-directed exploration of new and/or divergent technologies, with significance to the design of interior environments. Students will propose a self-directed design or research project, nominating a full time staff advisor; for the subject instructors' approval. The proposal will clearly establish learning objectives and outcomes, and assessment criteria.

051.725 Professionalism and Practice (3) Introduction to the profession and practice of Interior Design; types of practice; regulating bodies; education; career development; professional

051.726 The Business of Interior Design (3) Management principles, administration, communication strategies and practice structures in the design process; development of skills in communication and procedures. The interior design business environment; ethics, responsibilities; related industries; job search techniques.

SECTION 36: Landscape Architecture

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Professor

Thomsen, C.H., B.F.A. (Land.Arch.) (Illinois), M.Regional Plan. (Pennsylvania), M.A.L.A., F.C.S.L.A.

Associate Professors

McLachlan, E.B., B.E.S., M.Land.Arch. (Manitoba), M.A.L.A., F.C.S.L.A.; **Perron**, R. P., B.Sc., M.N.R.M. (Manitoba); **Tate**, A., B.A., Dip.L.D. (Manchester), C.S.L.A., P.P.L.I.

Assistant Professors

Eaton M., B.E.S., Ph.D. (Heriot Watt); **Goto,** S., B.A. (Tokyo), M.A., Ph.D. (Chiba); **Nuttall**, D., B.Sc. (Simon Fraser), M.Sc. (Western), M.Land.Arch., Ph.D. (Guelph); **Trottier**, J., B.Land.Arch. (Montreal), M.UrbanPlanning (McGill).

Adjunct Professors

Algie, S., B.A. (Carleton); **Cohlmeyer**, C., B.A., M.Land.Arch. (Manitoba); **Cram**, H., M.A.L.A., C.S.L.A; **McLeod**, S., B.Sc. Civil Eng., M.Sc. Civil Eng. (Manitoba); **Yanchyshyn**, B., B.E.S., M.Land.Arch. (California).

Program Information

The program leading to the Master of Landscape Architecture degree at the University of Manitoba was the first graduate program in Canada. It is accredited by the Canadian Society of Landscape Architects, and the Department is a member in good standing of the international Council of Educators in Landscape Architecture. Approximately 75 full-time students are enrolled in the program, representing all regions of Canada and other countries of the world.

Study is directed towards the analysis, planning and design of exterior spaces, both urban and rural. The program emphasizes the development and testing of physical forms intended to positively affect the quality of the designed environment; forms which are responsive to societal needs, while remaining expressive of the physiographic conditions associated with specific geographic locations.

The general objectives of the program are:

- the articulation of a theoretical basis for the design of the built environment
- the development of a practical design methodology
- the exploration of societal, technical and natural processes as form determinants
- regional resources analysis and activity allocation
- the investigation of issues associated with landscape architectural practice.

At all levels, the Department attempts to provide a sense of need and purpose for each student, through the investigation of contemporary urban and rural environmental problems from micro to regional scales.

Fields of Research

Faculty in the Department have a variety of research interests including: perception of the prairie landscape; landscape and infrastructure; the rural landscape; design and urban environments; the social and cultural landscape; cultural theory and design; urban design; community design using ecological principles; the use of native plants in design; children's play environments; and public parks throughout the world.

Research Facilities

The Faculty of Architecture has an excellent library, a slide library, a products catalogue library, a woodshop, and a materials testing and experimentation lab (nearing completion). The Department uses the Delta Marsh and Star Lake Field Stations for field ecology work.

Master of Landscape Architecture (M.Land.Arch.)

Admission

Candidates for the Master's degree in Landscape Architecture must normally possess, at the time of their registration, the degree of Bachelor of Environmental Design, or Bachelor of Arts, Bachelor of Science, Bachelor of Architecture, Bachelor of Landscape Architecture, or a similar degree from a recognized college or university. Advance standing may be given to candidates whose prior training and experience are judged by the department to warrant such placement.

In cases where the candidate's previous academic experience is found to be deficient, the department will normally advise the student to satisfy certain academic requirements as a prerequisite for admission to the Master's program.

The Department of Landscape Architecture has additional application requirements. Contact the department for details.

Application Deadlines:

Students should submit their application and supporting documentation to the Department by the dates indicated below.

Start Date	Canadian/US	International
Regular - September 1st	15 April	01 December
Winter - January 1st	01 September	01 March

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar. The Master's in Landscape Architecture consists of:

Master's Year One

031.713/L04 Geographic Information Systems (3) The theory and application of GIS technology in the planning of urban and regional landscapes.

031.716 Landscape Architectural Field Ecology (3) Field study of plant taxonomy and ecology. Approximately two weeks duration immediately prior to the beginning of fall term. For Landscape Architecture students or with consent of department head.

031.717 Landscape Ecology in Design 1 (3) The course complements 031.716 L.A. Field Ecology and expands on the concepts of communities, ecosystems, and biomes and the interactions of organisms with each other and non-living components in the environment. For Landscape Architecture students or with consent of department head.

031.718 Landscape Architecture Studio 6 (6) Studies of the transformation of complex design problems from theoretical constructs into physical form. Context will focus on problem domains with the regions and/or townscape domains, in either a Canadian or foreign environment.

031.719 Landscape Architecture Studio 4 (6) The study of design applications of highly complex problem domains of both the urban and rural landscape.

031.720 Landscape Architecture Studio 5 (6) The examination of theories and their contemporary applications to regional scale landscapes with emphasis on environmental problem domains associated with land planning and design.

031.727 Landscape Architecture Construction (3) A comprehensive introduction to construction materials, methods and processes for Landscape Architecture projects. It looks first at regulatory issues and at issues of human safety and then at techniques for communicating construction proposals and how this information is incorporated into contract documents.

Electives: 6 credit hours: Students should consult the Department of Landscape Architecture for approved elective courses being offered in the current year.

Master's Year Two

031.721 Landscape Architecture Studio 7 (6) Advanced investigation of physical form within the context of urban and regional problem domains.

031.723 Professional Practice (3) A survey of the responsibilities of the professional in practice. The study includes examination of issues in professional ethics, office structure/organization, contract administration, and the scope and standards of current practice in Manitoba and in Canada.

031.725 Landscape Architecture Theory (3) Investigation of the theoretical foundations of landscape architecture in order to understand the complex nature of its practice, to identify its disciplinary boundaries, to understand its multidisciplnary nature and to investigate assumptions and myths that permeate its limited discourse.

031.726 Landscape Architecture since 1900 (3) A study of significant works of landscape architecture since 1900, including those of Canada, within the context of cultural and ideological change over the world.

Electives: 3 credit hours: Students should consult the Department of Landscape Architecture for approved elective courses being offered in the current year.

069.700 Thesis

or

069.703 Practicum

Interdepartmental Courses

The following interdepartmental course is offered jointly by two or more departments.

031.619 Field Studies in Landscape Architecture (3) A foreign study course offered annually on topics of historic or contemporary interest. (Offered by the departments of Architecture, City Planning and Landscape Architecture.)

166.707 Topics in Environmental Processes I - Environmental Horticulture (3) Management principles involved in the production of ornamental perennial plants in the nursery and their establishment and maintenance in the urban environment, with an emphasis on arboriculture. Includes a number of tutorials to allow for guest speakers, discussions and tour. Instructor consent required (Plant Science 039.337).

166.707 Topics in Environmental Processes I - History of Japanese Architecture and Gardens before the 18th Century (3)

166.708 Topics in Environmental Processes II - Woody Plants in the Prairie Landscape (3) Classification, identification, ecological characteristics, landscape characteristics and use of native and introduced woody plants found in the prairie landscape. The course will include the preparation of a landscape plan incorporating a selection of the plants studied. Offered alternate years. Instructor consent required (Plant Science 039.453).

Second Language Reading Requirement: None
Expected Time to Graduate: Two years

Ph.D.

There is no Ph.D. program offered in the Department of Landscape Architecture.

SECTION 37: Faculty of Law

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Dean Emeritus

Edwards, C.H.C., Q.C., LL.B.(Hons.) (London).

Senior Scholar

Braid, E.A., LL.B. (Manitoba), LL.M. (London).

Professors

Anderson, D.T., Q.C., B.A. (Manitoba), B.A., B.C.L. (Oxford); **Busby**, K., LL.B. (Manitoba), LL.M. (Columbia); **Deutscher**, D.B., B.A., LL.B. (Manitoba), LL.M. (Harvard); **Esau**, A.J., B.A., LL.B. (Alberta), LL.M. (Harvard); **Guth**, D.J., B.A. (Marquette), M.A. (Creighton), B.A. Status (Clare College, Cambridge), Ph.D. (Pittsburgh); **Harvey**, D.A.C., Q.C., B.A. (Toronto), LL.B., LL.M. (Osgoode); **Irvine**, J.C., B.A., M.A., B.C.L. (Oxford); **McGillivray**, A., B.A., LL.B. (Saskatchewan), LL.M. (Toronto); **Nemiroff**, G., B.Sc. (McGill), B.A. (Sir George Williams), B.C.L. (McGill), LL.B., LL.M. (Dalhousie); **Osborne**, P.H., LL.B.(Hons.) (Auckland), LL.M. (McGill); **Penner**, R., Q.C., B.A., LL.B. (Manitoba); **Schwartz**, B.P., LL.B. (Queen's), LL.M., J.S.D. (Yale); **Secter**, H.L., B.Comm., LL.B. (Manitoba), LL.M. (Harvard), LL.D. (Hon., Winnipeg); **Sneiderman**, B., B.A., LL.B. (Connecticut), LL.M. (NYU); **Stuesser**, L., B.A.(Hons.) (Winnipeg), B.Ed. (Brock), M.A. (Guelph), LL.B. (Manitoba), LL.M. (Harvard); **Vincent**, L., B.A., LL.B. (Manitoba), LL.M. (London).

Assistant Professors

Fainstein, L., B.A., LL.B. (Manitoba); **Fien**, C.M., B.Sc., LL.B. (Manitoba); **Gallant**, M.M., B.A. (Prince Edward Island), LL.B. (New Brunswick), LL.M. (UBC), Ph.D. (London); **Parkes**, D., B.A. (Trinity Western), LL.B. (U.B.C.), LL.M. (Columbia); **Turnbull**, L.A., B.A., (Queen's), LL.B. (Ottawa), LL.M. and J.S.D. (Columbia); **Whitecloud**, W., B.A. (Calgary), LL.B. (Queen's).

Adjunct Professors

Gillespie, C., B.Sc. (Melbourne), Ph.D. (Monash), LL.B. (Manitoba); **Leonoff**, H.S., Q.C., B.Sc. (Manitoba), LL.B., LL.M. (York); **Matas**, D., B.A. (Hons.) (Manitoba), M.A. (Princeton), B.A., B.C.L. (Oxford), LL.D. (Concordia); **Norton**, J., B.Sc., LL.B. (Manitoba), LL.M. (London).

Program Information

The Faculty offers a structured and personal LL.M. experience designed for successful completion within one calendar year, beginning in September. In addition to course work, the student must complete a thesis of 90 to 120 pages. Each student is assigned a faculty advisor with expertise in the chosen area of study, who will direct thesis research and design and assist the student in course selection. Each student is also assigned an external reader who will review and evaluate the thesis. Early and regular contact with the advisor is stressed.

In the first term, the student will complete a required seminar course, Graduate Legal Research and Theory. The seminar's focus on alternative approaches to legal study, legal research and writing is designed to assist the student in approaching the thesis work, provide a collegial unity to the program, and facilitate the exchange of ideas. The student is welcome to take full part in academic seminars and functions. In addition to the graduate seminar, the student will successfully complete a minimum of two courses, to be taken in either term and selected with the approval of the advisor. One course may be taken in a faculty other than Law.

That the Master of Laws program will enhance career prospects is seen in the fact that our international and Canadian graduates have secured positions in international corporations, legal practice, academic institutions, and doctoral programs elsewhere.

Fields of Research

The Faculty of Law represents a variety of research interests and strengths. In addition to basic areas of common law — property, contract, tort, criminal, administrative, tax, international, family, constitutional, evidence, etc. — faculty expertise includes Aboriginal law, legal history, children and the law, intellectual property, law and literature, and international business and trade. The Faculty is home to the Asper Chair in International Business and Trade Law.

Research Facilities

The E.K. Williams Law Library offers support and facilities for searching the law, including state-of-the-art computer access. International students should bring with them materials including statutes, codes, judgments and reference books if needed for thesis research.

Winnipeg is home to archival collections of materials relevant to legal studies. Collections include the Provincial Archives of Manitoba and its Government Records Centre, the Manitoba Legal-Judicial Archives, and the Legislative Library. The Provincial Archives house the Hudson's Bay Company Archive, which contains millions of mainly pre-1900 documents. This is a unique and important resource for law and society studies related to the fur trade, the Hudson's Bay Company, First Nations, Metis and Inuit cultures, and Canadian and English legal history.

Master of Laws (LL.M.)

Admission

In addition to the requirements of the Faculty of Graduate Studies set out in in the Graduate Studies Regulations Section of this *Calendar*,), candidates must show that they are equipped intellectually to engage in advanced legal study and research. The Faculty of Law anticipates that the prospective LL.M. student will have earned the LL.B. or equivalent degree in law with a first or high upper second (A or B+) standing. Applicants ordinarily hold a common law or Canadian civil law degree but applications from those whose legal education has been in another legal system will be given full consideration.

Contact the Faculty of Law at lawgrad@ms.umanitoba.ca for additional information and application procedures.

Applicants from non-English speaking countries must have an English language proficiency of 600-plus TOEFL score and may be required by the Faculty of Law to demonstrate proficiency based on other tests accepted by the Faculty of Graduate Studies. Some international students have arrived six to twelve months in advance of applying for admission to the LL.M. program in order to enrol in English as a Second Language courses at the University of Manitoba.

The Faculty of Law offers the Dickson, Freedman and Kristjiansson Graduate Fellowships. In partnership with the Faculty of Graduate Studies, the Faculty of Law may make additional awards. Applicants should research other educational funding opportunities including support from the legal profession and awards, scholarships and bursaries available from or tenable at the University of Manitoba. Canadian embassies offer basic information services and should be contacted early. Criteria for admission, awards and fellowships are found on the Graduate Studies and Law web sites.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students must attend the university full-time for a minimum of one academic year (normally September to May). Students are expected to complete the LL.M. program in one calendar year (normally, September to August for October convocation), although two years is permitted. Students must complete a satisfactory thesis on a subject approved by the advisor, to be submitted not later than eight weeks before the anticipated date of graduation. The student must successfully complete two courses in addition to Graduate Legal Research and Theory. Courses will be chosen in consultation with the advisor.

Subjects of Graduate Study

A candidate's subject of study shall be approved by the Graduate Studies Committee of the Faculty of Law. Thesis design, refinement and research will be supervised by a member of the Law Faculty.

Second language reading requirement: none

Expected time to graduate: one year, although two years is permitted.

Ph.D./S.J.D.

The Faculty of Law does not offer a Ph.D./S.J.D. Program

Course Descriptions

045.711 Graduate Legal Research and Theory (2) One Semester. Begins with visits to the Law Library and to the Provincial Archives of Manitoba, Government Records Centre. Weekly seminars explore alternative approaches to the study of Law.

SECTION 38: Linguistics

Head: K. Russell
General Office: 514 Fletcher Argue Building
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E-mail: lingdpt@cc.umanitoba.ca
Website: www.umanitoba.ca/linguistics

Academic Staff

Distinguished Professor

Wolfart, H.C., [B.A.equiv.](Albert-Ludwigs-Universität, Freiburg im Breisgau), M.A. (Yale), M.A. (Cornell), M.Phil., Ph.D. (Yale), F.R.S.C.

Senior Scholar

Wade, W.D., B.A., M.A., Ph.D. (Colorado).

Professor

Nahir, M., B.A. (Bar-Ilan), M.A., Ph.D. (Pittsburgh).

Associate Professors

MacDonald, L.A., B.A.(Hons.) (Trent), M.A. (Calgary), Ph.D. (Manitoba); **Pentland**, D.H., B.A.(Hons.) (Manitoba), M.A., Ph.D. (Toronto); **Russell**, K., B.Sc. (Manitoba), M.A., Ph.D. (Southern California).

Assistant Professors

Ghomeshi, J., B.A.(Hons.) (York), M.A., Ph.D. (Toronto); **Hagiwara**, R.E., B.A. (Washington), M.A., Ph.D. (UCLA); **Janzen**, T., B.Ed. (Saskatchewan), M.A. (Manitoba), Ph.D. (New Mexico).

Adjunct Professor

Nichols, J.D., A.B. (Hamilton), A.M., Ph.D. (Harvard), F.R.S.C.

Program Information

The Linguistics Department offers individualized and flexible graduate programs leading to both the Master of Arts and the Doctor of Philosophy degrees. For students who want to pursue in-depth and especially field-based research on language, the University of Manitoba, which is situated in a linguistically diverse region, is an ideal location. The research programs of most past and current graduate students in the department involve original fieldwork, either with the local indigenous languages or in such places as China and the South Pacific.

Fields of Research

The department has research strengths in both formal and functional/typological approaches to the core areas of linguistics (phonetics, phonology, morphology, and syntax), as well as historical linguistics, language planning and policy, text-based analysis and computational linguistics. The department's research draws on a wide range of languages, such as Hebrew, Persian, Tauya and American Sign Language, and the department is also a world centre for the study of the Algonquian family of languages. In addition to journal articles and monographs, department members produce reference grammars, dictionaries, and text collections for local languages.

Research Facilities

Research facilities available in the department include professional analogue and DAT recorders (available to graduate students for fieldwork), an anechoic chamber, and a Kay Computerized Speech Lab.

M.A. in Linguistics

Admission

Admission requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this Calendar. The M.A. program in linguistics is strongly research-oriented; admission decisions are, therefore, based only in part on the applicant's academic record; the department's resources and interests also play an important role. A four-year B.A. in linguistics is the normal preparation for the M.A. program. Students without such preparation may be required to complete the pre-Master's year first. The department has additional application procedures beyond those of the Faculty of Graduate Studies. Contact the Linguistics department for information.

Application Deadlines

The M.A. program in linguistics starts September 1. Other start dates are possible only under exceptional circumstances. The deadline for applications to be received in the department from International students is January 15. For Canadian/U.S. students, applications should be submitted to the department by March 15th.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. The Master of Arts program in Linguistics requires 18 credit hours of coursework at the graduate level, including Field Methods (126.759), Phonology (126.755), and Syntax (126.763). The remaining courses (6 credit hours) may be taken in either linguistics or related disciplines, subject to approval by the department's graduate committee. In certain cases the graduate committee may require the student to take additional courses. Students are encouraged to complete their coursework by the end of the first year of the program. M.A. candidates must demonstrate proficiency in a second language. In addition to coursework and the language reading requirement, students must complete and successfully defend a thesis.

Second Language Reading Requirement: Yes

Expected time to Graduation: Two years

Ph.D. in Linguistics

Admission

Admission requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. The Ph.D. program in linguistics is strongly research-oriented; admission decisions are, therefore, based only in part on the applicant's academic record; the department's resources and interests also play an important role. Students with a Master's degree in linguistics from the University of Manitoba or with an equivalent degree from elsewhere may be admitted into the Ph.D. program. Students who have a Master's degree but lack the specific course background for admission to the Ph.D. program may be admitted into the M.A. program. After completion of the M.A. course requirements with an average of B+ such students may apply to transfer directly to the Ph.D. program without completing the M.A. The department has additional application procedures beyond those of the Faculty of Graduate Studies. Contact the Linguistics department for further information.

Application Deadlines

The Ph.D. program in linguistics starts September 1. Other start dates are possible only under exceptional circumstances. The deadline for applications to be received in the department from International students is January 15. For Canadian/U.S. students, applications should be submitted to the department by March 15th.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Ph.D. students will normally complete 18 credit hours coursework at the graduate level. Courses are to be chosen in consultation with the advisor and students are encouraged to complete them by the end of the first year of the program.

Candidacy Exams

Candidacy Exams are normally written in the second year of the Program. These exams consist of two original research papers of publishable quality in distinct areas of linguistics. Students must pass an oral exam based on each of the two papers.

Ph.D. candidates must demonstrate proficiency in a second language. This will at the same time satisfy the language reading requirement of the Faculty of Graduate Studies. Students who have satisfied this requirement at the M.A. level will be deemed to have met this requirement at the Ph.D. level.

Students must complete and successfully defend a dissertation. In preparation for this step, a written dissertation proposal must be presented and defended orally, normally in the third year.

Second language requirement: yes
Expected time to graduation: four years

Course Descriptions

126.750 Linguistic Variation and Change (3) Focuses on sources, causes and patterns of linguistic change, spread of changes and the resulting relationships among languages.

126.751 Linguistic Typology (3) Highlights universals and differences in phonological, morphological and/or syntactic structures drawn from data from a wide variety of languages.

126.752 Mathematical Linguistics (3) Explores mathematical techniques in the modelling of linguistic phenomena.

126.753 Phonetics (3) Presents a theoretical approach to current issues in phonetics and testing hypotheses about phonetic data.

126.755 Phonology (3) Presents a theoretical approach to current issues in phonological analysis, building and testing hypotheses about phonological data.

126.757 Semantic Theory (3) A theoretical approach to current issues in semantics focusing on formal and logical aspects of meaning.

126.758 Computational Linguistics (3) Computational modelling of language and the use of computational tools in linguistic research.

126.760 Seminar in Linguistic Theory (3) Linguistic theory, its appropriateness to particular bodies of data (including entire languages) and associated meta-theoretical issues.

126.762 Seminar in North American Indian Languages (3) The linguistic structure of a North American language or group of languages.

126.792 Special Problems in Linguistic Research (3) Specialized topics in linguistics.

126.794 Graduate Reading and Research 1 (3) Independent reading and/or research on a selected topic.

126.795 Graduate Reading and Research 2 (3) Independent reading and/or research on a selected topic.

126.759 Field Methods (6) Provides practical experience in techniques for data collection, analysis and interpretation of original data, through guided work with a speaker of a language unfamiliar to students.

126.763 Syntax (3) Presents a theoretical approach to current issues in syntactic analysis, building and testing hypotheses about syntactic data.

SECTION 39: Management/Business Administration

I.H. Asper School of Business

Heads: S. James, Executive Director, MBA Programs, and M. Smith, Ph.D. Program Director
Graduate Chair: M. Smith
General Office: 324 Drake Centre
Telephone: (204) 474 8448
Fax: (204) 474 7529
E-mail: asper_grad@umanitoba.ca
Website: www.umanitoba.ca/asper

Academic Staff

Deans Emeriti

R. Grandpre, J. Mundie.

Accounting and Finance

Professors

Elias, N.S., B.Comm. (Alexandria), M.S., Ph.D. (Minnesota), C.M.A.; **Gould**, L.I., B.S. (Pennsylvania), M.B.A. (New York), Ph.D. (Toronto); **McCallum**, J.S., B.Sc., B.A. (Montreal), M.B.A. (Queen's), Ph.D. (Toronto); **Mittoo**, U.R., B.A., M.A. (Panjab), M.B.A. (Manitoba), Ph.D. (UBC).

Associate Professors

Abeysekera, S., B.A. (Jackson State), M.B.A. (Simon Fraser), Ph.D. (Texas A and M); **Mossman**, C.E., B.A.(Hons.) (Royal Military College), M.B.A. (Queen's), Ph.D. (Western Ontario); **Stangeland**, D.A., B.Comm., Ph.D. (Alberta).

Assistant Professors

Bhattacharyya, N., B.Sc. (North Eastern Hill), M.B.A. (Indian Institute of Management), Ph.D. (UBC); **Brabston**, M., B.A. (Vanderbilt), M.B.A. (Alabama, Birmingham), Ph.D. (Florida State); **Eisenberg**, L., Ph.D. (Pennsylvania); **Hine**, M., B.Comm. (Alberta), M.B.A. (Arizona), Ph.D. (Arizona); **Hoffjan**, A., M.B.A. (Muenster), Ph.D. (Dusseldorf); **Jacoby**, G., B.A., M.A. (Hebrew), Ph.D. (York); **Morrill**, C.K.J., B.A., Ph.D. (Alberta); **Morrill**, J.B., B.Comm., Ph.D. (Alberta), C.A.; **Travica**, B., B. A. (Belgrade), M. A. (State University of New York), Ph.D. (Syracuse); **Zheng**, X., B.A. (China), M.B.A. (China), Ph.D. (abd) (SUNY).

Business Administration

Senior Scholars

Atwell, J.F., B.Comm.(Hons.), M.A. (Manitoba); **Hall**, R.I., B.Sc. (Birmingham), D.I.C. (London), Ph.D. (Washington), C.I.T. (Harvard); **Henderson**, R., B.Sc. (M.E.) (Manitoba), M.B.A. (Harvard), Ph.D. (Western Ontario), P.Eng.; **Hercus**, T.F., B.A. (Manitoba), M.B.A. (Toronto); **Mundie**, J.D., B.Comm. (Manitoba), M.B.A. (Ohio State), Ph.D. (Stanford); **Nuttall**, G.A., B.Sc. (M.E.) (Manitoba), M.A. (Minnesota); **Willborn**, W., B.Ed., M.A. (Manitoba), Dip.rer.pol. (Hamburg), Dr.rer.soc.oec. (Innsbruck).

Professors

Bartell, M., B.A.(Hons.) (McGill), M.B.A. (Chicago), Ph.D. (Northwestern); **Bector**, C.R., B.A. (Punjab), M.A. (Agra), Ph.D. (Kanpur), F.I.M.A.; **Bhatt**, S.K., B.Sc., M.Sc. (Agra), Ph.D. (Kanpur); **Bruning**, N.S., B.A., M.A. (Arkansas), Ph.D. (Alabama); **Dyck**, B., B.Comm.(Hons.) (Manitoba), Ph.D. (Alberta); **Frohlich**, N., B.Sc.(Hons.) (Manitoba), M.S. (Rutgers), Ph.D. (Princeton); **Godard**, J.H., B.Comm.(Hons.), M.B.A. (Manitoba), Ph.D. (Cornell); **Gray**, J.L., B.Sc. (Evansville), M.Sc. (Southern Illinois), Ph.D. (South Carolina); **Hogan**, T.P., B.A. (Loras College), M.A., Ph.D. (Catholic University of America); **Notz**, W.W., B.S.(Hons.) (Colorado), M.B.A. (Denver), Ph.D. (Northwestern); **Owen**, B.E., B.S.A., M.Sc. (Manitoba), Ph.D. (Western Ontario); **Rosenbloom**, E.S., B.Sc.(Hons.), M.Sc. (Math), M. Sc. (Statistics) (Manitoba), Ph.D. (Waterloo); **Starke**, F.A., B.A., M.B.A. (Southern Illinois), Ph.D. (Ohio State).

Associate Professor

Anderson, G.B., B.A. (Idaho); **Dass**, P., B.Sc., M.B.A. (Punjab), Ph.D. (Michigan State); **Lee**, R.T., B.A., M.S. (San Francisco), Ph.D. (Wayne State).

Assistant Professors

Bowring, M., B.A. (Queen's), M.B.A. (York), Ph.D. Candidate (Alberta); **Hecht,** T., B.Sc. (McGill), M.A., Ph.D. Candidate (Western Ontario); **McLachlin**, R.D., B.Sc. (Eng.), M.B.A. (Alberta), Ph.D. (Western Ontario); **Park,** H., B.A., M.B.A., (Soeul National University), Ph.D. (Wisconsin); **Sue-Chan,** C., B.Sc. (Toronto), M.L.I.S. (Western Ontario), M.B.A., Ph.D. (Toronto); **Wang**, X., B.Ed., M.Ed. (Northeast Normal), Ph. D. (McGill).

Marketing

Senior Scholar

Wilson, M.K., B.A. (Ohio State), M.B.A., D.B.A. (Indiana).

Professors

Bruning, E.R., B.S. (Arkansas), M.A., Ph.D. (Alabama); **Good**, W.S., B.Sc.F. (Toronto), M.S., M.B.A., Ph.D. (Michigan State).

Associate Professors

Litz, R.A., B.Comm.(Hons.) (Manitoba), M.B.A. (Minnesota), Ph.D. (Pittsburgh); **Smith**, M.C., B.Sc.(Hons.), M.B.A. (Queen's), Ph.D. (Oregon).

Assistant Professors

Bhatnagar, N., M.Sc.Mgmt.Studies, M.Sc.(Hons) (India), Ph.D. (North Carolina at Chapel Hill) pending; **Manchanda**, R.V., B.Comm., M.B.A. (India), M.Sc. (Illinois), Ph.D. (Illinois); **Samu**, S., B.Sc., M.B.A. (India), Ph.D. (India); **Sivaramakrishnan**, S., B.Sc. (Madras), M.B.A. (Bharathiar), Ph.D. (Pennsylvania State).

Warren Centre for Actuarial Studies and Research

Assistant Professors

Byrne, M., B.A. (Manitoba), B.A.(Hons.) (Manitoba), F.S.A., F.C.I.A.; **Pai**, J.S., B.Comm. (Feng Chai), M.S., Ph.D. (Connecticut); **Pedersen,** H., B.Sc. (Manitoba), M.Sc. (Stanford), Ph.D. (Washington); **Shand**, K.J., B.Comm.(Hons.) (Manitoba), Ph.D. Candidate (Heriot-Watt), F.S.A., F.C.I.A.

Transport Institute

Associate Professor

Prentice, B.E., B.A. (Western), M.Sc. (Guelph), Ph.D. (Manitoba).

Program Information

The current realities of global competition, rapid technological change, and fundamental economic and political realignment require leaders who can identify trends, rather than follow them. The AACSB accredited Asper management programs provide the learning that enables graduates to change paradigms, not simply to manage within them.

The *Asper MBA—Full-Time (MBA MANITOBA)* is an enriched learning experience that prepares graduates for leadership roles in a world where demands are constantly changing. To supplement the standard program requirements, there is a focus on development of the interpersonal, leadership, communication and teamwork skills required to manage change, innovation, diversity and social responsibility. The program features: an intense 11-month format; two international study tours; executive mentorship; small classes; and business networking.

The Asper *MBA—Part-Time* is designed for practicing professionals who aspire to develop their management skills while maintaining their careers. The program involves a total experience that includes developing close relationships with faculty and students, the creation of professional management attitudes, and the maturation of individuals as managers. The emphasis is on a participative learning process through which students can develop the knowledge, skills and attitudes central to the practice of management. The program features: flexible course schedule in a three to six year time frame; specialization in finance, health administration, management, marketing, and generalist areas; team work; and business networking.

The *Ph.D. Program in Management* is designed to prepare individuals for teaching and research careers in universities, or for applied research positions in either the private or public sector. The program is based upon the premise that contemporary managerial problems are typically multi-faceted and need to be examined from a perspective that is not restricted by the boundaries of any single discipline. The inter-disciplinary nature of the program extends beyond the Asper School of Business to related disciplines across the University of Manitoba. Areas of concentration: finance, management science, marketing, and organizational behaviour.

Fields of Research

The Asper School of Business is one of the best equipped management schools in Canada for research in managerial issues of national and international interest.

Researchers in business administration are examining a wide range of issues including organizational change and conflict management, job stress, work role socialization, compensation structures, goal setting, employment equity and discrimination.

Researchers in marketing and entrepreneurship are studying issues of national loyalty in international air travel, how customers perceive price discounts, how the age of the consumer affects the impact of advertising, the effects of buying group membership for small retailers facing a giant competitor entering their market, and youth entrepreneurship.

In the accounting and finance area, research programs span issues in international capital markets and international corporate finance.

Other researchers are examining issues such as Internet search strategies and telecommuting.

Research Facilities

The Asper School of Business occupies the Drake Centre for Management Studies, one of the finest management education facilities in North America. The centre houses case rooms, lecture theatres, computer laboratories, a graduate study area, and research space.

The Albert D. Cohen Management Library holds about 58,000 monograph volumes and 540 current periodicals. It has a collection of 2,130 corporate annual reports, including 480 current reports, specialized trade directories, and investment updating services. The Library subscribes to full-text databases such as *ProQuest Direct, Canadian Business and Current Affairs (CBCA), Mergent's FIS Online, and E-Stat (Statistics Canada)*.

Academic and applied research is supported in the Centre for International Business Studies, the Transport Institute, the Asper Centre for Entrepreneurship, and the Centre for Accounting Research and Education which subscribes to the following databases: S & P Compustat, University of Chicago CRSP, TSX CMFRC, Disclosure: Compact D, and SSRN.

SECTION 39.1 MBA

Asper MBA—Full-Time (MBA MANITOBA)

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, applicants require:

• Baccalaureate degree or its equivalent from an accredited university, having attained in the most recent 60 credit hours of university-level work, a minimum grade point average of 3.0 on a 4.0 grading scale (approximately 75% or a "B");

• GMAT: A minimum score of 500 on the Graduate Management Aptitude Test (For more information about the test, call 1-800-462-8669 or see website: www.gmat.com);

• Work experience: A minimum of three years, preferably in a professional or managerial role;

Applicants should be aware that the actual admission standards are often above the stated minimum requirements.

The faculty may admit a small number of highly experienced and gifted individuals who do not hold a university degree but who have demonstrated both the potential for leadership and an ability to meet the academic challenge of an MBA program. The applicant should have meaningful work experience, outstanding performance in an alternate program of study such as a professional designation or certificate program, and attained an exceptional score on the GMAT.

Admission Deadline

The deadline to apply is January 15 for international applicants, and May 1 for Canadian/U.S. applicants. Applications received after these dates will be considered if space permits. Applications received before the deadline will be given early consideration.

Program Requirements

The Asper MBA—Full-Time program has a required 66 credit hour curriculum with 60 credit hours of core courses and 6 credit hours of electives.

Required Core Courses

Course Number		Credit Hours
009.605	Accounting 1	3
009.606	Accounting 2	3

009.607	Corporation Finance	3
009.613	Using Information Technology	1.5
009.614	Building the Information Age Organization	1.5
027.603	Organization Theory and Behaviour	3
027.607	Quantitative Analysis for Management	3
027.609	Production Management	3
027.701	Business Policy Seminar	3
027.708	Research Methods	3
027.745	Industrial Relations/Human Resource Management	3
027.750	Management of Labour and Employee Relations	1.5
027.751	Strategic Leadership and Managing Change	1.5
027.752	Issues in Managerial Communications	3
027.772	Business Conditions Analysis	1.5
027.774	Business/Government Relations	1.5
098.701	Industry Project	3
098.702	Managing for Sustainable Development	1.5
098.703	Social and Community Awareness Project	N/C
098.704	Leadership and Personal Development Seminar	N/C
098.705	International Study Trip	3
098.706	Professional Seminar	6
118.608	Marketing	3
118.724	Entrepreneurship and New Venture Formation	1.5
118.730	International Marketing	3
	Total Credit Hours	60

Elective Courses

Students must take 6 credit hours of graduate level elective courses, which are pre-set on a year-to-year basis.

Program Overview

Over the year, the subject streams progressively develop the essential leadership attitudes, managerial skills, and business knowledge areas essential to succeed as a senior manager in today's competitive business world.

Phase 1 focuses on developing fundamental business analysis skills and understanding of how a business functions and prospers in the local economy. Phase 2, building on newly acquired analytical skills, addresses the challenges of day-to-day business management within a North American context. Phase 3 raises business understanding to the global level, and develops long-term strategic and leadership skills. The following is a sample year of MBA MANITOBA, including the concepts to be addressed in each phase:

Orientation: Leadership and Personal Development Seminar
Role of the General Manager
Business Conditions Analysis
Managerial Communications

Phase 1: Analyzing Organizations
Industry and Competitive Analysis
Business Research and Analysis
Building the Information Age Organization
Essentials of Financial Management
Decision Making Under Certainty
Understanding Financial Statements
Foundations of Strategic Marketing
Study Tour: Appreciating the Local Economy
Designing Effective Organizations
*Capital Markets
Using Information Technology
Interpreting and Analyzing Financial Statements
Behaviour Skills for Effective Managers
Community Service Project
Professional Development Seminars

Phase 2: Managing Organizations
Accounting Information and Decision Making
Staffing Organizations
Strategic Marketing
Decision Making Under Uncertainty
Financial Management
Management of Labour and Employee Relations
Global Operations Strategy
Designing Fast Response Operations
Strategy Formulation
Country Analysis
Business/Government Relations
Management Planning and Control
NAFTA Study Tour
Professional Development Seminars

Phase 3: Leading Organizations
Entrepreneurship and New Venture Formation
Leveraging Human Resources
International Business
*International Finance
Strategic Leadership and Managing Change
Strategy Implementation
*CEO Course
*Strategic Cost Management
Off-Shore Study Tour and Policy Project
Managing for Sustainable Development
Management Consulting
Managerial Communications
Professional Development Seminars

* = recently scheduled elective course

Second language reading requirement: none
Expected time to graduate: 11 months

Asper MBA—Part-Time

The objective of the part-time program is to develop business leaders who operate with a sense of ethics and social responsibility in a competitive global environment. The program is designed from the perspective of the general manager, with an opportunity to specialize in finance, health administration, management, marketing, or to complete a generalist program. In addition to problem-solving skills, the program emphasizes critical thinking and decision implementation skills and allows students to integrate their learning in the workplace. The program is designed for individuals who work full-time and courses are scheduled evenings and weekends to accommodate working professionals.

Admission

Admission requirements are the same as for the Full-Time MBA program.

Admission Deadline

To begin the program in September, the deadline to apply is January 15 for international applicants, and May 1 for Canadian/U.S. applicants. To begin the program in January, the deadline to apply is June 15 for international applicants, and October 1 for Canadian/U.S. applicants.

Applications received after these dates will be considered if space permits. Applications received before the deadline will be given early consideration.

Program Requirements

The part-time MBA program is a required 60 credit hour curriculum, with 42 credit hours of core courses, and 18 credit hours of electives. Advanced standing is granted only for equivalent graduate level courses from recognized universities. Exemption may be granted for graduates of a recognized B.Comm. (Hons.) program. Contact the Asper School for the specifics of their policies.

The core of the program is designed to provide a common base of coursework for all students. All courses are required, unless exemption, advance standing or course substitution is granted.

Required Core Courses

Course Number		Credit Hours
027.501	Mathematics for Management*	AX
009.605	Accounting 1*	3
009.606	Accounting 2*	3
009.607	Corporation Finance*	3
009.613	Using Information Technology*	1.5
009.614	Building the Information Age Organization*	1.5
027.603	Organization Theory and Behaviour*	3
027.606	Quantitative Methods*	3
027.607	Quantitative Analysis for Management*	3
027.609	Production Management*	3

027.701	Business Policy Seminar**	3
027.745	Industrial Relations/Human Resource Manage ment*	3
027.771	Managerial Communication*	1.5
027.772	Business Conditions Analysis	1.5
027.773	International Business*	1.5
027.774	Business/Government Relations*	1.5
098.707	Fundamental Professional and Leadership Seminar	1.5
098.708	Professional and Leadership Seminar	1.5
118.608	Marketing*	3
	Total Credit Hours	42

NOTES:

* Eligible for exemption.

** 027.701 Business Policy Seminar constitutes the comprehensive examination. The course must be completed at the University of Manitoba in the final year of a student's program.

Elective Courses

For the remaining courses students must take 18 credit hours of approved graduate level elective courses. Please note that not all electives are available each year. Courses required for each area of specialization are listed below:

Finance

Four courses from:

009.707	Theory of Financial Management	3
009.715	Investment Policy	3
009.722	Advanced Seminar in Finance	3
009.723	Seminar in Financial Intermediaries and Capital Markets	3
009.726	Selected Topics in Finance	3
	plus 6 hours of approved 700-level MBA coursework	

Health Administration

Four courses from:

093.713	Methods in Health Services Research and Evaluation	3
093.729	Economic Evaluation of Health Care	3
093.730	Health Policy and Planning	3
093.731	Epidemiology of Health Care	3
093.732	Organization and Financing of the Canadian Health Care System*	3
093.751	Current Topics in Community Health	3
093.752	Principles of Epidemiology 1*	3
098.701	Industry Project**	3
	plus 6 hours of approved 700-level MBA coursework	

NOTES:

* Required for Health Administration Specialization

** Can be used as a 3 credit hour elective course for field placements in health care organizations upon approval of the MBA Program Committee. Placements and supervision of the placements will be the responsibility of the Department of Community Health Sciences.

Health Administration courses are scheduled by the Department of Community Health Sciences and may not fit within the normal MBA elective schedule.

Marketing

Four courses from:

118.708	Selected Topics in Marketing	3
118.720	Decisions and Concepts in Marketing	3
118.721	Marketing and Competitive Behaviour	3
118.722	Seminar in Marketing	3
118.723	Seminar in Consumer Behaviour	3
118.730	International Marketing	3
	plus 6 hours of approved 700-level MBA coursework	

Management

Four courses from:

027.703	Comparative Management	3
027.704	Systems Analysis for Management	3
027.708	Research Methods	3
027.709	Organizational Decision Making	3
027.710	Interpersonal Processes	3
027.711	Business and Its Environment	3
027.712	Organizational Power and Politics	3
027.730	Topics in Advanced Production and Operations Management	3
027.735	Administration: Selected Topics	3
027.736	Organizational Behaviour and Self Development	3
027.737	Managing Innovation	3
	plus 6 hours of approved 700-level MBA coursework	

Generalist

18 hours of approved 700-level MBA elective coursework

Readings/Research Option

With the approval of the MBA Program Committee and the academic area involved, a student can choose to undertake a research project or a readings course. The research project counts as six credit hours of elective coursework; the readings course counts as three credit hours of elective coursework. A student is allowed up to two readings courses or one readings course and one research project during the program. A research or readings proposal must be submitted to a faculty supervisor and the MBA Program Committee for approval prior to registration for the course. Readings and research courses can only be taken within the Asper School of Business and may not be used as credit toward an area of specialization.

Thesis Option

The thesis option is available to students with strong academic preparation in their area of proposed research. The thesis counts as 12 credit hours of elective coursework and must conform to all requirements of the Faculty of Graduate Studies. Thesis students are strongly advised to take 027.708 Research Methods. Students who are permitted to write a Master's thesis are referred to their major department for information concerning form and content, supervision, and deadlines.

Second language reading requirement: none

Expected time to graduate: 3 - 6 years

SECTION 39.2 Faculty Based Ph.D. in Management

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, an earned Master's degree (MBA preferred), and in exceptional cases, a Bachelor's degree in a management or business discipline from a recognized institution, or a discipline sharing a common origin or a parallel discipline to the applicant's chosen area of concentration, is required.

Prior to admission, the candidate is to provide the following:

- A statement of goals and interests;
- An official transcript of academic record with a minimum grade point average of 3.0 on a 4.0 scale (approximately 75% or a "B") in the last 60 credit hours;
- A score on a graduate aptitude test, preferably the GMAT, with a minimum score of 600 (GRE will be accepted if 80% achieved on all scales);
- Three letters of recommendation from persons who know the candidate's academic ability;
- Evidence of research and teaching ability.

Admission Deadline

The deadline to apply is January 15 for international applicants, and March 1 for Canadian/U.S. applicants. Applications received after these dates will be considered if space permits.

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. The basic program design assumes that students have completed an MBA degree or its equivalent. The MBA degree constitutes the "core" of knowledge that is prerequisite to proceeding to Ph.D. study since it provides the breadth of knowledge necessary for Ph.D.'s in Management. Students who are deficient in this "core" may be required to take additional MBA-level courses. Decisions regarding deficient background will be made by the student's advisory committee.

All students must complete the following course requirements:

A minimum of 12 hours of study in the chosen area of specialization, as approved by the advisory committee. (See specific specialization requirements that follow).

Faculty-Based Doctoral Courses

119.711 Doctoral Seminar in Management (3)

119.712 Management Research Project I (3)

119.713 Management Research Project II (3)

Research Methods

A minimum of 6 hours of research methods courses, as approved by the advisory committee.

Support Area

A minimum of 9 hours of study in a chosen support area, as approved by the advisory committee. A minimum of 3 of these hours must be taken outside the Asper School of Business.

Minimum total Credit Hours: 36

NOTE: The student's advisory committee may require additional coursework.

Area of Specialization Required Coursework:

Finance

009.750	Financial Theory and Corporate Policy	3
009.751	Finance 1: Capital Markets	3
009.752	Finance 2: Corporate Finance	3
	Plus a minimum of 3 hours within the Finance area	

Management Science

027.755	Readings in Management Science	3
027.756	Doctoral Seminar in Management Science	3
	Plus a minimum of 6 hours within the Management Science area.	

Marketing

118.710	Readings in Marketing	3
118.711	Doctoral Seminar in Marketing	3
	Plus a minimum of 6 hours within the Marketing area	

Organizational Behaviour

027.741	Doctoral Seminar in Organizational Behaviour	3
027.744	Doctoral Seminar in Organizational Theory	3

Plus a minimum of 6 hours within the Organizational Behaviour area.

Second language requirement: none

Expected time to graduation: 4 - 5 years

Course Descriptions

Accounting and Finance

009.605 Accounting 1 (3) Principles and concepts of accounting underlying the measurement of business income and evaluation of performance.

009.606 Accounting 2 (3) The uses, limitation, and interpretation of financial statements; accounting details and reports used in planning, control, and decision-making. *Prerequisite:* 009.605.

009.607 Corporation Finance (3) The financial management of business organizations, including management of current assets, long-term capital planning, lease financing, capital budgeting, and corporate external expansion and reorganization. *Prerequisite:* 009.605.

009.613 Using Information Technology (1.5) This course is designed to cover the building blocks of IT. Five major topics to be covered include: computer hardware, computer software, data/information, telecommunications, and systems development.

009.614 Building the Information Age Organization (1.5) This course is designed to explore the question -"What are the benefits and pitfalls of Information Technology?" Business case studies and class discussion will be utilized heavily. *Prerequisite:* 009.613.

009.707 Theory of Financial Management (3) Study of selected topics in the various fields of financial management; emphasis on trends, current problems, and research in the fields. *Prerequisite:* 009.607.

009.715 Investment Policy (3) Topics will include the structure of rates in the financial markets, the problem of investment timing and selection, and principles of financial analysis. *Prerequisite:* 009.607.

009.722 Advanced Seminar in Finance (3) A case-oriented course that will require extensive preparation and presentation of selected cases in corporate financial management; emphasis on the application of theoretical models of finance to real problems. *Prerequisite:* 009.607.

009.723 Seminar in Financial Intermediaries and Capital Markets (3) Topics will include the major participants in the capital markets and their functions; the demand and supply of money and the structure of interest rates; recent developments and international factors in the capital markets. *Prerequisite:* 009.607.

009.724 Readings in Accounting and Finance (3) Supervised readings in one of the areas of accounting and finance.

009.726 Selected Topics in Finance (3) A study of selected topics in finance relating to advanced issues in theory or practice. Topics considered will depend on the interests and needs of the participants. *Prerequisite:* 009.607 plus others if specified by the professor.

009.750 Financial Theory and Corporate Policy (Ph.D.) (3) Explores the conceptual and theoretical foundations of finance and their applications to corporate financial policy. *Prerequisite*: admission to the Ph.D. program in Management (Finance) or approval by instructor.

009.751 Finance 1: Capital Markets (Ph.D.) (3) An understanding of the theory and empirical research in capital markets including theories and tests of financial asset valuation, portfolio analysis and market efficiency. *Prerequisite*: admission to the Ph.D. program in Management (Finance) or approval by instructor.

009.752 Finance 2: Corporate Finance (Ph.D.) (3) Theoretical issues in corporation finance. Issues covered will include investment choice and shareholder unanimity, capital structure, dividend irrelevancy, corporate and personal taxes, bankruptcy costs, agency cost, asymmetric information and signalling models, theory of the firm, and corporate take-overs. *Prerequisite*: admission to the Ph.D. program in Management (Finance) or approval by instructor.

009.753 Advanced Topics in Finance (Ph.D.) (3) Seminar emphasizing the mathematical tools necessary for financial decision making including an introduction to stochastic processes, stochastic dominance, and separation theorems. Applications in derivative markets, investment theory, and corporate finance. *Prerequisite*: admission to the Ph.D. program in Management (Finance) or approval by instructor.

Business Administration

027.501 Mathematics for Management (3) (AX) A remedial course in linear and matrix algebra and calculus; with applications to elementary management problems. **Note**: This course will not be included in the calculation of the grade point average. Pass/Fail.

027.603 Organization Theory and Behaviour (3) An examination of current theories of structure and behaviour as they apply to organizations in the public and private sector. Emphasis upon research findings and their application in management situations.

027.606 Quantitative Methods (3) Topics to be selected from quantitative aspects of business problem formulation. Sampling, time series analysis, linear regression and correlation; application to problems in business and government. *Pre- or corequisite:* satisfactory completion of 027.501.

027.607 Quantitative Analysis for Management (3) Introduction to the use of quantitative techniques, and computers to solve management problems. Mathematical optimization models, network analysis, and probability models. *Prerequisite:* 027.606.

027.609 Production Management (3) Analysis of the basic concepts of production systems, and operation and control of such systems.

027.701 Business Policy Seminar (3) This course entails the study of general management. Students shall integrate the concepts from the various functional areas of the organization covered in the program with the different environments: social, political, economic and technological. Students will analyze general management problems, shall formulate policies, and display ability to implement policies. Must be taken in final term in the program.

027.703 Comparative Management (3) Comparative study and evaluation of management philosophy and practices in cross-cultural setting; the cultural, economic, and political environment which influence management decision-making.

027.704 Systems Analysis for Management (3) The concepts of systems analysis used to provide an analytical framework for study of management as the integrative process which cuts across functional divisions and operational activities.

027.706 Readings in Business Administration (3) Supervised readings in one of the areas of business administration including human resource management, industrial relations, organizational behaviour, policy and environment.

027.707 Administrative Studies Research Project (6) Research in any one of the areas of administrative studies.

027.708 Research Methods (3) Principles of research design and data collection with examples drawn across the areas of marketing management, industrial relations, policy analysis, etc. Both cases and computer-based exercises are used.

027.709 Organizational Decision-Making (3) A study of the goal-setting and decision-making processes in organizations and the implications for the growth and survival of such organizations.

027.710 Interpersonal Processes (3) An examination of theories of interpersonal behaviour and processes as they apply to managerial situations. Emphasis upon individual behaviour and change, group dynamics, leadership behaviour, and communications.

027.711 Business and Its Environment (3) Analysis of the environmental factors within which a business operates.

027.712 Organizational Power and Politics (3) An examination of personal, interpersonal and organizational power in the context of organizational politics. Topics covered include rational versus political models of organizations, the accumulation and management of personal power, the politics of decision-making, the politics of managerial succession, the politics of budgets, authority, intergroup conflict, and bargaining and negotiation processes.

027.714 Topics in Industrial Relations/Human Resource Management (3) An in-depth analysis of various topics in industrial relations and human resource management. *Pre- or corequisite:* 027.745.

027.715 Comparative Industrial Relations (3) A comparative analysis of the industrial relations systems of major industrialized countries including: Britain, West Germany, Sweden, United States, and Japan. Attention will also be given to international industrial relations including: multinational companies and the international labour movement.

027.716 Staffing, Training and Development (3) A review of the Human Resource Management functions of staffing, training and development. Topics include: planning, recruitment, selection process, selection tests, internal placement, training needs analysis, training evaluation, training methods, management development and international management development. *Pre- or corequisite*: 027.745.

027.730 Topics in Advanced Production and Operations Management (3) A study of

recent developments in production systems and management. Topics include systems design, plant location and layout, inventory systems planning and control. *Prerequisite:* 027.609.

027.735 Administration: Selected Topics (3) Topics will include the development of administrative thought, studies in entrepreneurial history, current research in decision processes, leadership and organization theory.

027.736 Organizational Behaviour and Self Development (3) This course will operate in a seminar format with two goals. The first goal is to provide an environment in which the student can develop and manage to successful conclusion a project in which they have significant intrinsic interest. The second goal is to improve the student's understanding of the inner life of an organization by increasing his/her ability to discriminate between the organizational "ropes to skip and the ropes to know."

027.737 Managing Innovation (3) An examination of organizational design characteristics in the context of a competitive international perspective. Emphasis is on organizational and technological innovation to facilitate the development of new products or processes or to implement change in existing products or processes. Topics covered include Canadian experience and policy, facilitators and inhibitors in the creative process, diffusion of innovations, and the aims of the patent process.

027.740 Readings in Organizational Behaviour (Ph.D.) (3) An examination of theory and research from the social and administrative sciences that focuses on the interaction between organizations and their environments. The evaluation and synthesis of theoretical and empirical work in this area will be emphasized. *Prerequisite*: admission to the Ph.D. program in Management (Organizational Behaviour) or approval by instructor.

027.741 Doctoral Seminar in Organizational Behaviour (Ph.D.) (3) An examination of theory and research from the social and administrative sciences that is relevant to the behaviour of individuals and groups within organizations. Emphasis will be placed on evaluation and synthesis of theoretical and empirical work in this area. *Prerequisite*: admission to the Ph.D. program in Management (Organizational Behaviour) or approval by instructor.

027.744 Doctoral Seminar in Organizational Theory (Ph.D.) (3) The major goal of this course is to familiarize students with central schools of thought within organization theory. As with other theories in the social sciences, these schools of thought tend to be based on differing assumptions about the nature of the organizational world, the operation of causality, epistemology, and the role of human actors. *Prerequisite*: admission to the Ph.D. program in Management (Organizational Behaviour) or approval by instructor.

027.745 Industrial Relations/Human Resource Management (3) The process of valuing, employing, developing, motivating and maintaining human resources in an industrial society. An introduction to the study of labour relations in the social technical systems of the Federal Government, the Provincial Government and profit and nonprofit organizations.

027.746 Collective Bargaining (3) The labour management relations in the negotiation and administration of the collective agreement. The analysis of conflict and the application of bargaining theories. *Pre- or corequisite:* 027.745.

027.747 The Fundamentals of Public Policy Analysis (3) Introduction to the basic concepts and objectives of public policy analysis. Analytic tools and techniques of policy analysis: cost-benefit analysis, forecasting, design and application of program evaluations, implementation of evaluation results. Case studies in policy analysis.

027.748 Public Sector Decision Making (3) Analysis of models of collective action with emphasis on the supply of public goods. Examination of voting, coalition formation, and general choice procedures with regard to their impact on governmental programs. Discussion of the institutional setting of Canadian policy formation. Analysis of the role of bureaucracy.

027.749 Regulatory Processes and Policies (3) Analysis of the processes of regulation of private sector conduct and performance. Methods and effects of regulation. Purpose of regulatory statutes. Sources of initiative in the regulatory process. The effects of regulation. Formulation of general empirical rules for the behaviour of regulatory agencies. Politics and economics of regulatory reform.

027.750 The Management of Labour and Employee Relations (Full-Time MBA Program) (1.5) An examination of the systems of labour and employee relations in Canada as it compares with the systems of other countries. Emphasis upon understanding and managing labour and employee relations in a changing economy.

027.751 Strategic Leadership and Managing Change (Full-Time MBA Program) (1.5) An examination of the role of the manager as a change agent and processes associated with strategic vision and change. Analysis of factors affecting strategic decisions and how organizations adapt to their environment. Emphasis is upon the role of leaders: transformational leadership, charisma, organizational design and managing organizational culture change.

027.752 Issues in Managerial Communication (3) An examination of strategies and development of skills for effective oral, written, non-verbal, interpersonal, group, cross-cultural, and ethical communication in management.

027.753 Selected Topics (3) An examination of current issues in areas which could, for example, include: organizational behaviour, organizational theory, strategy, human resource management, and industrial relations. *Prerequisite*: consent of instructor.

027.754 Doctoral Seminar in Research Methods (Ph.D.) (3) Principles of research design and data collection appropriate for the areas of marketing, management, industrial relations, policy analysis, finance, management science, etc. Research problems and issues will be discussed from a number of perspectives. Conceptual material, statistical analyses, theoretical material and the utilization of statistical application software are used as the bases for seminar discussion. *Prerequisite*: admission to the Ph.D. program in Management or approval by instructor.

027.755 Readings in Management Science (Ph.D.) (3) A study of recent literature in the Management Sciences and their applications, with emphasis on new developments. *Prerequisite*: admission to the Ph.D. program in Management (Management Science) or approval by instructor.

027.756 Doctoral Seminar in Management Science (Ph.D.) (3) Seminars on the selected research topics of recent advances in the field of Management Science covering areas of current interests. *Prerequisite*: admission to the Ph.D. program in Management (Management Science) or approval by instructor.

027.767 Business Decision Analysis (3) Development and applications of quantitative methods to solve decision-making problems under uncertainty. Topics include the structuring of complex decision problems, utility theory, subjective probability, value of information, risk sharing, and group decisions. *Prerequisite:* 027.607.

027.768 Mathematical Optimization Models (3) A specialized course in mathematical optimization. Linear programing, integer programing, Fritz John and Kuhn-Tucker theorems, quadratic programing, nonlinear programing, duality, network analysis. *Prerequisite:* 027.607 or consent of instructor.

027.769 Probability Models and Games (3) A specialized course in probabilistic models. Topics include Markov chains, queues, inventories, simulation, games, search problems. *Prerequisite*: 027.607 or consent of instructor.

027.770 Mathematical Control Models (3) Quantitative aspects of large-scale systems models. Design, implementation, maintenance, and use of such systems, including mathematical models of the firm, and information requirements; systems tests and evaluations. *Prerequisite:* 027.607.

027.771 Managerial Communication (1.5) Focus is on the interpersonal, intergroup, and intraorganizational communication skills required for effective leadership, and the objectives are to assist the participants in the following: increasing the clarity, correctness, and effectiveness of written and oral communication; recognizing and analysing communication dynamics at work in personal, group, and organizational interactions; increasing combination flexibility and proficiency in times of corporate challenge, change, and crisis.

027.772 Business Conditions Analysis (1.5) To provide an awareness of key components of the economic/business environment. Identifies critical indicators that affect decision-making and suggests strategies for forecasting future conditions. Topics covered include critical demographic trends, the changing technological frontier, international trade, finance, and investment trends, and trends in interest rates and exchange rates. A theoretical overview will precede the discussion of business conditions indicators.

027.773 International Business (1.5) Develop an appreciation of business decision-making in an international/global context. Learning activities are focused towards developing intellectual and interpersonal skills in order for managers to function more effectively in international markets.

027.774 Business/Government Relations (1.5) Focuses on the logic of political-economic-business relations. The point of view is that of the manager. Specific tools of analysis are discussed that assist managers in understanding and working with aspects of public policy which interface with their private sector decisions.

General Course Requirements for the Ph.D. Program

119.711 Doctoral Seminar in Management (Ph.D.) (3) Examination of the philosophy of science in management and overview of management research typologies, methods, and the role of research in the practice of management. *Prerequisite*: admission to the Ph.D. program in Management or approval by instructor.

119.712 Management Research Project I (Ph.D.) (3) Examination of research designs and preparation of theoretical paper in management. *Prerequisite*: admission to the Ph.D. program in Management or approval by instructor.

119.713 Management Research Project II (Ph.D.) (3) Implementation of research project, collection of data, analysis of results. *Prerequisite*: admission to the Ph.D. program in Management or approval by instructor.

Interdepartmental Courses

098.701 Industry Project (3) Supervised study and research of a problem opportunity in business or management. Specific course requirements determined by the faculty member assigned to be the course coordinator. In addition, each project will be supervised by a faculty member expert in the area. Projects consist of written report(s) containing substantive, practical evidence and analytically structured comments, academic materials, and bibliographical references. Pass/Fail basis only. *Prerequisite:* completion of all core MBA courses (or equivalent experience) and consent of MBA program director.

098.702 Managing for Sustainable Development (Full-Time MBA Program) (1.5) Strategic issues related to the manager's role in sustainable development, including enterprises in the renewable and non-renewable resource sectors, life-cycle analysis, and full cost accounting. Emphasis is placed on environmental management control systems, environmental performance measurement, reporting, and the impact of environmental management on strategic management decisions.

098.703 Social and Community Awareness Project (Full-Time MBA Program) (non-credit) An experiential project examining issues related to economically and/or socially disadvantaged individuals and groups with emphasis on corporate social responsibility.

098.704 Leadership and Personal Development Seminar (Full-Time MBA Program) (non-credit) Preparation in computer, technical, interpersonal, and team-building skills for MBA MANITOBA program.

098.705 International Study Trip (Full-Time MBA Program) (3) A supervised international experience to examine the relationship between corporations, senior managers, and social institutions in selected countries. Examination of the interplay between

culture, economic development, management systems and strategies in other countries. Emphasis upon establishment of business networks on an international basis.

098.706 Professional Seminar (Full-Time MBA Program) (6) A series of seminars on professional management topics complementing the MBA program curriculum.

098.707 Fundamental Professional and Leadership Seminar (1.5) Series of seminars covering fundamental topics essential for modern management including business ethics and managing diversity.

098.708 Professional and Leadership Seminar (1.5) Series of seminars covering fundamental topics essential for modern management including such topics as: aboriginal business, managerial law, situational leadership, creating shareholder value, developing a business plan, and career management.

Marketing

118.608 Marketing (3) Analysis of the evolution and characteristics of marketing systems; the various types of consumers and their behaviour; marketing activities of the firm; legislation at all levels which affect marketing decisions.

118.708 Selected Topics in Marketing (3) A study of selected areas of recent development in the field of marketing. Topics may include the marketing of services, market research, business to business marketing, marketing channel systems, personal selling or sales management, and physical distribution. *Prerequisite:* 118.608

118.710 Readings in Marketing (Ph.D.) (3) A survey of current literature in the major areas of marketing and marketing research. Emphasis upon empirical developments as they affect the application of marketing concepts. *Prerequisite*: admission to the Ph.D. program in Management (Marketing) or approval by instructor.

118.711 Doctoral Seminar in Marketing (Ph.D.) (3) Advanced study of marketing thought integrating the functional areas of marketing. Seminars on selected research topics and recent developments in the field. *Prerequisite*: admission to the Ph.D. program in Management (Marketing) or approval by instructor.

118.712 Ph.D. Seminar in Buyer Behavior (Ph.D.) (3) Concepts and literature relating psychological and sociological perspectives to buyer behaviour in Marketing. *Prerequisite*: admission to the Ph.D. program in Management (Marketing) or approval by instructor.

118.720 Decisions and Concepts in Marketing (3) Application of the principles of marketing from a managerial viewpoint; emphasis on marketing planning, strategy, and control; and appraisal of the effectiveness of marketing activities. *Prerequisite:* 118.608.

118.721 Marketing and Competitive Behaviour (3) Designed to give the student a deeper understanding of the dynamics of marketing behaviour. Oriented towards theoretical conceptualizations of the problems and practices in marketing areas. *Prerequisite:* 118.608.

118.722 Seminar in Marketing (3) Study of selected topics in marketing with emphasis on recent theoretical developments and their application. *Prerequisite*: 118.608.

118.723 Seminar in Consumer Behaviour (3) Intensive study of consumer behaviour as it relates to the marketing function. *Prerequisite:* 118.608.

118.724 Entrepreneurship and New Venture Formation (Full-Time MBA Program) (1.5) Entrepreneurship and enterprising behaviour with an emphasis on the identification and evaluation of viable new venture concepts and their development into successful enterprises.

118.730 International Marketing (3) A study of problems and opportunities of marketing in foreign environments. It will focus on the cultural, economic and geographical problems encountered in managing the marketing function from a Canadian manager's perspective. *Prerequisite:* 118.608.

118.750 Readings in Marketing (3) Supervised readings in one of the areas of Marketing. *Prerequisite:* 118.608 and at least one other graduate marketing course.

Health Administration

See the Faculty of Medicine, Department of Community Health Sciences section of this *Calendar* for course descriptions.

093.713 Methods in Health Services Research and Evaluation (3)

093.729 Economic Evaluation of Health Care (3)

093.730 Health Policy and Planning (3)

093.731 Epidemiology of Health Care (3)

093.732 Organization and Financing of the Canadian Health Care System (3)

093.751 Current Topics in Community Health (3)

093.752 Principles of Epidemiology 1 (3)

SECTION 40: Mathematical, Computational and Statistical Sciences

Institute of Industrial Mathematical Sciences (IIMS)

Director and Program Coordinator: J.F. Brewster
General Office: 420 Machray Hall
Telephone: (204) 474 6724
Fax: (204) 474 7602
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Web: www.umanitoba.ca/institutes/iims

Academic Staff

See academic staff lists for the departments of Mathematics, Computer Science and Statistics.

Program Information

The Master of Mathematical, Computational and Statistical Sciences is a joint program of the Departments of Mathematics, Computer Science and Statistics. The program is interdisciplinary both in concept and structure, and furthers the mission of the University of Manitoba in its intent to enhance contacts and partnerships with outside organizations.

Students enrolled in the program are employees of industry, business or government. A major component of a student's program is a practicum, which is intended to make an important contribution to a project at the student's place of employment. While working on the practicum the student will be jointly supervised by an Industry Advisor (from the student's workplace) and an Academic Advisor (from the University).

Fields of Research

All applied areas of mathematics, computer science and statistics are potential fields of research under this program.

Research Facilities

The Institute of Industrial Mathematical Sciences is a research institute within the Faculty of Science. The IIMS has the mandate to conduct applied research in the mathematical, computational or statistical sciences -- either in collaboration with industry, or on problems motivated by industrial applications. The IIMS also facilitates collaboration between mathematical scientists and industrial partners, and among mathematical scientists in different disciplines. The director of the IIMS is the coordinator of the Master of Mathematical, Computational and Statistical Sciences program.

Master of Mathematical, Computational and Statistical Sciences

Admission

All applications will be reviewed on an individual basis, using the criteria for admission of the Faculty of Graduate Studies. Students are normally expected to have completed a four-year Bachelor's degree in Engineering, Management, Science or other related areas for entrance. In exceptional cases, industrial experience together with appropriate university courses may be considered to be equivalent to the completion of a four-year degree.

Application Deadlines

The following are the deadlines for submission of applications to the IIMS:

Start Date		Canadian/U.S.	Non-Canadian
Regular	(September)	June 1	March 1
Winter	(January)	October 1	July 1
Spring	(May)	February 1	November 1
Summer	(July)	April 1	January 1

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar. A minimum of 18 credit hours of approved course work, and a practicum. The specific courses to be taken will depend upon the student's background and area of concentration. Normally, the courses to be taken will be select-

ed from the three participating departments, although appropriate courses from the faculties of Engineering and Management may also be permitted. A required course of all students is a graduate level Industrial Modelling course. This course is currently under development, and will be team taught by members of the three departments.

Second language reading requirement: none
Expected time to graduate: 18 months

Course Descriptions

Courses listed under the departments of Mathematics, Computer Science and Statistics are potential courses in this program.

SECTION 41: Mathematics

Head: TBA
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E-mail: mathematics_dept@umanitoba.ca
Website: umanitoba.ca/science/mathematics

Academic Staff

Distinguished Professors

Cohen, H., B.Sc.(Hons.) (Manitoba), Sc.M. (Brown), Ph.D. (Minnesota), P.Eng., F.A.A.M.; **Gratzer**, G., B.Sc. (Eôtvôs), Ph.D. (Hungarian Academy of Sciences), Dr. Rerum Naturalis (Eôtvôs), D.Sc. (Hungarian Academy of Sciences), F.R.S.C.; **Gupta**, N.D., B.A. (Kashmir), LL.B., M.A. (Aligarh), Ph.D. (Australian National), F.R.S.C.; **Mendelsohn**, N.S., B.A., M.A., Ph.D. (Toronto), F.R.S.C.

Senior Scholars

Clutton-Brock, M., B.A. (Cambridge), M.Sc. (Victoria), Ph.D. (Washington); **Dowling**, D.M., B.Sc.(Hons.), M.Sc. (Manitoba), Ph.D (Toronto); **Dowling**, R.J., B.Sc.(Hons.) (Manitoba), M.A. (Minnesota); **Finlayson**, H.C., B.Sc., M.Sc. (Alberta), Ph.D. (Minnesota); **Losey**, N.E., B.A.(Hons.) (Toronto), M.Sc., Ph.D. (Wisconsin), S.U.A.C.; **McClure**, J.P., B.Sc., M.A. (Waterloo), Ph.D. (Newcastle, UK); **Parameswaran**, M.R., B.A., Dip. Ger. (Madras), B.Sc.(Hons.), M.A., M.Sc., D.Sc. (Annamalai), M.A. (Manitoba); **Quackenbush**, R.W., B.S. (M.I.T.), M.S., Ph.D. (Stevens Institute of Technology); **Rayburn**, M.C., B.A. (Evansville), M.S. (Auburn), Ph.D. (Kentucky); **Venkataraman**, R., B.A.(Hons.) (Loyola, India), Dip. French, M.Sc., Ph.D. (Madras).

Professors

Aitchison, P.W., B.Sc.(Hons.) (London), M.A. (Colorado), Ph.D. (Australian National); **Berry**, T.G., B.Math.(Hons.), M.Math, Ph.D. (Waterloo); **Doob**, M., A.B. (Columbia), M.A., Ph.D. (CUNY); **Gerhard**, J.A., B.Sc., M.Sc., Ph.D. (McMaster); **Ghahramani**, F., B.Sc.(Hons.) (Tehran), M.Sc. (Tehran Teacher Training), Ph.D. (Edinburgh); **Guo**, B., B.Sc. (Fudan), M.Sc., Ph.D. (Maryland); **Gupta**, C.K., B.A. (Kashmir), M.A. (Aligarh), M.A.(Hons.), Ph.D. (Australian National), F.R.S.C.; **Hoskins**, W.D., B. Tech., Ph.D. (Brunel); **Kelly**, D., B.A.Sc. (UBC), Ph.D. (Queen's); **Krause**, G.R., Dipl. Math., Dr. Phil. Nat. (Frankfurt); **Lakser**, H., B.Sc.(Hons.) (Manitoba), A.M. (Princeton), Ph.D. (Manitoba); **Padmanabhan**, R., B.Sc., M.Sc. (Madras), Ph.D. (Madurai); **Platt**, C.R., B.Sc., M.Sc. (Iowa State), Ph.D. (Pennsylvania State); **Shivakumar**, P.N., B.Sc. (Mysore), M.Sc. (Baneras) (London), Ph.D., D.Sc. (London), C.Math., F.I.M.A.; **Sichler**, J.J., M.Sc., R.N.Dr., Ph.D. (Charles, Prague); **Thomas**, R.S.D., B.Sc.(Hons.) (Toronto), M.A. (Waterloo), Ph.D. (Southampton), C.Math., F.I.M.A.; **Trim**, D.W., B.Sc.(Hons.), M.Sc., Ph.D. (Waterloo); **Williams**, J.J., B.Sc., M.Sc., Ph.D. (Toronto); **Woods**, R.G., B.Sc.(Hons.), M.Sc. (Manitoba), Ph.D. (McGill). **Zorboska**, N., B.S., M.S. (Skopje), Ph.D. (Toronto).

Associate Professors

Gumel, A.B., B.Sc. (Bayero), Ph.D. (Brunel); **Kopotun,** K., M.Sc. (Kiev), Ph.D. (Alberta); **Kucera**, T.G., B.Sc.(Hons.), M.Sc. (Manitoba), Ph.D. (McGill).

Assistant Professors

Craigen, R., B.Sc. (UBC), M.Math., Ph.D. (Waterloo); **Charette**, V. B.Sc., M.Sc. (Quebec), Ph.D. (Maryland); **Gunderson**, D. B.Sc., M.Sc. (Calgary), Ph.D. (Emory); **Holens**, T.F., B.Sc.(Hons.), M.Sc. (Manitoba); **Lui**, S.H., B.Sc., M.Sc. (Toronto), Ph.D. (California Inst. Of Tech); **Zhang**, Y., M.Sc. (Shandong), Ph.D. (Manitoba).

Adjunct Professors

Batten, L.M., B.Math (Hons.), M.Math, Ph.D. (Waterloo); **Derksen**, R. W., B.Sc., M.Sc., Ph.D. (Manitoba);

Program Information

The department offers Master's and Ph.D. programs at the graduate level, which cover many areas of mathematics. Graduates find work in industry or in academia.

Fields of Research

The department has people working in the areas of algebra, analysis, computational mechanics, computer graphics, differential equations, discrete mathematics, finite-element methods, foundations, geometry, matrix computations, numerical analysis and topology. More information about specific individuals and their current graduate students can be found on the department web pages.

The department operates several seminars in addition to graduate courses. Faculty, graduate students and visitors from all over the world participate in such research seminars. Regular seminars are held in discrete mathematics, functional analysis, rings and modules, mathematical biology and universal algebra/lattice theory. There is also a weekly graduate student seminar in which graduate students give talks on topics of their choice.

Research Facilities

The department provides each graduate student with an office and access to computers, laser printers, mail, photocopier, fax machine, mathematical journals, a reading room and a lounge.

The computer room has several Macintosh and Windows computers running the operating systems - Mac O/S, Windows 2000.. Software programs include Maple, Mathematica, MathCad, Matlab, Scientific Workplace, word processing/spreadsheet programs, web access and network access to UNIX servers.

M.Sc. in Mathematics

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*, students should generally have a strong background in Mathematics with courses leading to an Honours or four-year Major in Mathematics in a B.Sc., B.A., or equivalent degree. The student's background will be evaluated by the department's Graduate Studies Committee and admission to the program will be based on this evaluation. Students with other degrees or backgrounds may be eligible for admission to a pre-Master's program to the satisfaction of the department. Courses will be prescribed on an individual basis to help the student qualify for graduate work in Mathematics. Contact the department for information.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 4 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 9 months prior to their intended start date.

Program requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. The program consists of approved coursework and a thesis or practicum. Students are required to take 15 credit hours of coursework, of which at least 6 hours must be at the graduate level and at least 6 hours in an area of mathematics clearly different from the area of specialization of the thesis or practicum. Particular programs of study within Mathematics may require courses outside the Department of Mathematics.

Second language reading requirement: none
Expected time to graduate: two years

Ph.D. in Mathematics

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. Students entering the Ph.D. program must have either an Honours degree or a M.Sc. degree in Mathematics.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 4 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Particular programs of study within mathematics may require courses outside the Department of Mathematics. In addition to the course work, the student is required to take a candidacy examination, which will consist of three comprehensive exams from the following areas: Algebra, Analysis, Combinatorics, Differential Equations, Geometry, Computational Mathematics, Topology, at least one of which must be Algebra or Analysis. The candidate's supervisor must approve the choice of subjects. To proceed to a Ph.D. degree a student must have a grade of "A" on each of the three parts.

Second language requirement: yes
Expected time to graduation: 3-5 years

Course Descriptions

The department offers courses in several areas of Mathematics. The content of each topics course will be chosen from the topics listed, and an appropriate subtitle will be attached to the course name. Thus, a course with a given number can be taken more than once by using different subtitles.

The "seminar" courses are for special topics not included among the listed ones.

136.801 Advanced Matrix Computations (3) Matrix computation, decomposition of matrices, iterative methods, sparse matrices, eigenvalue problems. *Prerequisites:* linear algebra, computing, numerical analysis, and consent of instructor.

136.811 Applied Finite Element Analysis (3) Theory and practice of the finite element method of the solution of partial differential equations and its application to engineering and scientific problems. It includes the h, p and h-p versions, a priori and a posteriori error estimates, adaptability and the structure of finite element software. *Prerequisite:* numerical analysis and partial differential equations or consent of the instructor.

136.815 Numerical Solution of Partial Differential Equations (3) Finite-difference and finite-element methods for parabolic, elliptic and hyperbolic partial differential equations. *Prerequisites:* partial differential equations, numerical analysis, and consent of instructor.

136.821 Topics in Combinatorics 1 (3) Topics will be chosen from the areas of algebraic combinatorics, coding theory, design theory, enumerative combinatorics, graph theory. *Prerequisite:* approval of department.

136.822 Topics in Combinatorics 2 (6) Topics will be chosen from the areas of algebraic combinatorics, coding theory, design theory, enumerative combinatorics, graph theory. *Prerequisite:* approval of department.

136.831 Partial Differential Equations of Applied Mathematics (3) Complex-variable methods, perturbation methods, variational methods, discontinuities. *Prerequisites:* partial differential equations, complex variables, and consent of instructor.

136.841 Seminar in Applied and Computational Mathematics 1 (3) Designed to accommodate special topics in applied or computational areas of mathematics not included in other course offerings. Students are advised to consult the department as to availability.

136.842 Seminar in Applied and Computational Mathematics 2 (6) Designed to accommodate special topics in applied or computational areas of mathematics not included in other course offerings. Students are advised to consult the department as to availability.

136.843 Seminar in Mathematics 1 (3) Designed to accommodate special topics not included in topics' courses. *Prerequisite:* approval of department.

136.844 Seminar in Mathematics 2 (6) Designed to accommodate special topics not included in topics' courses. *Prerequisite:* approval of department.

136.851 Topics in Algebra 1 (3) Topics will be chosen from the areas of associative and non-associative algebras, Boolean algebra and lattice theory, category theory, group theory, ring theory and universal algebra. *Prerequisite:* approval of department.

136.852 Topics in Algebra 2 (6) Topics will be chosen from the areas of associative and non-associative algebras, Boolean algebra and lattice theory, category theory, group theory, ring theory and universal algebra. *Prerequisite:* approval of department.

136.861 Topics in Analysis 1 (3) Topics will be chosen from the areas of asymptotics, functional analysis, operator theory, real and complex variables, summability theory, topological vector spaces. *Prerequisite:* approval of department.

136.862 Topics in Analysis 2 (6) Topics will be chosen from the areas of asymptotics, functional analysis, operator theory, real and complex variables, summability theory, topological vector spaces. *Prerequisite:* approval of department.

136.871 Topics in Foundations 1 (3) Topics will be chosen from the areas of logic, model theory, recursive functions, set theory. *Prerequisite:* approval by department.

136.872 Topics in Foundations 2 (6) Topics will be chosen from the areas of logic, model theory, recursive functions, set theory. *Prerequisite:* approval by department

136.881 Topics in Geometry 1 (3) Topics will be chosen from the areas of algebraic curves, combinatorial geometry, Euclidean geometry, fractal geometry, groups and geometrics, projective geometry. *Prerequisite:* approval of department.

136.882 Topics in Geometry 2 (6) Topics will be chosen from the areas of algebraic curves, combinatorial geometry, Euclidean geometry, fractal geometry, groups and geometrics, projective geometry. *Prerequisite:* approval of department.

136.891 Topics in Topology 1 (3) Topics will be chosen from the areas of compactifications and related extensions, covering properties, rings of continuous functions, set-theoretic topology, topological groups, uniformities and related structures. *Prerequisite:* approval of department.

136.892 Topics in Topology 2 (6) Topics will be chosen from the areas of compactifications and related extensions, covering properties, rings of continuous functions, set-theoretic topology, topological groups, uniformities and related structures. *Prerequisite:* approval of department.

SECTION 42: Mechanical and Industrial Engineering

Head: S. Balakrishnan
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Website: www.umanitoba.ca/engineering/mech_and_ind

Academic Staff

Professors Emeriti

Azad, R.S., B.Sc.(Hons.), Ph.D. (Nottingham), P.Eng.; **Chant**, R. E., B.Eng., M.Eng. (Mech.) (McGill), F.E.I.C., M.C.S.M.E., P.Eng.; **Hawaleshka**, O., B.Eng., M.Eng. (McGill); **Shewchuk**, J., B.Sc., M.Sc. (Saskatchewan), Ph.D. (Pennsylvania State); **Sims**, G.E., B.Sc. (M.E.) (Manitoba), M.Sc. (Birmingham), Ph.D. (London), C.S.M.E., PEng; **Tangri**, K. K., B.Sc. (Punjab), B.Sc. (Met. Eng.) (B.H.U., India), M.Sc., Ph.D. (Missouri), PEng.

Chair Professors

Chaturvedi, M.C., B.Sc. (Met.) (Banara) M.Met., Ph.D. (Sheffield), P.Eng.; **Jayaraman**, R., M.Sc. (Wayne State), Ph.D. (Northwestern).

Professors

Balakrishnan, S., B.Tech., M.Tech. (IIT, Madras), Ph.D. (M.E.) (Manitoba), PEng; **Bassim**, M.N., B.Sc. (Cairo), M.Sc., Ph.D. (Virginia), PEng; **Cahoon**, J.R., B.Sc. (Met.E.), M.Sc., Ph.D. (Alberta), PEng, FASM; **Chaturvedi**, M.C., B.Sc. (Met.) (Banara) M.Met., Ph.D. (Sheffield), P.Eng; **Popplewell**, N., B.Sc.(Hons.) (Math.) (Leeds), M.Sc., Ph.D. (Southhampton.), PEng; **Ruth**, D.W., B.Sc. (M.E.), M.Sc. (M.E.) (Manitoba), Ph.D. (Waterloo), PEng; **Sepehri**, N., B.Sc. (Iran), M.A.Sc., Ph.D. (UBC), PEng; **Soliman**, H.M., B.Sc. (M.E.) (Assiut), M.S., Ph.D. (M.E.) (Kansas), PEng; **Strong**, D., B.Sc. (E.E.), M.Sc. Aerophysics, Ph.D. Indus. Eng. (Toronto), PEng; **Thornton-Trump**, A. B., B.Sc. (UBC), M. Sc., Ph.D. (Waterloo), PEng.

Associate Professors

Chatoorgoon, V.R., M.S. (California), B.Sc. (Manchester, UK), Ph.D. (Toronto); **Derksen**, R., B.Sc., M.Sc., Ph.D. (Manitoba), PEng; **Jayaraman**, R., M.Sc. (Wayne State), Ph.D. (Northwestern); **Naterer**, G.F., B.Math, M.A.Sc. (M.E.), Ph.D. (M.I.E.) (Waterloo); **Ormiston**, S.J., B.Sc. (Manitoba), M.A.Sc., Ph.D. (Waterloo), PEng; **Richards**, N.L., Ph.D. (Aston), Dip.Met.Class I (West Glamorgan); **Schilling**, R.H., B.Sc. (M.E.) (Manitoba), PEng; **Wu**, C.Q., B.Sc. (Beijing), M.Sc. (UBC), Ph.D. (Manitoba), PEng.

Assistant Professors

Birouk, M., M.Sc., Ph.D. (M.E.) (Orléans); **Fraser,** D. W., B.Sc., M.Sc. (M.E.) (Manitoba) Ph.D. (M.E.) (Toronto); **Peng**, Q. B.Eng. M.Eng. (Xian Jiaotong Univ.), Ph.D. (Birmingham, UK); **Singh**, M.N., B.Sc. (Calgary), M.A.Sc. (Waterloo), Ph.D. (Waterloo); **Tachie**, M. F., M.Sc. Ph.D. (M.E.) (Saskatchewan); **Wang**, G., B.Sc. (H.U.S.T.) (China), M.Sc. (H.U.S.T.) (China), Ph.D. (Victoria) PEng.

Adjunct Professors

Alfa, A.S., B.Eng. (Ahmadu Bello), M.Sc. (Manitoba), Ph.D. (NSW), P.Eng.; **Bhole**, S., (B.E. (Poona), M.B.A. (Cranfield), M.Sc., Ph.D. (Birmingham); **Caley**, W.F., B.Sc., M.Sc. (Queen's), Ph.D. (Toronto); **Chan**, C., Ph.D. (California), M.Sc., **Garg**, A., M.Sc. (Villanova), I.O.E., Ph.D. (Michigan); **Goel**, N., B.Sc., M.Sc.., Ph.D. (India); **Speers,** T., Ph.D. (Manitoba), M.Sc. (Sask.); **Tandon**, K., B.A. (Punjab), M.A. (Agra), Ph.D. (Kanpur); **Watts**, D., M.P.A., Ph.D., (Manitoba); **Wells**, Richard, M.Eng., Ph.D. (England); **Xu**, Qiang, Ph.D. (Beijing); Zhao, Y., B.Eng. (Nanjing), M.Sc., Ph.D. (Saskatchewan).

Program Information

The department offers programs of study and research toward the Master of Engineering, Master of Science and Doctor of Philosophy degrees in the following: thermal sciences; fluid mechanics; manufacturing and controls; applied mechanics; production and operation research; materials science and engineering.

The department consists of highly qualified engineers and scientists with interlocking specialization, with doctoral degrees and post-doctoral honours from universities and research institutions from around the world.

Fields of Research

Fluid Mechanics: Concerned with the behaviour of fluids when subjected to pressure gradients. Active research is performed in turbulence, computational fluid dynamics, multiphase flow with droplets and engineering calculations of fluid flow.

Thermal Sciences: Concerned with the application of heat and work to engineering problems. Active research is performed in two phase flow, pool boiling simulation, enhanced heat transfer, solid-liquid phase change, entropy analysis/optimization, combined heat transfer and heat transfer in porous media, droplets vaporization and combustion, reacting and non-reacting spray flows, acoustic wave propagation and supercritical flow stability, ocean hydrothermal energy and minerals research, super-critical properties of ocean hydrothermal fluids, runout table cooling in the steel processing industries.

Material Science and Engineering: Concerned with the behaviour of engineering materials. Active research is focused on deformation studies, joining of aerospace materials, acoustic emission, solidification and diffusion in microgravity, phase transformation in solids, wear and wear protection, processing of polymer composites, durability and interfaces in polymer composites.

Applied Mechanics and Design: Concerned with the analysis and conception of machine and structural components. Active research is performed in biomechanics, solid mechanics, fracture mechanics, fatigue analysis, experimental stress analysis, vibrations and acoustics, kinematics and dynamics of linkage and mechanisms and computer aided design.

Manufacturing and Controls: Concerned with analysis design and operation of automated systems and control systems. Active research is conducted in robotics, sensor technology, system integration, automatic controls, information systems, human-machine control systems, teleoperation, virtual design and manufacturing, and web-based manufacturing systems.

Production and Operations Research: Involves the planning, design and operation of production, services and socio-technical systems. Active research is conducted in queuing, networks, scheduling, facilities planning, technology transfer process, inventory planning, reliability engineering and ergonomic design.

Research Facilities

Typical research facilities are: Fully equipped facility for turbulence measurements; apparatus to study porosity and multiphase flow in porous media; laser-induced fluorescence capabilities; Unix workstations and several high resolution graphics terminals; apparatus for measurement of pressure drop and heat transfer; two-phase flow regimes during condensation and many more; computer controlled x-ray diffratometer, TEM, SEMs, optical image analyzer, mechanical testing systems, constant stress creep machines, Hopkinson bar high-strain rate deformation systems; corrosion testing and research facilities; facilities related to processing and manufacture of polymeric composites; laser optics laboratory comprising a vibration-free optical bench; a 10 ton high frequency resonant fatigue machine; analog-digital facilities for the analysis of acoustic and vibration signals; advanced manufacturing cells under full control of personal computers; a rapid prototyping system with a SLA3500 Stereolithography machine; a teleoperated hydraulic MK-II Unimate manipulator; a hydraulic test station for force/motion control studies; Electromyography (EMG) systems; high speed computer workstations for computational simulations, water and spray/wind tunnels with Particle Image Velocimetry and flow visualization, pulsed and continuous wave laser systems.

M.Sc. in Mechanical and Industrial Engineering

Admission

Applicants are normally required to hold a Bachelor's degree in Mechanical/Industrial Engineering from a recognized university. Applicants with other engineering degrees or with honours degrees in related areas may also be accepted at the discretion of the department. In certain cases (e.g., non-engineering graduates), acceptance may initially be limited to pre-Master's study. Contact the department for information.

Application deadlines

The Department of Mechanical and Industrial Engineering allows students to begin their program on either 1 January, 1 May, 1 July or 1 September. Canadian and US students should send their applications with complete supporting documentation to the Department of Mechanical and Industrial Engineering no less than three (3) months before the intended start date. International students should send their applications with complete supporting documentation to the Department of Mechanical and Industrial Engineering to arrive no later than seven months (7) before the intended start date.

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. A minimum of 18 credit hours of coursework will be required with at least nine credit hours at the 700 level as approved by the student's advisor. The minimum time is one calendar year of full-time study and research of which at least one academic year must be spent on campus. The maximum time limit is five years.

All candidates of the M.Sc. degree are required to register in 025.789, M.Sc. Graduate Research Seminar. The M.Sc. degree will not be awarded without a passing grade in 025.789.

Second language reading requirement: none

Expected time to graduate: two years

M.Eng. in Mechanical and Industrial Engineering

The Master of Engineering (M.Eng.) program provides an industrially oriented program for practicing engineers who wish to continue their studies on a broad base. The program also facilitates continuing education for credit.

Admission

Applicants must have a minimum of B.Sc.(Eng.) degree. In exceptional cases, based on the candidates professional experience, this requirement may be waived by the department. For full-time study, it is desirable that the applicant have one or more years of engineering experience.

Application deadlines

The Department of Mechanical and Industrial Engineering allows students to begin their program on either 1 January, 1 May, 1 July or 1 September. Canadian and US students should send their applications with complete supporting documentation to the Department of Mechanical and Industrial Engineering no less than three (3) months before the intended start date. International students should send their applications with complete supporting documentation to the Department of Mechanical and Industrial Engineering to arrive no later than seven months (7) before the intended start date.

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. The minimum requirement for the award of the M.Eng. Degree is 30 credit

hours of coursework with at least nine credit hours at the 700 level. Of the 30 credit hours, six credit hours will be assigned to an approved project and report [069.705 M.Eng. Project and Report (6)]. The maximum time allowed for completion of the degree requirements is six years.

A student undertaking the M.Eng. program while holding the Diploma in Engineering from the University of Manitoba, shall be required to obtain 15 additional credit hours plus any credit hours negated by the six year time limit on the M.Eng. program.

Second language reading requirement: none

Ph.D. in Mechanical and Industrial Engineering

Admission

Admission to the Ph.D. program is normally from the Master's degree level, i.e., M.Eng. or M.Sc. Students making exceptional progress while enrolled in either the M.Eng. or M.Sc. program may be transferred to the Ph.D. program upon the consent of the department head based on recommendations from the student's advisor and an appointed selection committee who investigate the student's qualifications and suitability for Ph.D. study. In such cases, the program credit hour requirements shall be decided in conjunction with the transfer.

Application deadlines

The Department of Mechanical and Industrial Engineering allows students to begin their program on either 1 January, 1 May, 1 July or 1 September. Canadian and US students should send their applications with complete supporting documentation to the Department of Mechanical and Industrial Engineering no less than three (3) months before the intended start date. International students should send their applications with complete supporting documentation to the Department of Mechanical and Industrial Engineering to arrive no later than seven months (7) before the intended start date.

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. All candidates of the Ph.D. are required to register in 025.790, Ph.D. Graduate Research Seminar (two-term course). The Ph.D. will not be awarded without a passing grade in 025.790. Any research projects conducted off-campus, the student must be geographically available to the campus and visit it regularly. In addition, the department has supplementary regulations and students should consult with the department regarding Supplementary Regulations.

Second language requirement: none

Expected time to graduation: two years

Course Descriptions

Interdisciplinary Courses

025.789 M.Sc. Graduate Research Seminar (1) Seminar presentation and discussion of current research topics in mechanical, industrial and materials engineering research.

025.790 Ph.D. Graduate Research Seminar (1) Seminar presentation and discussion of current research topics in mechanical, industrial and materials engineering research.

Thermal Sciences

025.715 Conduction Heat Transfer (3) Steady and unsteady state heat transfer by conduction, single and multidimensional systems. Conduction with moving boundaries and computer uses of finite difference techniques.

025.716 Convective Heat Transfer (3) Conservation principles and flux laws. Differential and integral equations of the boundary layer. Momentum and heat transfer for laminar and turbulent flow inside tubes and over external surfaces.

025.717 Radiation (3) Thermal radiation properties, blackbody radiation, heat exchange by radiation among surfaces in the presence or absence of participating media. Theory and measurement techniques, network methods, solar energy utilization.

025.746 Topics in Heat Transfer 1 (3) Selected topics in heat transfer based on 025.715, 025.716, and 025.717. Topics will be chosen from the following: conduction with and without internal heat generation, combined mode heat transfer problems, boiling and condensation heat transfer, heat exchanger design, propulsion systems heat transfer problems, special problems in forced, free and mixed convection, and two-phase flow.

025.747 Topics in Heat Transfer 2 (3) A continuation of certain topics of 025.746 to include the most recent advances in these areas.

025.781 Computational Thermofluids (3) An introduction to the solution of thermofluids problems. Computational techniques (finite difference, finite element, boundary element). Modelling of turbulent flow. Spectral methods.

Fluid Mechanics

025.719 Classical Fluid Mechanics 1 (3) Bernoulli's equation, equations of motion, two-dimensional motion, streaming motions, aerofoils, sources and sinks, moving cylinders, theorem of Schwartz and Christoffel, jets and currents.

025.720 Classical Fluid Mechanics 2 (3) Helmholtz motions, right linear vortices, waves. stokes stream function, spheres and ellipsoids, solid moving through a fluid, vortex motion, viscosity.

025.722 Boundary Layer Theory (3) Basic concepts of boundary layer and separation. Navier-Stokes equations, exact solutions. Momentum and energy equations, approximate solutions; boundary layer control, and thermal boundary layers.

025.724 Turbomachinery (3) Generalized flow relations in rotating machinery, velocity triangles, limitation on work done per stage and Mach number effects, vortex flow, flow in cascades, blade temperatures and stresses, performance of turbomachines.

025.741 Theory of Turbulence (3) Development and application of statistical theories to isotropic, nonisotropic, and homogeneous turbulent fluid motion.

025.742 Selected Topics in Turbulence (3) An extension of 025.741 to investigate the specialized problems of turbulence such as space-time correlation functions and spectral transfer in constrained and unconstrained fluid flows.

025.743 Stability of Flow (3) Methods of solution of the Orr-Sommerfield Equation by analytic and computer techniques. Application to jets, wakes, and boundary layers, including nonlinear effects.

025.750 Topics in Aerodynamics (3) A course dealing with special types of air flows potential, boundary layer, and mixed flows.

025.779 Transport Phenomena in Porous Media (3) Single and multiphase flow in porous media. Porosity, permeability, capillary pressure, relative permeability, electrical properties.

025.780 Topics in Porous Media (3) An extension of 025.779 to allow investigation of special topics; e.g., computational methods, experimental techniques, mixed transport phenomena (diffusion/dispersion, conductive/convective heat transfer), advanced concepts, etc.

025.786 Turbulence Measurements (6) Thermal Anemometers, Laser Velocimetry, Imaging Techniques, Wall Shear Stress, Measurement and Flow Visualization. Digital data acquisition. Signal processing, Future new techniques. Pressure Measurements. *Prerequisites*: 025.741 and 025.742.

Manufacturing and Controls

025.707 Automatic Controls (6) Control system theory. Synthesis and analysis of components and systems, including stability criteria, transfer functions of components, frequency response techniques, steady state and transient behaviour of systems. Operational methods and analog computer studies of system equations.

025.759 Design of Motor Vehicles to Reduce Accident Severity (3) Application of principles of mechanics to the analysis of vehicle accidents; design and performance of tires, brakes, steering, suspension, and bodies; study of passenger injuries; designing of vehicles to minimize passenger injury; human factors in vehicle accidents.

025.766 Measurement Systems - Application and Design (3) A sufficiently broad coverage will be provided in both the use and the design of instruments in mechanical engineering and related fields. Analytical treatment of measurement methods and systems will also be covered. Analog-digital processing of measurements with special reference to modern computer-based instruments and computer-aided manufacturing will be provided. *Prerequisite*: 025.343 Measurement and Control.

025.769 Computer Integrated Manufacturing (3) Basic concepts of microcomputer hardware and software with special emphasis on different manufacturing applications. These include data acquisition and analysis, machine monitoring and diagnostics, process control, robotics, machine tool control, automatic testing and quality control.

025.770 Analysis and Design of Industrial Information Systems (3) Analysis of information flow for selected systems: production planning, engineering, warehouse operation, flight scheduling and garment industry. Analysis of user interface for information and decision support systems. Design of selected information and decision support systems. Integrating optimization models with information systems. Analysis and design of modern material requirements planning systems.

025.771 Modelling and Design of Flexible Manufacturing Systems (3) Components of Flexible Manufacturing Systems (FMS), formulating and solving FMS design and operational problems. Interfacing FMS components and software design. Management of FMS project planning, design and implementation. Stochastic approach to FMS design and operation.

025.772 Industrial Applications of Artificial Intelligence (3) Overview of artificial intelligence components and techniques. Analysis and design of intelligent systems for fabrication, machining, assembly and handling systems.

025.774 Selected Topics in Robot Technology (3) The role of digital computers and digital interface equipment in the control and operation of robots. Fundamentals of robot kinematics and coordinate systems. Various robotic sensing systems such as vision, tactile, proximity, ultrasonic. The selection of topics may change from time to time depending on student interest and advances in the field of robotic technology. *Prerequisite*: 025.484 or consent of instructor.

025.784 Systems Modelling and Simulation (3) Topics may include: Models and Model Building. Mathematical Models: analytical solutions, numerical solutions, steady-state solutions. Modeling techniques: state models, linear graphs, bond graphs, transfer functions, large-scale models, linear vs nonlinear models. Simulation of Systems (discrete/continuous) on digital computers; numerical operations and algorithms. Simulation Languages (discrete/continuous) applied to analysis and design

of dynamic and control systems, or, services and manufacturing systems. *Prerequisite*: consent of instructor.

025.791 System Design for Robots and Teleoperators (3) Definitions and classification. Kinematics: transformations, forward and inverse kinematic solution methods, differential kinematic equations, motion trajectories. Dynamics: energy method vs. Newton-Euler formulation. Actuators; electric, hydraulics and pneumatics. Control: requirement and methods for control of robots and teleoperators. *Prerequisites*: 025.343, 025.348 or equivalent.

Production and Operation Research

025.751 Industrial Engineering Systems (3) Production engineering, equipment procurement decisions, plant layout and materials handling, optimization methods, models and simulation, control of engineering operations, data processing. *Prerequisites*: 025.752 or the former 013.361.

025.752 Industrial Engineering (4) Industrial engineering topics, such as value engineering, work measurement, quality control, inventory control scheduling. *Prerequisite*: 025.448.

025.760 Selected Topics in Engineering Design (3) Lectures and seminars on selected advanced topics in the field of mechanical engineering design.

025.767 Industrial Engineering Research Methods 1 (3) The course consists of assigned, appropriate Industrial Engineering R and D projects of applied nature, targeted to the needs of local industry, an in-depth review of the state of the art in the problem area under consideration. Close supervision is provided by the advisor and the representative of the industry involved. A detailed analysis and report will be presented.

025.768 Advanced Operations Research (3) Formulations and algorithms for the following problems, set partitioning, set covering, clustering, location, layout, order picking, vehicle routing, vehicle scheduling. Applications of these problems to planning of manufacturing systems, scheduling of production, systems, materials handling systems and planning for warehouse and storage systems. *Prerequisite*: 025.476 or consent of instructor.

025.773 Sequencing and Scheduling (3) Single and multiple machine unconstrained scheduling problems. Constructive algorithms for flow shops and job shop problems. Scheduling problems with due dates, start times and precedence constraints. Optimal and heuristic algorithms for solving scheduling problems. Application of scheduling and sequencing theory for solving a number of practical problems. *Prerequisite*: 025.476.

025.782 Queuing Systems in Engineering (3) Markov Process, renewal theory, birth-death process. Birth-death queueing systems in equilibrium; Markovian queues in equilibrium; the M/G/1 queue; Jackson networks; numerical methods in queueing; applications of queueing models to production, service, communication and traffic systems.

025.787 Human Factors: Theory, Dynamics and Design (3) Dynamics in Human Factors, Theoretical Fundamentals of Ergodynamics, Law of Transformations, Dynamics of Cognitive strategies, Information Systems: Ergonomic Analysis and Design, Transformation and Main Ergonomic Problems in Dynamic Manufacturing Technologies. *Prerequisite*: instructor's approval.

025.788 Network Flow Problems in Engineering (3) Notations and Definitions, Network Representations and Transformations, Algorithm Design and Analysis, Shortest Paths, Maximum Flows, Minimum Cost Flows, Assignment and Matchings, Minimum Spanning Trees, Lagrangian Relaxation and Network Optimization, Multi-Commodity Flows, computational Testing of Algorithms, Applications. *Prerequisites*: 025.341 and 025.476.

Materials Science and Engineering

025.728 Advanced Structural Metallurgy (3) Electronic structure of the elements and the periodic table, binding energy and atom arrangements in crystals, solid solution and intermediate phases (valency, electron and size factor compounds). Electron theories of metals, Brillouin Zones and Fermi Surface.

025.729 Diffusion in Solids (3) Diffusion equations, atomic theory of diffusion, diffusion in dilute alloys, diffusion in a concentration gradient, diffusion in non-metals, high diffusivity paths, thermal diffusion, and electrolysis in solids.

025.732 Defects in Crystals and Their Relation to Mechanical Properties of Metals (3) Dislocations and point defects in crystals and their role in the anelastic behaviour, plastic yielding, strain and alloy hardening, ductile and brittle fracture, recovery and recrystallization creep, fatigue, and radiation damage in metals.

025.733 Phase Transformation in Solids (3) Advanced treatment of phase transformations in solids such as precipitation, eutectoid decomposition, and martensitic reactions.

025.734 Corrosion and Oxidation of Metallic Materials (3) Topics include the electromechanical basis of corrosion, corrosion prevention by inhibitors, alloying and heat treatment passivity, stress corrosion crackling and fatigue, crack initiation and propagation, solid state chemistry including ionic and electronic conduction, and oxidation of metals and alloys.

025.735 Research Topics in Physical Metallurgy and Metal Physics (3) Topics selected from recent researches in physical metallurgy and metal physics.

025.737 Modern Research Techniques (3) Laboratory course designed to introduce the research student to a wide variety of equipment and techniques useful in metallurgical research, discussion, and laboratory. *Pre-requisites*: Instructor approval.

025.738 Electron Microscopy of Materials (3) Theory and practice of electron microscopy, with emphasis on the application of transmission technique to materials research. *Pre-requisites*: Instructor approval

025.739 Dislocation Theory (3) Description of a dislocation; the stress field around a dislocation; forces on a dislocation; dislocation reactions in crystals, dislocation multiplication, pole mechanisms, twinning, stacking fault tetrahedron. Peierls force and related topics; image forces, interactions with point defects and other topics.

025.740 Solidification of Metals and Alloys (3) The theory of solidification with respect to microstructure and solute distribution. Practical applications such as casting semiconductors and zone refining.

025.761 Engineering Properties of Polymers (3) A survey of the physics of crystalline and amorphous polymers, including molecular weight distribution measurements, physics of rubber elasticity, theories of the glass transition, crystallinity measurements, crystallization kinetics, mechanical properties of crystalline and amorphous polymers.

025.762 Fracture of Materials and Structures (3) Griffith criterion for crack propagation, stress intensity factors, plasticity effects, experimental methods for evaluation of criteria, J-integral, crack opening displacement. Microscopic aspects, dislocations at the crack tip, cleavage fracture, nil ductility temperature. Fatigue, creep, stress corrosion cracking.

025.792 Engineering Mechanics of Composite Materials (3) Brief overview of composites; constituents; properties; processing and application; micro-mechanics of reinforcement; elastic behaviour of unidirectional lamina; strength of unidirectional lamina; elastic behaviour of multi-directional laminates; stress and failure analysis of multidirectional laminates; hygrothermal effects and durability; introduction to textile composites.

Ancillary courses from other departments:

007.351 X-ray Crystallography (3)

002.230 Physical Chemistry (6)

016.452 Introduction to Solid State Physics (3)

016.712 Physics of Solids (6)

016.728 Diffraction Theory and Techniques 2 (3)

Applied Mechanics

025.726 Theory of Vibrations (3) The formulation of vibration problems using variational principles; matrix formulation of the free and forced vibrations of discrete and continuous systems; the effect of damping; approximate methods for solving the equations of motion; numerical techniques.

025.727 Advanced Vibrations (3) The finite element method; random vibrations. *Prerequisite*: 25.726 or equivalent.

025.728 Advanced Structural Metallurgy (3) Electronic structure of the elements and the periodic table, binding energy and atom arrangements in crystals, solid solution and intermediate phases (valency, electron and size factor compounds). Electron theories of metals, Brillouin Zones and Fermi Surface.

025.732 Defects in Crystals and Their Relation to Mechanical Properties of Metals (3) See course description under Materials Science above.

025.736 Instrumentation (3) A seminar course to provide students in departments other than Electrical Engineering with background knowledge necessary to make effective use of electronic instrumentation in research.

025.745 Biomechanics (3) Topics in kinematics related to normal gait and prosthetic devices; properties of materials used for prostheses; arterial, bone, and composite materials, including design and manufacturing methods. *Prerequisite*: 024.209 or consent of instructor.

025.763 Metal Forming Theory and Practice (3) Study of the mechanics of different metal forming processes and general equipment design considerations.

025.776 Advanced Solid Mechanics (3) Selected advanced topics in solid mechanics; e.g., relationship between solid physics and solid mechanics, mechanical properties for static, low- and high-cycle fatigue, failure theories and mechanisms, theory of shell structures, numerical methods, applications.

025.777 Computer-Aided Engineering (3) Principles and mathematical formulation of computer-aided design, manufacturing and database management systems; related topics pertinent to computer integrated design and manufacturing systems.

025.778 Selected Topics in Engineering Mechanics (3) Lectures and seminars on selected advanced topics in engineering mechanics such as space dynamics, orbital mechanics and kineto-elastodynamics, current problems, implications in current research.

025.783 Computational Mechanics (3) Continuum Mechanics, Hyperelasticity, Theory of Plasticity, Finite element modelling of nonlinear problems and time-dependent material representation. *Prerequisites*: consent of instructor.

025.785 Applied Finite Element Method (3) Weighted Residuals, Boundary versus Finite Element Method, Conventional and Special elements, Equality and Inequality Constraints, Error Estimates, Self-adaptive Techniques and Mixed Formulations. *Prerequisites*: 025.353 or instructor approval.

025.793 Advanced Non-linear Systems Analysis (3) Topics may include (i) Modelling of Constrained Dynamic Systems, including derivation of dynamic equations for constrained systems using Lagrangian equations and/or Newton-Euler equations; (ii) Advanced Stability Theories, including construction of Lyapunov functions and Lyapunov's stability control; and (iii) Introduction to Analysis of Non-smooth Systems, including Filippov's solution analysis and extended Lyapunov's stability theory to non-smooth systems. Applications to computer modelling of bipedal locomotion, analysis of robotic contact tasks and stability analysis of power systems will be addressed.

Ancillary Courses from other departments:

023.708 Experimental Stress Analysis (3)

023.729 Theory of Shells (3)
023.739 Theory of Plasticity (3)
023.759 Theory of Elasticity (3)
023.761 Special Topics in Theoretical and Applied Mechanics (3)
023.788 Continuum Mechanics (3)

SECTION 43: Medical Microbiology

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Academic Staff

Professor Emeritus

Ronald, A., O.C., M.D., F.R.C.P.C., F.A.C.P., F.R.C.P.C.;

Professors

Alfa, M., B.Sc., M.Sc. (NSW), Ph.D. (Alberta); **Aoki**, F., M.D.(Hons.) (Manitoba), F.R.C.P.C.; **Bow**, E., B.A.(Hons.), M.Sc. (McMaster), M.D. (Calgary), F.R.C.P.C., F.R.C.P.C.; **Bowden**, G., M.Phil., Ph.D. (London); **Coombs**, K., B.A. (University College, Genesio, NY), Ph.D. (Texas); **Embree**, J., B.Sc. (New Brunswick), M.Sc., M.D. (Dalhousie), F.R.C.P.C.; **Hammond**, G., B.Sc., M.D.C.M. (McGill), F.R.C.P.; **Harding**, G. M., B.Sc., M.D. (Manitoba), F.R.C.P.C.; **Hoban**, D., B.Sc., M.Sc., Ph.D. (Manitoba); **Jay**, F., B.Sc. (McGill), M.Sc. (New Brunswick), Ph.D. (Liverpool); **Light**, R., B.A. (Saskatchewan), M.D. (Alberta); **McClarty**, G., B.Sc.(Hons.), Ph.D. (Manitoba); **Nicolle**, L., B.Sc., B.Sc.(Med.), M.D. (Manitoba), F.R.C.P.C., Certificate of Special Competence in I.D.; **Plummer**, F., M.D. (Manitoba), F.R.C.P.C.; **Zhanel**, G. B.Sc. (Pharm.), Pharm.D. (Minn.), Ph.D. (Manitoba).

Associate Professors

Blanchard, J., B.Sc., M.D., M.P.H. (Johns Hopkins); **Embil**, J., B.Sc.(Hons.) (Dalhousie), M.D. (Dalhousie), D.A.B.I.M., F.R.C.P.C.; **Feldmann**, H., B.Sc.(Hons), Ph.D., M.D, (Germany); **Hayglass**, K., B.Sc.(Hons), Ph.D. (Ontario); **Kabani**, A., M.B.Ch.B. (Bristol), F.R.C.P.S., F.A.A.P., F.R.C.P.C. (Med. Micro.); **Moses**, S., M.D. (Toronto), M.P.H. (Johns Hopkins); **Nagelkerke**, N., M.Sc. (Leiden), Ph.D. (Amsterdam); **Orr**, P., M.D. (Toronto), F.R.C.P.C.; **Plourde**, P., M.D. (Ottawa); **Yang**, X., B.Sc., M.Sc., Ph.D. (Manitoba), M.D. (China).

Assistant Professors

Dawood, M., B.Sc. (Alexandria), M.Sc. (Egypt), Ph.D. (Purdue); **Fast**, M., B.Sc.(Med.), M.D. (Manitoba); **Ferguson**, A., Ph.D. (Bristol); **Forgie**, S., M.D. (Manitoba); **Fowke**, K., Ph.D. (Manitoba); **Gelmon**, L., B.A., M.D. (Saskatchewan); **Maclean**, I., B.Sc.(Hons.), M.Sc., Ph.D.; **Rosser**, S., M.D. (Alberta); **Simonsen**, J., B.Sc., M.D. (Dalhousie), F.R.C.P.C., O.T.M. and H.; **Van Caeseele**, P., B.Sc., M.D. (Manitoba), F.R.C.P.C.

Adjunct Professors

Andonov, A., M.D. (USSR); **Artsob**, H., B.Sc. (McGill), M.Sc. (McDonald College), Ph.D. (McGill); **Bernard**, K., M.Sc. (McGill); **Berry**, J., Ph.D. (Manitoba); **Booth**, S., Ph.D. (Oxford); **Booth**, T., B.Sc., Ph.D. (U.K.); **Cao**, J., Ph.D. (Surrey); **Carpenter**, M., Ph.D. (Manitoba); **Clark,** C., Ph.D. (Alberta); **Czub,** M., DVM (Berlin), Dr. Med. Vet (Giessen); **Drebot**, M., B.Sc.(Hons.), Ph.D. (Dalhousie); **He**, R., M.D. (Beijing), Ph.D. (Dalhousie); **Johnson**, W., B.Sc.(Hons.), Ph.D. (Alberta); **Knox**, D., Ph.D. (Ontario); **Li**, Y., B.Sc., Ph. D. (China), Ph. D. (Ottawa); **Mulvey**, M., B.Sc., Ph.D. (Manitoba); **Ng**, L.K., B.Sc., M.Sc., Ph.D. (Alberta); **Peeling**, R., B.Sc. (Toronto), M.Sc., Ph.D. (Manitoba); **Severini**, A., M.D. (Italy); **Tipples**, G., B.Sc.(Hons.), Ph.D.; **Wagner**, S., M.Sc., Ph.D. (Germany); **Wang**, G., M.D. (China); **Weingartl**, H., M.Sc., Ph.D. (Ontario); **Wylie**, J., B.Sc., M.Sc. (Ottawa), Ph.D. (Manitoba).

Program Information

The Department of Medical Microbiology offers programs of studies leading to the MSc and PhD degrees with research and academic experience suitable for a career in Basic Microbiology or Infectious Diseases.

The department has nationally recognized strengths in several areas, particularly epidemiology. It also enjoys extensive collaborative projects with both the University of Kenya in Nairobi, Kenya, and with the new federal laboratories for disease research. The Nairobi project uses epidemiologic, biologic, and molecular biologic studies to better understand sexually-transmitted diseases in the African population. Numerous opportunities for collaborative work with members of other departments as well as with various affiliated research organizations (including the Clinical Microbiology Laboratories of the Health Sciences Centre, the Infectious Diseases programs of the Health Sciences Centre, the Cadham Provincial Laboratory, the federal laboratories, and St. Boniface Hospital) exist.

Recent graduates of the program have been highly successful in academia, industrial, medical, and veterinary careers.

Fields of Research

Scientific interests of the faculty is broad and research projects range from the basic understanding of gene regulation and molecular basis of cellular functions to the development of vaccines and diagnostics for human health and veterinary diseases. The Department has active research programs in cell and molecular biology, immunology, virology, bacterial genetics, microbial pathogenicity, Chlamydial biology, and clinical microbiology. Many research projects are oriented to human diseases and many are carried out in collaboration with physicians who have access to patients.

Research Facilities

Medical Microbiology occupies the 5th Floor of the Basic Medical Sciences Building on the Bannatyne Campus of the university and includes modern research laboratories. The department's equipment, much of which is shared, supports research ranging from molecular biology to clinical microbiology. It includes ample biohazard containment facilities, controlled environment equipment, ultracentrifugation, spectrophotometric, chromatographic and electrophoretic equipment, a transmission electron microscope, fluorescent microscopes, liquid scintillation counters, personal computers and computer terminals for direct access to the main frame computer. A library and a number of other ancillary facilities are available.

M.Sc. in Medical Microbiology

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar,* graduates in Medicine, Dentistry, Veterinary Medicine, or general Science may apply for entry into this graduate program. The department requires that an incoming student have a minimum Grade Point Average of 3.0, or its equivalent, in the year immediately preceding first registration. Students with a three-year B.Sc. degree must normally enrol in a pre-Master's course arranged in consultation with the Graduate Studies Committee and the head of the department.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the **Department of Medical Microbiology** as follows:

Session	Start Date	Canadian/US	International
Regular	(September)	June 1	March 1
Winter	(January)	October 1	July 1
Spring	(May)	February 1	November 1
Summer	(July)	April 1	January 1

Program Requirements

Program requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Second language reading requirement: none
Expected time to graduate: 2 - 3 years

Ph.D. in Medical Microbiology

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

As listed above in Master's Program section.

Program Requirements

Program requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Second language requirement: none
Expected time to graduation: two to three years

Course Descriptions

The following courses may be taken for major or ancillary credit (except for 097.718). Students in any category may apply for registration, with the consent of the department, but those doing research in the department concurrently must restrict their coursework to 12 credit hours, unless special permission is obtained to the contrary. Not all courses are offered in every session.

097.701 Virology (6) Fundamental properties of viruses of bacteria, animals and plants. *Prerequisite:* permission of instructor.

097.702 Medical Mycology (3) Characteristics of pathogenic fungi of humanity. Relevant laboratory work.

097.704 Clinical Bacteriology (6) Scientific basis of routine laboratory methods used in the diagnosis of bacterial infection: specimen handling techniques; laboratory organization.

097.705 Microbial Pathogenicity (6) Comparative structure of virulent and avirulent bacteria, biochemical basis of virulence; host defenses.

097.713 Clinical Virology (3) The epidemiology, biological properties, clinical features, and laboratory investigation of human diseases caused by viruses. Laboratory periods will concern themselves with diagnostic procedures used in the isolation and identification of viruses.

097.714 Clinical Parasitology (3) The course will consist of a series of lectures on the epidemiology, molecular pathogenesis, clinical features, diagnosis (clinical and laboratory), treatment and prevention of human disease; each class is followed by a laboratory period in which the student obtains some practical experience.

097.716 The Molecular Basis of Antibiotic Action (3) Historical development, mechanism of action, principles of antimicrobial susceptibility testing and molecular and genetic basis for antibiotic resistance transfer. *Prerequisite:* courses include Microbial Physiology or Biochemistry and at least an introductory course in Genetics and the consent of instructor.

097.717 Molecular Biology of Animal Viruses (3) Lecture and conference course. Recent advances in molecular aspects of virus structure, replication, genetics, and spectrum of virus-host cell interaction. *Prerequisites:* 097.701, or consent of instructor.

097.718 Seminars in Medical Microbiology (3) Arranged in three parts: staff and student seminars on current research, journal club and review topic in general Medical Microbiology and infectious diseases.

097.720 Host Defence Responses (3) Aspects of the cellular responses during inflammation and infection. Topics will include inflammatory cell function, mechanisms of cell accumulation and activation, roles of cytokines in these processes. Selected examples will be discussed in detail. The course will involve some student presentations.

SECTION 44: Medical Rehabilitation

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Academic Staff

Department of Occupational Therapy

Professors

Anderson, J., B.Sc, (UBC), Ph.D. (Manitoba); **Cooper**, J.E., Dip. P. and O.T. (Toronto), B.O.T. , M.Sc., Ph.D. (Manitoba).

Associate Professors

Booth, A.D., B.Sc.(O.T.) (Pennsylvania), M.B.A. (Manitoba); **Etcheverry**, E., Dip.O.T., B.O.T., M.Ed., Ph.D. (Manitoba).

Assistant Professors

Collins, D., B.Sc.(O.T.) (Queen's) M.Sc. (Manitoba); **Friesen**, M., Dip.O.T. (Alberta), B.O.T., M.Ed. (Manitoba); **Quanbury**, A., B.Sc. (Queen's), M.A.Sc. (Toronto), **Ripat**, J., BMR (OT), M.Sc. (Manitoba)

Department of Physical Therapy

Associate Professors

Kriellaars, D., B.P.E. (Manitoba), M.Sc. (Dalhousie), Ph.D. (Manitoba); **Szturm**, T.J., B.Sc.(P.T.) (Western), Ph.D. (Manitoba).

Assistant Professors

Macdonald, J.A., B.P.T. (McGill), M.S.Ed. (Connecticut); **MacNeil**, B., B.Sc.(P.T.) (Dalhousie), Ph.D. (Kinesiology) (Waterloo); **Weinberg**, L., Certificate in Gerontology, B.P.T., M.Sc., Ph.D. (Manitoba).

Program Information

The School of Medical Rehabilitation currently offers an M.Sc. (Rehabilitation) degree program. The purpose of this program is to conduct and promote basic and clinical research directed towards prevention of disability, improvement and restoration of functional capability altered as a consequence of injury or disease, and alleviation of pain associated with injury and disease.

The diverse research programs and facilities of the School offer opportunities for graduate education in the areas of neuroscience, cardio-respiratory function, applied exercise physiology, human dynamics, musculo-skeletal function, and human occupation. Through proximity to a range of clinical settings and strong collaborative links the program offers particular opportunities to engage in clinically relevant research. Opportunities are available to engage in research relevant to most of the major areas of rehabilitation. Graduates of this program have gone on to advanced clinical practice and administrative positions within the health care system. Because of the strong research emphasis, graduates are well prepared for doctoral study.

Fields of Research

The School has several diverse but complimentary programs of research in the areas listed above which are directed to: assessing outcomes of therapeutic interventions by single centre clinical trials; furthering understanding of the physiological basis of current rehabilitation clinical practice; developing new strategies to restore function or to substitute for functional losses, as well as to improve mobility and enhance physical adaptation to functional losses; developing new strategies to manage functional impairment; developing rehabilitation-related interventions to minimize secondary impairments and promote life long health; developing innovative rehabilitation interventions, including novel physical therapies and rehabilitation engineering products; and understanding the mechanisms of workplace injury, developing strategies to prevent injury and decrease morbidity consequent to work-related injury.

Research Facilities

The School of Medical Rehabilitation is located at the Bannatyne Campus in downtown Winnipeg. This campus is adjacent to the Health Sciences Centre, a major teaching hospital complex, with rehabilitation-related facilities for pediatric, adult and geriatric patients including physiotherapy, occupational therapy, rehabilitation engineering, prosthetics and orthotics. The school has a number of world-class research laboratories conveniently located in the Rehabilitation Hospital of the Health Sciences Centre.

M.Sc. in Medical Rehabilitation

Admission

In addition to the minimum course requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar,* admission requirements include a baccalaureate degree in Physical Therapy, or Occupational Therapy, or a baccalaureate degree in an area related to rehabilitation, and an academic record which meets the entrance requirements of the Faculty of Graduate Studies. Preferences will be given to persons with a BMR(PT) or BMR(OT), or equivalent.

Application Deadlines

The School of Medical Rehabilitation allows students to begin their program on either September 1 or January 1. For admission for each of these start dates, Canadian/U.S. students should send their applications with complete supporting documentation to the School of Medical Rehabilitation no less than three (3) months before the intended start date. Non-Canadian students should send their applications with complete supporting documentation to the School of Medical Rehabilitation to arrive no later than seven months (7) before the intended start date.

Program Requirements

Program requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Second language reading requirement: None
Expected time to graduate: Two years

Ph.D.

The School of Medical Rehabilitation does not offer a Ph.D. Program

Course Descriptions

068.701 Neurosciences (3) To provide the student with a comprehensive understanding of the neurophysiological basis of motor behaviour including: motor control mechanisms, pathophysiological correlates, and clinical manifestations of central nervous system lesions involving motor centres.

068.705 Ergonomics (3) This course shall examine the basic tenet of ergonomics, "the modification of the environment to meet the needs of the individual," and contrasted to "the adaptation of the individual to meet the constraints of the environment."

068.706 Gerontology (3) To increase the student's knowledge of issues in Gerontology that relate to clinical management of the geriatric patient.

068.707 Exercise Rehabilitation for Persons with Disabilities (3) The student shall acquire a better understanding and increased knowledge of: the application of endurance exercise testing and training principles with disabled individuals; and the practical application of these skills.

068.708 Pediatrics: Neuro-Development (3) To increase the student's understanding of the developmental factors important in planning interventions with the pediatric neurological patient.

068.713 Advanced Ergonomics (3) This course is designed to enhance the student's understanding and application of ergonomic principles in the clinical setting. The student will choose from a selected list of current ergonomic topics and will research this topic under the guidance of the supervisor. The research will be formally presented at the end of the course.

068.716 Rehabilitation Research Techniques (3) Introduction to techniques used in rehabilitation research including bioelectrical signal recording such as electromyography, strength assessment using isovelocity dynamometry, acquisition, processing and storage of experimental data.

068.717 Topics in Rehabilitation (3) A readings, tutorial and practical course designed to enhance the student's knowledge of basic science and clinical investigations and to provide experience in the logical development of approach to a problem.

068.718 Readings in Rehabilitation (3) Readings course covering recent advances in an area of rehabilitation related to a student's field of research.

068.719 Structure and Function of the Musculoskeletal System (3) Tutorial and laboratory course providing in-depth study of the structure and function of a specific musculoskeletal region pertinent to rehabilitation. Synthesis of subject material in anatomy, physiology, biomechanics, pathology and rehabilitation. *Prerequisites:* 068.145, 068.146, 068.153 or 068.289, and 068.347 or equivalent courses.

068.720 Dynamometry (3) A comprehensive study of dynamometry and the use of dynamometers for the assessment of strength, endurance and passive properties of soft tissues.

068.721 Dynamics 1 (3) To understand the relationship between neuro-physiological and biomechanical factors in the production of functional multi-segmented motion in clinical motor disorders encountered in medical rehabilitation.

068.722 Dynamics 2 (3) This course is designed to enhance the student's understanding and application of biomechanical principles to the clinical setting. The student will choose from a selected list of current kinesiological topics and will research this topic under the guidance of the supervisor. The research will be formally presented at the end of the course. *Prerequisite:* 068.721

068.723 Independent Study (6) Students complete an in-depth study of evidence of practice in an area of interest. Students will work with an assigned faculty advisor to define and evaluate a particular area of interest in rehabilitation practice,

particularly in occupational therapy or physical therapy.

068.724 Theoretical Foundations of Occupational Therapy (3) An in-depth study of the theory base in Occupational Therapy. The focus of the course is models of occupation and their impact on occupational therapy practice.

068.725 Facilitating Client-Centred Processes (3) This is a theory and practical course designed to develop an advanced understanding of the principles of client-centred practice. The focus of the course will be the development of the requisite knowledge, skills and attitudes to evaluate and implement client-centred approaches and facilitate environments conducive to client-centred practice.

SECTION 45: Microbiology

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Academic Staff

Professor Emeritus

Suzuki, I., B.Sc. (Tokyo), Ph.D. (Iowa).

Professors

Butler, M., B.Sc. (Birmingham), M.Sc. (Waterloo), Ph.D. (King's College); **Klassen**, G.R., B.Sc., M.Sc., Ph.D. (Manitoba); **Loewen**, P.C., B.Sc., Ph.D. (Alberta); **Wright**, J.A., B.Sc., M.Sc., Ph.D. (Manitoba).

Associate Professors

Court, D.A., B.Sc.(Hons.) (Regina), Ph.D. (Guelph); **Dibrov**, P., M.Sc., Ph.D. (Moscow State); **Sparling**, R.R.M., B.Sc. (McGill), Ph.D. (Iowa); **Worobec**, E.A., B.Sc. (Winnipeg), Ph.D. (Alberta).

Assistant Professors

de Kievit, T., B.Sc. (Waterloo), B.Sc. (Spec.Hons.) (Guelph), Ph.D. (Guelph); **Hausner**, G., B.Sc. (Winnipeg), M.Sc., Ph.D. (Manitoba); **Londry**, K., B.Sc.(Hons.), M.Sc. (Alberta), Ph.D. (Oklahoma); **Oresnik**, I.J., B.Sc., M.Sc. (McMaster), Ph.D. (Queen's); **Yurkov**, V., M.Sc. (Moscow State), Ph.D. (Moscow Academy of Sciences).

Adjunct Professors

Flett, R.J., B.Sc., M.Sc., Ph.D. (Manitoba); **Graham**, D.W., B.A.Sc., M.A.Sc. (British Columbia), Ph.D. (Arizona) **Kelly**, C.A., B.A. (Denison), M.Sc., Ph.D., (Michigan); **Mulvey**, M., B.Sc., Ph.D. (Manitoba); **Rudd**, J.W.M., B.Sc.(Hons.), M.Sc., Ph.D. (Manitoba).

Program Information

Microbiological research is probably one of the most dynamic areas of scientific endeavour at present. Concern over the impact of society's activities on the environment is increasing and there is a strong need for research in environmental microbiology. Biotechnology, especially based on various gene manipulation techniques, shows tremendous promise in many areas of medicine, agriculture, industry and basic microbiological research. These areas, and many other technological advances, are continually expanding. They all depend heavily on basic research and a supply of highly trained individuals, such as graduates from microbiology programs. Graduates take up positions in industry, universities, and the public sector. The demand for these well-qualified people continues.

Fields of Research

The department offers M.Sc. and Ph.D. programs of study in various areas of modern microbiology. Because the department is relatively small, the research interests of the faculty and students are concentrated in several main areas. Currently, research programs are offered in: microbial ecology and geochemistry; molecular biology/genetics; metabolism of autotrophic bacteria; microbial biotechnology and biochemistry; microbial pathogenicity.

Research Facilities

Microbiology program faculty members are engaged in active research projects. The department has all the facilities needed to conduct research in areas of specialization and the inventory of modern equipment is one that would be expected in any active research unit. In addition, close ties with other departments allow for the use of their facilities.

M.Sc. in Microbiology

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Program requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Second language reading requirement: none
Expected time to graduate: 2 - 3 years

Ph.D. in Microbiology

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Program requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Second language requirement: none
Expected time to graduation: 4 - 6 years

Course Descriptions

060.701 Graduate Seminar in Microbiology 1 (3) Seminars covering areas of interest to the faculty and students in the graduate Microbiology programme, and current developments in the broad field of microbiology (including microbial physiology, environmental microbiology, virology, pathogenicity, genetics, molecular biology, biochemistry, biotechnology, and cell culture). Open to all qualified students by permission of the Microbiology department head.

060.702 Graduate Seminar in Microbiology 2 (3) Seminars covering areas of interest to the faculty and students in the graduate Microbiology program, and current developments in the broad field of microbiology (including microbial physiology, environmental microbiology, virology, pathogenicity, genetics, molecular biology, biochemistry, biotechnology, and cell culture). Open to all qualified students by permission of the Microbiology department head.

060.703 Graduate Seminar in Microbiology 3 (3) Seminars covering areas of interest to the faculty and students in the graduate Microbiology programme, and current developments in the broad field of microbiology (including microbial physiology, environmental microbiology, virology, pathogenicity, genetics, molecular biology, biochemistry, biotechnology, and cell culture). Open to all qualified students by permission of the Microbiology department head.

060.708 Biochemical Mechanisms (3) A treatment of current concepts of biochemical mechanisms in selected areas of investigation, including multifunctional enzyme complexes and membrane-associated systems. *Prerequisite:* consent of instructor. Inquire at the department for availability.

060.709 Biological Oxidations and Bioenergetics (3) A treatment of current concepts of biological oxidations, and bioenergetics in microorganisms including autotrophic bacteria. Inquire at the department for availability.

060.710 Advanced Concepts in Molecular Biology (3) Recent advances in the molecular basis and control of gene activity; information transfer and molecular evolution. Inquire at the department for availability.

060.711 Advances in Microbial Genetics (3) Developmental genetics; recombination; bacteriophages; fine structure analysis; biochemical genetics and specialized genetic systems. Inquire at the department for availability.

060.712 Enzymology (6) Lectures and reading assignments on the structure and function of enzymes and on enzyme kinetics. Each student will isolate, purify, and study the kinetics of a particular enzyme reaction. Inquire at the department for availability.

060.713 Advanced Physiology of Bacteria (3) An assignment and conference course. Selected topics covering recent advances in the energy relationships of bacteria and the growth and death of bacteria. Inquire at the department for availability.

060.716 Special Problems in Microbiology (3) An assignment and conference course to be taken only through consultation with the head of the department. The topics will vary, depending upon student needs and interests, and will include specialized topics not available in regular course offerings.

060.717 Current Topics in Mammalian Cell Culture (3) A lecture and discussion course based on current research problems involving mammalian cells in culture. *Prerequisite:* consent of instructor.Inquire at the department for availability.

060.719 Microbial Ecology (3) Topics and current developments in the field of microbial ecology will be covered with emphasis on aquatic ecosystems. A combined lecture, discussion, and seminar format will be used. Inquire at the department for availability.

SECTION 46: Music

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Academic Staff

Professor Emeritus

Turner, R., B.Mus. (McGill), M.Mus. (Peabody), D.Mus. (McGill).

Professors

Engbrecht, H., A.R.C.T., B.Mus. (Bethel College), M.Mus. (Southern Methodist); **Jensen**, K., B.Mus. (Saskatchewan), L.Mus. (Saskatchewan), Recital Dip. (Royal Academy of Music), L.R.A.M., Ph.D. (London); **Lonis**, D., B.S.E. (Illinois), M.M. (North Western), E.D.D. (Illinois); **Matthews**, M., B.Mus. (California State, Northridge), M.A. (California State, Sacramento), Ph.D. (North Texas State); **Wedgewood**, R., B.Mus. (Macmurray), M.Mus. (Arkansas.), Ph.D. (Wisconsin, Madison).

Associate Professors

Braun, M., B.Mus., M.Mus. (Toronto); **Burleson**, R., B.Mus. (Hartford), M.A. (Washington); **Gillis**, R., B.Mus.Ed. (Saskatchewan), M.Mus., D.M.A. (Michigan); **Horton**, C., B.Mus. (Redlands), M.Mus. (North Carolina); **Kehler-Siebert**, J., B.A. (Winnipeg), M.Mus. (Toronto), D.M.A. (Eastman); **Paterson**, P., Mus. Bac. (Toronto), M.Sc. (Ithaca); **Rempel**, U., B.Mus., Ed.Cert. (UBC), M.A. (California, Santa Barbara.); **Ritchey**, L., A.R.C.C.O.;

Assistant Professors

Chen, C., B.Mus. (Peabody), M.Mus. (Minnesota); **Linklater**, F., B.Mus. (Brandon), M.Mus. (North Texas), Ph.D. (Michigan); **Linklater,** J., B. Mus. (Brandon), M.Mus. (Michigan); **Loewen**, L., B.Mus. (Brandon), M.Mus. (Montreal, D.M.A. (Minnesota); **Markstrom**, Kurt, B.Mus., M.Mus, M.Lib.Sc. (Alberta), Ph.D. (Toronto); **Marleyn**, P., Dip.RAM (Royal Academy of Music), M.Mus. and Artist Dip. (New England); **Moroz**, David, B.Mus, M.Mus. (Julliard), D.Mus. (Montreal); **Pokhanovski,** O., B.Mus. (Moscow), D. Mus. (Montreal).

Program Information

The School of Music offers a Master of Music (M.Mus.) in three major areas: performance, composition and conducting. The emphasis is upon full professional preparation in a strong academic context. Students in the string component of the program are eligible for adjunct training by a special agreement with the Winnipeg Symphony Orchestra. Students in the voice component are eligible for being considered for training and solo professional activities with Winnipeg operatic companies, choral organizations and chamber groups.

Fields of Creative Work and Research

The School of Music fosters an active, integrated performance environment which provides the broadest possible professional training. This is complemented by a program of research in musicology, ethnomusicology, music theory and related fields. Students with interests outside of the M.Mus. have the option of pursuing advanced studies in music via the Individual Interdisciplinary Program (IIP) of the Faculty of Graduate Studies.

Research Facilities

Of particular interest to students in the M.Mus. (composition) is our Electroacoustic Music Studio. Our library resources support a wide variety of performance studies in various historical eras.

Master of Music program

Admission

Admission requirements of the Faculty of Graduate Study are found in the Graduate Studies Regulations Section of this *Calendar*. Persons who have completed (1) a four-year undergraduate degree program in music with a minimum 3.0 GPA in the last two full years or (2) a conservatory diploma which is offered in residence may apply for admission to the M.Mus. program.

Application Deadlines

All applications should be sent to the School of Music on or before January 31st to begin study in September, or June 15th for a January start date.

Application procedures vary, according to the proposed area of study:

- Performance applicants will perform an audition and will submit a curriculum vitae which includes details of performance experience and repertoire. Except in special circumstances, the audition will be in person, at the School of Music. String players wishing to apply for the Winnipeg Symphony Orchestra partnership will be required to perform a separate audition according to the standard procedures of the W.S.O.
- Composition applicants will present a portfolio of works and will submit a curriculum vitae detailing experience both in the area of composition and in the field, in general.

Program Requirements

The School of Music offers three program areas leading to the M.Mus. As part of each program, all M.Mus. students are required to take: 033.700, 033.705, 033.711, 033.718, 033.740, 033.741 and complete program requirements for areas of study, as follows:

M.Mus. in Performance

Electives: 6 credit hours

(String students participating in the Winnipeg Symphony Orchestra will take one Topics in Music course (3CH) in Orchestral Performance.)

Total: 24 credit hours

The Performance thesis/practicum requires either: (a) one recital, normally consisting of solo repertoire, accompanied by a paper which provides historical or analytical program annotation; or (b) two recitals, one of which is solo repertoire and the other of which may include solo and ensemble repertoire. No paper is required under option (b).

A proposal for this project will be developed by the student in consultation with the Major Practical Study instructor and must be approved by the student's committee. The committee will consider the stylistic and technical appropriateness of the program in its adjudication.

M. Mus. in Composition

Electives: 3 credit hours

Total: 24 credit hours

The Composition thesis/practicum requires the production of a substantial body of work accompanied by a significant analytical paper which explains the structure of the piece(s) and the compositional processes. Normally, a performance of the piece(s) is required.

A proposal for this project will be developed by the student in consultation with the composition instructor and must be approved by the student's committee. The committee will consider the extent of the performance forces, the proposed length and the technical requirements of the body of work in adjudicating appropriateness.

M. Mus. in Conducting

Electives: 6 credit hours

Total: 24 credit hours

The Conducting thesis/practicum requires a significant repertoire of performance which is chosen, rehearsed, scheduled and conducted by the student. The performance of this body of work will be accompanied by historical or analytical program annotation.

A proposal for this project will be developed by the student in consultation with the conducting instructor and must be approved by the student's committee. The committee will consider the stylistic and technical appropriateness of the repertoire in its adjudication.

Second Language Reading Requirement: Reading knowledge of one language other than English is required. The language required will normally be French, German or Italian. Other languages will be accepted if more appropriate to the student's program. The specific requirement will be determined in consultation with the student's committee. This requirement may be met through one of the following:

- Evidence of the completion of an undergraduate language course at the 100 level or above in the five years preceding acceptance into the program.
- The translation, using a dictionary, of a passage in the major area of study.
- Completion of a course at the 090 or higher level after registration in the Masters Degree program.
- Determination by the student's committee that the requirement has been met through previous education and/or experience.

Expected Time to Graduate: Two years.

Ph.D. in Music

The School of Music does not offer a Ph.D. Program at this time.

Course Descriptions

033.705 Bibliography and Research Methods (3) The techniques of bibliography and research methods in music are studied through research projects in selected areas relevant to each student's major field of study. Skill is developed in the use of primary and secondary sources, expository writing, and documentation.

033.700 Music History Seminar (3) The study of the nature of past and current concepts and practices in the discipline of music history.

033.711 Music Theory Seminar (3) A comprehensive survey of 20th-century analytical methodologies of tonal and post-tonal music.

033.718 Ensemble (3) Studio instruction and monitored pre-professional training activities in chamber music, leading to the presentation of ensemble performance.

033.740 Major Practical Study I (3) Private studio instruction and monitored pre-professional training activities in one of the following: composition, conducting, or any one of the standard instruments or voice.

033.741 Major Practical Study II (3) A continuation of Major Practical Study I.

033.760 Advanced Orchestration (3) Advanced practical work in orchestration for various-sized large ensembles up to and including full orchestra. Detailed study of selected scores and work on individual orchestration projects.

033.781 Electroacoustic Music (3) This course is a study of the techniques of electroacoustic music.

033.786 Topics in Music (3) Course orientation will vary according to the needs and interests of instructors and students. A specific topic will be chosen for each offering of the course.

SECTION 47: Native Studies

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Academic Staff

Senior Scholar

Ahenakew, F., B.A., M.A. (Manitoba).

Professors

Kulchyski, P., B.A.(Winnipeg), M.A., Ph.D. (York); **LaRocque**, E., B.A. (Goshen), M.A. (Assoc. Mennonite Seminary), M.A., Ph.D. (Manitoba); **Oakes**, J., B.H.Ecol., M.Sc., Ph.D. (Manitoba).

Associate Professors

Wuttunee, W., B.Comm., LL.B., M.B.A. (Calgary), Ph.D. (Manitoba).

Assistant Professors

Shore, F., B.A. (Brandon), M.A., Ph.D. (Manitoba); **Trott**, C., B.A. (Toronto), B.Th. (McGill), Ph.D. (Toronto).

Adjunct Professors

Fitznor, L. B.Ed., M.Ed. (Manitoba); **Karlinsky**, A. B.Ed. (Calgary), MA (New York); **Lavallee**, M. Elder (Anishinaabe); **McIntosh**, A. B.A. M.A. Ph.D. (Manitoba); **Payne**, H. B.A., M.A. Ph.D. (Manitoba); **Rice**, B., B.A., M.A. (Concordia), Ph.D. (California); **Simpson**, L. B.Sc., M.Sc. (Waterloo), Ph.D. (Manitoba); **Schnitzer**, D., B.A., M.A. (Calgary), Ph.D. (Manitoba); **Sinclair**, M. B.A. LLB (Manitoba).

Program Information

The graduate program in Native Studies offers students the opportunity to complete the advanced study (M.A. or M.Sc.) of issues relating to Aboriginal peoples in a manner that reflects their commitment to the Aboriginal community and sensitivity to Aboriginal perspectives. The core nature of the Master's program in Native Studies at the University of Manitoba is based on a notion of the inherent interdisciplinarity of the field of Native Studies. This program is rooted in a unique position between Aboriginal and Western world views; it fosters a broad understanding of Aboriginal issues in the University community and beyond. The graduate program in Native Studies is committed to the principles of academic excellence, inclusivity, creativity, and leadership in the field of Native Studies.

A high degree of interaction occurs between faculty members and graduate students because of the small size of the program. While in the program, graduate students have opportunities such as working as sessional instructors in Aboriginal communities teaching Native Studies courses; presenting their research at conferences; publishing in refereed journals celebrating Aboriginal scholarship; and competing for awards, bursaries, scholarships and fellowships. Graduates from this program work at a wide range of jobs in private industry, government agencies, Aboriginal organizations, education, health, environment, management, and other related fields.

Fields of Research

Areas of expertise in Native Studies at the University of Manitoba which are readily available to graduate students include: literature, urban issues, women's issues, culture (history, material culture, contemporary issues), self-government and land claims, economic development (including sustainable formal and informal economies), the environment, medicine, health services, Métis studies, Inuit studies, Aboriginal identity, resource management, recreation, wildlife management, political science, law, medical-anthropology, education, Aboriginal wisdom and Aboriginal ways of knowing, traditional ecological knowledge, resistance literature, critical theory, colonization, ethics, Cree and Ojibwa language and structure, and other related fields.

Research Facilities

Students access research facilities including: Churchill Northern Studies Centre, Hudson's Bay Company Archives, St. Boniface Métis Museum collection, Museum of Man and Nature collection, and facilities in Indian, Inuit, and Métis communities.

Master's in Native Studies

Admission

For students to be admitted directly into the Master's program, they are required to have the equivalent of an advanced/honours degree with a major in Native studies. Students who do not meet this equivalency will be required to take 30 credit hours of Native Studies courses.

Application deadlines

The department accepts applications for the Winter (January) and Regular (September) Terms only. The deadlines for submission of an application and supporting documentation to the Native Studies Office are as follows:

Winter (January) September 15
Regular (September) March 15

Program Requirements

The program requirements include twelve credit hours of required and six credit hours of additional course work at the 400 level or above for a total of 18 credit hours. A thesis is also required. Students should consult the Supplementary Regulations, available through the Native Studies Graduate Office, for more details regarding requirements.

Students who wish to pursue an M.Sc. will be required to have significant science background from faculties or departments offering science degrees. They will also be required to take at least six credit hours at the 700 level in science subjects in those Faculties offering the M.Sc. Other additional science courses at the 300- or 400- level may be required by the advisory or graduate committee.

Students' proposed coursework, advisory committee membership, and thesis topic will be examined by the Native Studies Graduate Committee in order to identify the program as leading to an M.Sc. or M.A. degree. The decision of which degree will be offered will be based on the nature of the thesis proposal; the nature of the coursework; and the discipline represented on the thesis advisory committee.

Twelve credit hours must include 032.723 Methodology and Research Issues in Native Studies; 032.721 Seminar in Native Studies; 032.722 L01 Selected Topics in Native Studies; and 032.728 Native Studies Colloquia. Selected Topics in Native Studies may be taken more than once.

Second Language Reading Requirement: none
Expected Time to Graduate: two years

Ph.D.

Students in the interdisciplinary field of Native Studies prepare individual interdisciplinary program proposals apply for admission into the Individual Interdisciplinary PhD programs.

Course Descriptions

Four core courses are offered in the Native Studies graduate program:

032.721 Seminar in Native Studies (3) [Issues in Colonization and Decolonization] A study of selected material in Métis, Aboriginal, or Inuit studies, designed to meet the special needs of graduate students interested in exploring interdisciplinary perspectives in Native Studies. Prerequisite: consent of instructor.

032.722 Selected Topics in Native Studies (3) A critical examination of issues in selected areas of Native Studies designed to meet the special needs of graduate students interested in exploring interdisciplinary perspectives in Native Studies. Prerequisite: consent of instructor.

032.723 Methodology and Research Issues in Native Studies (3) A review of research methods, such as oral histories, and research issues, such as ethics and intellectual property rights, within the context of Native Studies. Prerequisite: consent of instructor.

032.724 Issues in Colonization (3) An examination of the factors influencing colonization, assimilation and indigenization. This course explores the colonization and decolonization processes, theories of colonization and ways of promoting indigenization without assimilation.

032.728 Native Studies Colloquia (1) Theoretical, methodological, ethical and contextual issues in Native Studies are explored from the perspectives of formally and informally trained experts using a colloquia format. Students are required to attend regularly. Time slots to be determined the first week of September (Pass/Fail)

A number of support courses appropriate for a Master's program in Native Studies are available from a wide variety of departments. Course selections must be approved by the student's thesis and program advisory committee. A few examples of courses which may be of use to a student's graduate program include (this list is not intended to be exhaustive):

Northern Content

022.741 Biological Resources Management
056.722 Social Aspects of Resources and Environmental Management
056.723 Ecological Principles
056.730 Biodiversity
056.715 Environmental Assessment
032.728 Native Studies Colloquia
032.723 Methodology and Research Issues in Native Studies
049.726 Health Care in Advanced Practice Nursing I (6 credits plus practice)
049.727 Health Care in Advanced Practice Nursing II (6 credits plus practice)

Native Peoples' Content

093.722 Health and Health Services of Native Peoples
073.743 Planning Design
056.722 Social Aspects of Resources and Environmental Management
056.715 Environmental Assessment
129.727 Seminar in Cross Cultural Education 1
062.721 Family and Decision Making
062.722 Family Stress Managment
032.721 Issues in Colonization and Decolonization
032.722 A Way of Life - Kaihejaematiseyang
032.723 Methodology and Research Issues in Native Studies
032.728 Native Studies Colloquia
049.726 Health Care in Advanced Practice Nursing I (6 credits plus practice)
049.727 Health Care in Advanced Practice Nursing II (6 credits plus practice)

Other Courses of Interest for Native Studies:

001.788 Ecology Project Course (3)
004.754 Special Topics in English (3)
007.769 Precambrian Geological Sciences (3)
011.760 Northern Historical Studies (3)
018.744 Renewable Resource Economics (3)
022.740 Biological Resource Management 1(3)
027.709 Organizational Decision Making (3)
036.726 Directed Readings in Women's Studies (3)
053.720 Environment, Resources, and Populations (3)

SECTION 48: Natural Resources Management

Natural Resources Institute
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Academic Staff

Professors

Berkes, F., B.Sc., Ph.D. (McGill); **Dahlgren**, W., BPE, M.A. (Alberta), Ph.D. (Manitoba); **Gardner**, J., B.Sc. (Hons.) (Alberta), M.Sc., Ph.D. (McGill); **Haque,** C. Emdad, B.A. (Hons.), M.A. (Jahangirnagar), M.A., Ph.D. (Manitoba).

Associate Professors

Baydack, R.K., B.Sc.(Hons.), M.N.R.M. (Manitoba), Ph.D. (Colorado State.); **Johnson**, G., B.S., M.A., M.S., Ph.D. (Madison, Wisconsin); **Henley**, T.J., B.A. (Hons.), M.N.R.M. (Manitoba); **Sinclair**, A.J., B.A. (Hons.), M.A. (Carleton), Ph.D. (Waterloo).

Assistant Professors

Campbell, M., B.A., M.A. (Manitoba), Ph.D. (Waterloo); **Thompson**, S., B.Sc. (Hons.) (Waterloo), M.C.E., B.Ed. Ph.D. (Toronto).

Adjunct Professors

Bodaly, R.A., B.Sc.(Hons.) (Simon Fraser), Ph.D. (Manitoba); **Caldwell**, P., B.Sc. (Wisconsin State), B.Sc. (Colorado State), M.Sc. (Florida), Ph.D. (Kansas State); **Creech**, H., B.A. (Queen's), M.L.S. (Dalhousie); **Diduck**, A., L.L.B., M.N.R.M. (Manitoba), Ph.D (Waterloo); **Fast**, H.B., B.A. (Winnipeg), M.N.R.M., Ph.D. (Manitoba); **Jones**, R., B.Sc., M.Sc. (Idaho), Ph.D. (Oklahoma); **Kenkel**, N., B.Sc., M.Sc. (UBC), Ph.D. (Western); **McLachlan**, S., B.Sc.(Hons.) (McMaster), M.Sc. (Guelph), Ph.D. (York); **Miller**, P., B.A., M.A., Ph.D. (Yale); **Nicholson**, B., B.A. (Brandon), M.A., Ph.D. (Simon Fraser); **Onyebuchi**, E. I., B.M.A. (Lethbridge), M.N.R.M. (Manitoba), Ph.D. (UBC); **Rasid**, H., B.A. (Hons.), M.A. (Dhaka), Ph.D. (Saskatchewan); **Reist**, J. B.Sc. (Hons.) (Calgary), M.Sc., (Alberta), Ph.D. (Toronto); **Riewe**, R., B.S., M.S. (Wayne State), Ph.D. (Memorial); **Schneider**, R., B.A., Ph.D (Trier); **Simonovic**, S.P., B.Sc. M.Sc. (Belgrade), Ph.D. (California); **Stadel**, C., Political Science, Doctorate in Geography (Freiburg); **Wiseman**, D., B.Sc. (Brandon), M.Sc. (North Dakota), Ph.D. (Indiana); **Wrubleski**, D., B.Sc. (Regina), M.Sc. (Manitoba), Ph.D. (Alberta).

Program Information

The Natural Resources Institute (NRI) is one of the oldest units in Canada active in natural resources and environmental management research and teaching. As such, it has contributed to the training of over 600 academics, professionals, administrators, and practitioners who are now active in the natural resources and environment fields in Manitoba and throughout the world, in both the public and private sectors.

The institute's academic activities are interdisciplinary and are focused upon local and global problem solving linked to the strength and expertise of faculty members and the interests of students. Full-time faculty work closely with an outstanding cadre of adjunct professors from other university disciplines, from the universities of Brandon and Winnipeg, from several government departments (such as the Canadian Department of Fisheries and Oceans and the Manitoba Department of Conservation), as well as from non-governmental agencies and the private sector.

Natural resources and environmental policy and decision-making provide the context for most academic activities. NRI is noted for the identification of novel approaches to establish the necessary linkages between the environment, economy, and the social well being of people. Thus, the institute uses a three-dimensional approach to natural resources and environmental policy and decision-making as it continues to search for innovative solutions that will be good for the environment as well as for poverty alleviation.

This holistic interdisciplinary approach is pursued in teaching, research and outreach. The institute's strength and expertise cut across a number of resource fields; human dimensions of natural resources management; natural resources policy; institutions, decision-making processes, water resource management; environmental hazards and risk assessment; community based resource management; traditional ecological knowledge; habitat, wildlife, and ecological management and multi-stakeholder processes/public involvement; and conservation of biodiversity.

Institute faculty and students continue to make contributions to resources management—locally, nationally and internationally. Locally: City of Winnipeg waste management; province of Manitoba water strategic plan; province of Manitoba sustainable development (SD) initiatives; wildlife habitat with Ducks Unlimited and Delta Waterfowl. Nationally: First Canadian national hazards research assessment; coastal zone management work, monitoring of project impacts; review of Canadian Environmental Assessment Act (CEAA). International: impacts of urban development in high mountains in northern India; co-management of resources in Costa Rica, Bangladesh, Turkey, Stewardship initiatives in the EU, in particular, in Germany; international disaster prevention and mitigation; sustainable floodplain management in Bangladesh and Canada. The institute is the focal point at the University of Manitoba for interdisciplinary education, research, and outreach in resources and environmental issues. In the latter context the institute sees itself as having a major responsibility to the University of Manitoba, the City of Winnipeg and to the Province of Manitoba in the solution of problems involving natural resources and the environment. Institute staff takes their obligation to assist in the solution of global problems just as seriously.

The master's program in natural resources management combines a broad commitment to sustainability with development of well-focused, practical expertise in natural resources management. The program recognizes that pursuit of sustainability requires attention to ecological, economic, and social issues at all levels -from the local to the global. But it also expects that most gains are made through specific practical management application. Therefore, the program is designed around two main elements: an interdisciplinary examination of sustainability concerns and defined management project examinations undertaken in this broader context.

The doctoral program is aimed at developing independent researchers in the areas of natural resources and the environment. Students enter the program from a variety of academic backgrounds and disciplines.

Fields of Research

NRI's graduate programs are interdisciplinary, responding to the need to educate professionals in integrative thinking and problem solving. The programs cut across conventional disciplinary lines to emphasize linkages between social and natural systems, environmental policy and decision-making. The research is focused on integrating the environment with the economy and the well being of people. Research areas include resource and environmental sustainability; environmental hazards and risk assessment; water resource management; community-based resource management; wildlife habitat and landscape ecology; northern resources and development, ecosystem management, conservation of biodiversity, and multi-stakeholder planning and decision-making.

Research Facilities

Facilities on site include a fully equipped computer laboratory with appropriate software. Many of the NRI's interdisciplinary research projects are carried out jointly with a variety of agencies in various locations. Recent projects include those with Manitoba Conservation, Manitoba Hydro, Manitoba Model Forest, the City of Winnipeg, Fisheries and Oceans Canada—Central and Arctic Region, Parks Canada, Ducks Unlimited, and the International Institute for Sustainable Development. A significant number of NRI projects are carried out cooperatively with First Nations and many are completed overseas with a variety of international agencies. For those research projects requiring physical facilities, students and faculty have access to the Delta Marsh Field Station, the Fort Whyte Centre and the Experimental Lakes Area of Fisheries and Oceans Canada.

Master of Natural Resources Management

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

Start Date		Canadian/U.S.	International
Regular	(September)	June 1	March 1
Winter	(January)	October 1	July 1

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students in the Master's program follow an individual study plan that includes 15 credit-hours of required courses, a minimum of 15 credit-hours of elective courses and a Master's thesis.

The central academic agenda of the required set of courses includes: Assessment of the theoretical foundations and practical applications of progress toward sustainable management of natural resources; understanding of ecosystems as self-organizing and responding systems; examination of conventional and alternative social arrangements, including institutions and tools of governance, as a means of improving human well-being and environmental responsibility; and exposure to theories of resource and environmental management processes and tools.

Second language reading requirement: none

Expected time to graduate: two years

Ph.D. in Natural Resources and Environmental Management

This program provides studies in the environment and natural resources through a holistic and interdisciplinary approach. Students' programs and research will prepare them to pursue independent research aimed at solving the complex issues facing the world environment learning about varied approaches and using a variety of tool and methods.

A hallmark of the program is the collaboration with other University of Manitoba academic units and other Manitoba universities through an extensive cadre of adjunct professors and cross-appointments. This cadre is further strengthened by the appointment of adjunct professors from a variety of agencies external to the University of Manitoba, including the Freshwater Institute, the International Institute for Sustainable Development, Delta Waterfowl, and Ducks Unlimited, to name a few.

Admission

Admission to the program is as in the Faculty of Graduate Studies Regulations Section of this Calendar. An applicant should have a high academic standing in previous university work, a Master's degree in a related discipline, as determined by the NRI Selection Committee, and an area of research interest that may be supported by an NRI faculty member. Students must be accepted by an advisor prior to submitting an application to enter the program. A 3.5GPA (or equivalent) in their most recent 60 credit hours of course work and evidence of scholarly ability are required.

Application Deadlines:

Start Date	Canadian/U.S.	Non-Canadian
Regular (September)	June 1	March 1
Winter (January)	October 1	July 1

Program Requirements

All Ph.D. students will be required to complete a minimum of 12 and a maximum of 21 credit hours of course work at the 700-level or above, beyond the Master's degree (or its equivalent). A minimum of 6 credit hours of courses must be completed within the Natural Resources Institute and must include 056.731 Ph.D. Thesis Research Seminar (3).

Individual programs of study will vary from student to student depending on each student's research interest and the recommendations of each student's advisor and Ph.D. advisory committee. Students will be encouraged to use the pool of Natural Resources Institute required and elective courses as well as appropriate graduate courses available outside of the Natural Resources Institute in order to select the best set of courses to complement their programs.

Student academic progress will be reported annually to the Faculty of Graduate Studies. A minimum Grade Point Average of 3.0, with no grade below C+, must be maintained in order to continue in the program.

Second language reading requirement: required only in special circumstances determined at the time of admission.

Expected time to graduate: three years

Course Descriptions

The required courses for the Master's and doctoral program include the following. Each course requires consent of the instructor.

056.722 Social Aspects of Resource and Environmental Management (3) Context of resource management and development; history of resource management; definitions of resources and management; sharing power and responsibility for governance; the role of governments, user-groups, and the market; property rights and resource regimes; common property resources and institutions; traditional ecological knowledge; multi-stakeholder analysis; social analysis and the role of social values; top-down vs. bottom-up management; co-management.

056.723 Ecological Principles of Resource and Environmental Management (3) The ecological context of resources; historical evolution of the resource concept from utilitarian to ecosystem thinking; the ecosystem concept and its applications to resource management and planning; adaptive management by use of feedback learning and by managing dynamic processes of ecosystems; biophysical classifications of the environment; landscape ecology and habitat management; biodiversity – the conservation of living systems at the level of genes, species, and ecosystems; values of life support systems and ecological economics.

056.724 Resource and Environmental Management Processes (3) Policy formulation and implementation; policy analysis processes; decision making in complex environments; environmental assessment process-theory and practice; environmental assessment policy development; components of legislated assessment process.

056.725 Resource and Environmental Management Tools (3) Management tools; systems analysis tools-simulation, optimization, multi-objective analysis; economic tools-valuation and environmental accounting, incentives, supply-demand analysis; social approaches-public participation, conflict management, mediation, negotiation; legal, regulatory and policy tools.

056.726 Thesis Research Seminar (3) (pass/fail) Designing a research project, setting goals and objectives, choosing appropriate methods for data collection, analyzing data and communicating results of research; qualitative analysis and reporting of questionnaire and qualitative data; policy and regulatory research; budgeting and scheduling; research administration; application of computers.

Elective courses

The elective set of courses provides opportunity for in-depth examination of different issues related to sustainable management of natural resources. Selection of elective courses by students will be aimed at strengthening particular areas of expertise. Although only NRI elective courses are listed below, students may also choose electives from courses offered in other departments at the university.

056.707 Readings in Natural Resources Management 1 (3) Student planned research in an area of interest. Course syllabus designed by student and approved by NRI faculty.

056.708 Readings in Natural Resources Management 2 (3) Student planned research in an area of interest. Course syllabus designed by student and approved by NRI faculty.

056.711 Field Seminar (3) Exploration of selected issues in resource and environmental studies in field settings, arranged for groups of students. This course is subject to a field trip fee.

056.712 Mineral Resources Management and Policy (3) This course provides an interface between managers and mineral resources, focusing on a selection of practical topics related to minerals and mining. Role of mining activities in the development process; global, national, and provincial distribution of resources; policy issues relating to environmental, economic, and political consequences of non-renewable resource exploitation.

056.713 Energy Resources Management and Policy (3) This course covers global energy issues, objectives, strategies, and policies, and the environmental impacts of alternative energy sources; Canadian energy issues, objectives, strategies, and policies. The course stresses the need for a sound understanding of energy issues of fundamental importance, ability to assess alternatives, appreciation of policy strategies and instruments, and the ability to formulate an energy policy for a region.

056.716 Projects in Natural Resources Management 1 (3) Team research project in an area of interest. Application of problem-solving skills to current issues in natural resources management.

056.717 Projects in Natural Resources Management 2 (3) Team research project in an area of interest. Application of problem-solving skills to current issues in natural resources management.

056.718 Sustainable Development and Natural Resources (3) An examination of the context, concepts, principles, and applications of sustainable development and natural resources at the international, national, and regional levels. Sustainable development is considered from three perspectives – environment, economy, and peoples' well-being. Particular attention is focused upon the implications of sustainable development for natural resources and environmental management.

056.719 Natural Resources Administration and Law (3) This course, after an introduction to Law in general, canvasses various areas of the law relating to natural resources.

056.720 The Role of Information Management in Sustainable Resource Use (3) This course reviews some of the key concepts of spatial analysis including geographic information systems, remote sensing, image processing, and cartography. The second part of the course is based on the application of these concepts to a resource management issue using a case study approach. Students will gain familiarity with the following software: Idrisi for GIS; Adobe Photoshop for image processing; and Adobe

Illustrator for cartography. Classes will have three components, discussion/presentation; lecture; and lab.

056.721 Systems View of Resources Management (3) Systems view deals with theories about the behaviour of entities which exhibit organized complexity. In different fields, it is being applied as systems analysis which combines knowledge of the available analytic tools, understanding of when each is more appropriate, and skills in applying them to practical problems. Objectives of the course include: (a) development of base level skills in systems thinking; (b) application to one example in the field of natural resources management; and (c) exposure to a tool for implementation of systems thinking (STELLA II).

056.727 Property Rights and Institutions in Resource Management (3) Systems of rights, rules and responsibilities to guide resource use; the development of property rights and evolution of institutions.

056.728 Regional Development in Northern Manitoba (3) A comprehensive examination of natural resources, socio-economic conditions, and institutional structures forms the basis for an evaluation of long-term sustainability and developmental strategies for Manitoba's North.

056.729 Environmental Assessment (3) This course is a fundamental tool of decision making regarding natural resources and the environment and will provide students with an understanding of how environmental assessment is designed, administered and operates in the field.

056.730 Biodiversity (3) An examination of the study and management of biodiversity – the variety of life and its processes at the genetic, species, and ecosystem levels of biological organization and at the local, regional, national, and global scale. Emphasis to be placed on understanding why the conservation of biological diversity is important and how it can be attained.

056.731 Ph.D. Thesis Research Seminar (3) Designing research and methodology specific to a project; reviewing the philosophy of interdisciplinary approaches to Natural Resources and environmental management and trends in the field; analyzing appropriateness of a project with trends and directions in interdisciplinary research; conducting and administering research; communicating and disseminating results of research.

SECTION 49: Nursing

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Academic Staff

Dean Emerita

Glass, H, O.C., B.Sc.N, M.A., M.Ed, Ed.D., (Columbia)

Senior Scholars

Bramadat, I., B.A., B.N., M.S.N., Ph.D. (Texas); **Cameron**, C.F., B.A. (Queen's), M.Sc. (Boston), Ph.D. (Wayne State); **Gupton**, A., B.S. (California), M.N., Ph.D. (Manitoba); **Schilder,** E.J., B.N. (Manitoba), M.A. (Washington), D.N.Sc. (California).

Professors

Beaton, J.I., B.N. (Manitoba), M.A. (Washington), Ph.D. (Texas); **Chalmers**, K., B.Sc.N. (McMaster), M.Sc.(A.) (McGill), Ph.D. (Manchester); **Degner**, L.F., B.N. (Manitoba), M.A. (Washington), Ph.D. (Michigan); **Gregory**, D.M., B.Sc.N. (Ottawa), M.N. (Manitoba), Ph.D. (Arizona).

Associate Professors

Guse, L.W., B.N., M.N., Ph.D. (Manitoba); **Hawranik**, P., B.N., M.N., Ph.D. (Manitoba); **Heaman**, M.I., B.N., M.N. Ph.D (Manitoba); **Naimark**, B.J., B.N., M. Sc., Ph.D. (Manitoba); **Scanlan**, J., B.N., M.Ed., Ph.D. (Manitoba).

Assistant Professors

Askin, D.F., B.N., M.N. (Manitoba); **Ateah**, C.A., B.N. (Manitoba), M.Ed. (Alberta), Ph.D. (Manitoba); **Care**, W.D., B.N., M.Ed. (Manitoba), Ed.D. (Nova Southeastern); **Chernomas**, W., B.Sc. (Bridgeport), M.A. (New York), Ph.D. (Maryland); **Diehl-Jones,** Wm. B.Sc., M.Sc., B.Sc.N. (Western Ontario), Ph.D. (Manitoba); **Hack,** T. B.Comm., B.Sc., M.A., Ph.D. (Manitoba); **Katz,** A., B.N., M.N. Ph.D.(Manitoba); **Lobchuk,** M. B.N., M.N., Ph.D. (Manitoba); **McClement**, S., B.Sc.N. (Victoria), M.N., Ph.D. (Manitoba); **McMillan**, D., B.A., B.Sc.N. (Queens), M.N. (Manitoba), Ph.D. (Washington); **Sawatzky,** J.V., B.N., MN., Ph.D. (Manitoba); **Scruby**, L.S., B.N. (McGill), M.S. (Minnesota), Ph.D. (Manitoba); **Secco,** L. B.Sc.N, M.N., Ph.D. (Manitoba); **Woodgate,** R. BN, MN, Ph.D. (Manitoba).

Adjunct Professors

Christie, K.M., B.A., M.N. (Manitoba); **Clarke**, D.E., B.Sc., B.N., M.A., Ph.D. (Manitoba); **English**, J.C.B., C.B. Sc., M.H.Sc. (McMaster); **Hamelin**, K.J., B.A. (Winnipeg), M.Sc. (Manitoba); **Luker**, K.A., B.N. (Manchester), Ph.D. (Edinburgh); **Park**, C.L., B.N. (Manitoba), M.Ed., Ph.D. (Alberta); **Russell,** C.K. B.Sc.N., M.Sc.N., Ph.D. (Arizona) **Sloan**, J.A., B.Sc. (St. John's), M.Sc., Ph.D. (Manitoba); **Thomson**, M., B.Sc.N. (St. Francis Xavier), M.Sc.N. (Toronto) **Yu,** D.C.T. B.A., M.A. Ph.D. (Manitoba).

Program Information

The Faculty of Nursing currently offers a program leading to the Master of Nursing (MN) degree. The program includes a nursing major in the areas of Community Health Nursing; Gerontological Nursing; Human Response to Illness; Nursing Administration; and Woman Child and Family Health Nursing. The Faculty of Nursing is currently undertaking a full program review. Graduates of the program over the past ten years have gone on to function as middle and senior managers and administrators, clinical nurse specialists in institutions and community health settings, government health policy bureaucrats, nursing educators, directors of research in institutions, and other roles. Over twenty percent of graduates have gone on to pursue doctoral education.

In addition to the majors noted above, in September 1998, the Faculty initiated the Advanced Practice Nursing major. This major prepares nurses with advanced knowledge and skills to function as first line providers in primary care. This major is achieved through a course-based, non-thesis program of study comprised of 39 credit hours over two years (20 months). The program of study, taught by an interdisciplinary faculty, provides a strong basis in physiology, pathophysiology, pharmacology, advanced health assessment, community health and role development. Three clinical courses are designed to address the common health needs of individuals and families. Graduates of this program are prepared to work in an expanded nursing role as nurse practitioners in a variety of settings including community health centres, nursing stations in northern and remote areas of the province and country, and other primary care settings.

Fields of Research

The Faculty of Nursing is an "applied" faculty and nursing research emphasizes the development of knowledge as a framework for evidence-based practice. Because nursing plays a major role in the health care system, nursing faculty are involved in collaborative projects with others within nursing and with researchers in other disciplines with the ultimate goal of improving the health of people. Cancer care of individuals and families is a current area of research excellence in the Faculty. In 2000, the Canadian Health Services Research Foundation (CHSRF) awarded a Nursing chair to Dr. Lesley Degner for her work in cancer control. Other areas of research strength are in women's health including cardiovascular, reproductive and mental health; primary health care including aboriginal health and health services research; and aging. Many graduate faculty also have research appointments in local and international health and educational settings.

Research Facilities

The Manitoba Nursing Research Institute (MNRI) was established as a research unit within the Faculty of Nursing in 1985. The MNRI supports research and scholarly activities of faculty members, graduate students, and members of the local nursing community. Available supports include methodological and statistical consultation, library resources, computer data bases, statistical packages, qualitative data analysis programs, and information on research grant initiatives. Opportunities are available for graduate students to work with senior faculty as research assistants.

Master's of Nursing

Admission

Admission requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

Students in the Faculty of Nursing normally begin their program on 1 September. For admission for this start date, Canadian and International students should send their applications with complete supporting documentation to the Faculty of Nursing by the last day in February.

Applicants must possess:

- A baccalaureate degree in nursing from an approved or accredited university. Registered nurse applicants with a degree in another discipline are also eligible to apply. For these individuals, extra coursework may be required prior to consideration for admission to the graduate program;

- Completion of a Research Methods course and an Introductory Statistics course with a minimum grade of C+ in each course. The content of specific courses may be reviewed to determine whether these criteria are met;

- Proof of active practising nurse registration in Canada. Applicants from other countries may apply provided they have active practising nurse status in their home country. Once enrolled in the program, all students must maintain active practising nurse registration with the College of Registered Nurses of Manitoba.

The Faculty of Nursing has additional application procedures. Contact the Faculty of Nursing, Graduate Office, for an application package. Completed applications must be received in the Faculty of Nursing no later than the end of February for the year in which admission is sought.

Students admitted to the Master of Nursing program must be fully immunized as prescribed by the Faculty of Nursing Immunization Policy and submit a completed Immunization Record.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. The Master's Program in Nursing includes a minimum of 27 credit hours and a thesis, practicum, or comprehensive examination. The Advanced Practice Nursing major (Nurse Practitioner) consists of 39 credit hours plus a practicum.

Second language reading requirement: none
Maximum time to graduate: six years

Ph.D. in Nursing

The Faculty of Nursing does not offer a Ph.D. Program.

Course Descriptions

049.703 Foundations, Issues and Trends in Nursing (3) Explores how social forces have influenced the evolution of nursing, its place in society, and the health care system today. Examines Community Health Nursing issues and trends affecting present and future development of nursing.

049.704 Curriculum Development in Nursing (3) The course is designed to explore the developmental phases of curriculum design in a variety of educational settings and types of programs. Students will have the opportunity to engage in the planning and the structuring of educational programs.

049.705 Restorative Nursing (6) Advanced study of the scientific foundations of human functioning as it applies to individuals and families in the context of altered health status. Nursing theories and therapeutic interventions will be applied to the restoration of the health status of individuals and families. Practice is an integral part of the course. Offered on a rotating basis.

049.708 Special Topics in Nursing Research 2 (3) Seminar discussion of topics related to current issues and problems in the development, implementation, and evaluation of knowledge utilization programs in nursing practice. Required of all practicum students.

049.709 Science and Theory in Nursing (3) The course includes an exploration of nursing's theoretical evolution. Issues related to the development and application of theory in a practice discipline will be discussed with a focus on the role of research. Particular emphasis will be placed upon the analysis and evaluation of nursing's conceptual and theoretical systems.

049.710 Administration in Nursing (6) Exploration and analysis of the roles and responsibilities of the nursing administrator in today's health care system. Examination of the organizational structure and culture of nursing services in relation to conflict resolution, interdisciplinary relationships and union negotiation. Includes preceptorship experience. Offered on a rotating basis and currently under review.

049.711 Readings in Selected Topics (3) An intensive readings course for graduate students in nursing. Topics may be selected within the general field of nursing to suit the special needs and research interests of students, for example, transcultural nursing, women's health, or palliative care. Students must have a faculty member agree to advise them before registering.

049.714 The Older Adult: Advanced Nursing Assessment (3) Advanced study and practice integrating theory, concepts, research and skills related to nursing assessment of the strengths and vulnerabilities of older adults and their families. Emphasis is on health promotion for the elderly. Clinical practice in the community and/or the institution is a component of the course. Offered on a rotating basis.

049.715 The Older Adult: Clinical Decision-Making and Intervention in Nursing (3) Emphasis is on advanced study and practice in evaluation of clinical data and subsequent selection of appropriate nursing interventions to promote health of older adults and their families. Development of skills related to consultation and supervision is integral to the course. Clinical practice settings include the community and institutions. Offered on a rotating basis.

049.716 Cancer Nursing Research (3) Focuses on recent advances in cancer nursing research with an emphasis on research methodologies, ethical concerns, and design issues pertinent to research with cancer populations. Approaches to utilization of research findings in clinical practice will be addressed. Offered on a rotating basis.

049.717 Community Health Nursing: Assessment of Aggregate Needs (3) Furthers theoretical and practical knowledge of key components of community health nursing within the primary health care model. Focus is on community health nursing systems and their relationship to the total health care system. Factors influencing past, current, and future community health nursing practice are examined. Emphasis is on assessing aggregate needs and developing advanced skills in working with a target group in the community. Practice in the community is an integral part of the course. Offered on a rotating basis.

049.718 Community Health Nursing: Community Level Interventions (3) Furthers theoretical and practical knowledge in community wide interventions that promote health. Focus is on the community health nurse's role in program development and evaluation for targeted groups in the community, and the role of influencing health policy through lobby efforts. Practice in the community is an integral part of the course. *Prerequisite:* 049.717 or permission of instructor. Offered on a rotating basis.

049.720 Human Responses to Illness (6) Consists of a series of seminars, case studies and clinical practica on human responses common to ill individuals across the lifespan. The emphasis of the course is on synthesis and application of relevant principles of the Human Response to Illness Model, on the development of proficiency in advanced assessment and decision-making, and on initiating, planning and evaluation of nursing interventions. Clinical practice is a course component. Offered on a rotating basis.

049.721 Qualitative Research Methods in Nursing (3) Advances knowledge of qualitative methodology and the use of various qualitative research methods to understand phenomena of interest to nursing. Students are exposed to sampling strategies, qualitative data collection techniques, and processes associated with the analysis and interpretation of qualitative data. Specific qualitative research methods are explored in detail.

049.722 Quantitative Research Methods in Nursing (3) Advances understanding of the ways in which quantitative approaches can be applied to solve nursing problems. The quantitative research process will be described including, literature review, conceptual frameworks in nursing, sampling, data collection strategies, analysis of research data and communicating results. Includes exploration of the status and development of nursing knowledge through quantitative research methods.

049.725 Foundations of Advanced Practice Nursing (3) A study of the theoretical underpinnings surrounding the development of a variety of advanced practice nursing roles. The focus will be on the issues shaping role development in Manitoba and Canada including economic, political and sociologic factors determining health care policy and delivery will be examined.

049.726 Health Care in Advanced Practice Nursing 1 (6) An examination of the assessment and intervention strategies for individuals from birth to adolescence, including sexuality and reproductive health. Designed to provide the necessary knowledge and experience to assist individuals and their families with the most common health problems. Concepts of health promotion and health maintenance are integrated throughout the course. Integrated clinical practicum (12 hrs/week). *Prerequisites:* 089.210, 049.725, 049.728, 049.730.

049.727 Health Care in Advanced Practice Nursing 2 (6) A study of assessment and intervention strategies for individuals from young adult through older adult. The course is designed to provide the necessary knowledge and experience to assist individuals and their families with the most common health problems. Concepts of health promotion and health maintenance are integrated throughout the course. Integrated clinical practicum (12 hrs/week). *Prerequisites:* 089.210, 049.725, 049.728, 049.730.

049.728 Applied Physiology/Pathophysiology for Nurses (6) This is a clinically-applicable systems approach to normal and altered physiological regulation, and is of specific application to advanced nursing practice. Lectures in physiology and pathophysiology as well as student-led case studies will be used to provide synthesis and application of concepts to common health care problems seen in clinical practice.

049.729 Woman, Child, and Family Health: Nursing Perspectives (6) Detailed study of the theory, concepts, current research and nursing care related to the health needs of women, children, and their families. Students will focus their theoretical learning and clinical practice within selected areas of woman, child or family health. Clinical management of selected clients is an integral part of the course. This course will be offered on a rotating basis.

049.730 Advanced Health Assessment and Diagnostic Reasoning (6) Designed to develop health assessment and critical thinking skills appropriate for clinical practice at an advanced level. The collection and in-depth analysis of subjective and objective health information and the use of diagnostic reasoning are emphasized. All students engage in practice with fellow students, clinical teaching associates and consenting patients. Required for students in the APN major. *Prerequisite:* 049.211 or 049.212 plus 049.327 or 049.416 or equivalent or permission from instructor.

Section 50: Occupational Therapy

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Academic Staff

Professors

Anderson, J., B.Sc. (UBC), Ph.D. (Manitoba); **Cooper**, J.E., Dip. P. and O.T. (Toronto), B.O.T., M.Sc., Ph.D. (Manitoba).

Associate Professors

Booth, A.D., B.Sc.(O.T.) (Pennsylvania), M.B.A. (Manitoba); **Etcheverry**, E., Dip.O.T., B.O.T., M.Ed., Ph.D. (Manitoba).

Associate Professor and Academic Fieldwork Coordinator (Saskatchewan): Tompson, M. Dip.OT, M.ContEd, PhD.

Assistant Professors

Collins, D., B.Sc.(O.T.) (Queen's); Friesen, M., Dip.O.T. (Alberta), B.O.T., M.Ed. (Manitoba); **Quanbury**, A., B.Sc. (Queen's), M.A.Sc. (Toronto), **Ripat**, J., BMR (OT), M.Sc. (Manitoba)

Program Information

The Master of Occupational Therapy degree is a professional practice degree that can be obtained through participation in either a Regular program or an Accelerated program option. The Regular program option is for individuals who do not have a previous degree in occupational therapy. The Accelerated option is for occupational therapists who have a BMR(OT) degree or equivalent.

Admission

The following is a summary of the admission requirements. Equivalent academic courses completed at recognized universities elsewhere will be considered. All admission requirements, as well as application deadline dates and forms, are included in applicant information packages that are available from the School of Medical Rehabilitation General Office, R-106 771 McDermot Ave, Bannatyne Campus. This information is also posted on the university's website.

Regular Program

Completion of a previous undergraduate degree, minimum B average in last 60 credit hours of study, completion of all program pre-requisite courses or approved alternates with no grade in prerequisites below a C.

Pre-requisite courses include all of the courses listed below or equivalents approved by the MOT program committee:

077.120 Introduction to Sociology
017.120 Introduction to Psychology
017.229 Child Development
017.237 Developmental Psychology from Adolescence to Old Age
005.100 Basic Statistical Analysis 1
022.132 Anatomy of the Human Body
022.133 Physiology of the Human Body

Accelerated Option

Completion of a BMR(OT) degree or equivalent, minimum B average in the last 60 credit hours of the degree, completion of an additional 42 credit hours of non-OT degree credits and evidence of having passed the Canadian Association of Occupational Therapists (CAOT) certification examination and/or eligibility for registration in Manitoba by the Association of Occupational Therapists of Manitoba (AOTM).

Application Deadlines

Regular Program. The final date for receipt of applications for admission is **April 1st for Canadian applicants**; January 1st for non-Canadian applicants.

Accelerated Option. Students may begin their program on either September 1 or January 1. For admission for each of these start dates, Canadian students should send their applications with complete supporting documentation to the School of Medical Rehabilitation no less than three (3) months before the intended start date. Non-Canadian students should send their applications with complete supporting documentation to the School of Medical Rehabilitation to arrive no later than seven months (7) before the intended start date.

Program Requirements

Program requirements are those of the Faculty of Graduate Studies, found in the Graduate Studies Regulations section of this *Calendar*. MOT program Supplementary Regulations are available in applicant information packages and on the School of Medical Rehabilitation website.

Second language reading requirement: None
Expected time to graduate: Regular program - two years; accelerated option – 1 year.

Course Descriptions

The following 112 credit hours of courses are all required courses of the MOT Regular Program. All academic and fieldwork courses and a professional portfolio must be successfully completed in order to graduate. Accelerated program students will be required to take 12 credit hours of academic course work from the MOT program or equivalent. Six of these credit hours are to be 068.775 Independent Study or equivalent.

Year 1 Term 1 (Modules I and II)

068.610 Human Determinants of Occupational Performance (4) Students study the anatomical, physiological, biomechanical, and psychosocial factors that underlie the physical, cognitive and affective components of human capacities. Content is presented in the context of understanding the relationship between human capacities and occupational performance, the ability to carry out activities and tasks of self-care, productivity and leisure throughout the lifespan.

068.611 Theoretical and Philosophical Foundations of Occupational Therapy (3) Students study the theoretical and philosophical foundations of occupational therapy and the relationship between occupation and health and well-being. A case based introduction to the processes and approaches that guide practice with clients of various ages and in a variety of practice settings.

068.612 Health and Disability (3) Students study definitions of health, factors influencing health, and systems that relate to health in populations. Students are also introduced to classification of diseases and disorders and impairments and the disablement process.

068.613 Occupational Therapy Practice Skills 1 (3) Through instruction, case illustration and practice laboratory sessions students are introduced to practice skills related to the occupational therapy process. Occupational therapy skills and approaches used to identify occupational performance issues are introduced and practiced. Basic assessment of physical, cognitive, and affective performance components are taught. Students participate in problem solving and basic interventions around issues of occupational performance.

068.614 Enabling and Professional Development Skills 1 (3) An introduction to the development of personal knowledge, skills and attitudes related to enabling occupation in clients, and to promoting professional behaviours for safe, reliable, and ethical practice.

068.620 Basic Fieldwork (4) Students are placed in practice settings for four weeks of field experience under the supervision of a registered occupational therapist. Experiences are offered in a wide variety of field sites in Manitoba, Saskatchewan and northwestern Ontario. Evaluated at an introductory level.

Year 1 Term 2 (Modules III and IV)

068.630 Occupational Analysis and Adaptation (4) An in-depth examination of the relationship between components of human performance and engagement in occupations throughout the lifespan. Students analyze self-care, productivity and leisure occupations to identify physical, cognitive and affective components required for function. Principles and methods of adaptation and grading of occupation, task, activity, equipment and environment will be introduced.

068.631 The Environment and Occupational Performance (4) An examination of physical, social, cultural and institutional aspects of the environment and their relationship to occupational performance throughout the life span. Students will begin to identify the environment in terms of enablers and obstacles to function for individuals with variable capacities.

068.632 Health Conditions and Occupational Performance (4) An introduction to diseases, disorders and impairments as barriers to human occupational performance including an introduction to occupational therapy management approaches to enabling function.

068.633 Occupational Therapy Practice Skills 2 (4) This course builds on OT Practice Skills 1. With a focus on practice skills related to the occupational therapy process, students gain further practice in assessment of occupational performance issues and physical, cognitive, and affective performance components. Students are introduced to assessment of environmental factors that influence occupational performance and participate in problem solving and interventions around occupational performance issues.

068.634 Enabling and Professional Development Skills 2 (4) This course will build on the Enabling and Professional Development 1 course. Emphasis will be placed on the development of a variety of verbal and written communication skills, and clinical/ professional reasoning.

068.635 Research Methods for Evidence Based Practice (4) This course is a theory and practical course designed to provide a basic understanding of research principles and methods, evidence-based practice, outcome measures, program evaluation and their applications in occupational therapy.

068.640 Intermediate Fieldwork 1 (8) Students are placed in practice settings for eight weeks of field experience under the supervision of a registered occupational therapist. Experiences are offered in a wide variety of field sites in Manitoba, Saskatchewan and northwestern Ontario. Evaluated at an intermediate I level.

Year 2 Term 1 (Module V)

068.750 Occupational Therapy Process – Children and Adolescents 1 (4) Students study and apply the occupational therapy process as it relates to selected case scenarios involving children and adolescents. Case scenarios present a variety of issues frequently faced by children and adolescents who may benefit from occupational therapy services.

068.751 Occupational Therapy Process – Adults 1 (4) Students study and apply the occupational therapy process as it relates to selected case scenarios involving adults. Case scenarios present a variety of issues frequently faced by adults who may benefit from occupational therapy services.

068.752 Occupational Therapy Process – Senior Adults 1 (4) Students study and apply the occupational therapy process as it relates to selected case scenarios involving senior adults. Case scenarios present a variety of issues frequently faced by senior adults who may benefit from occupational therapy services.

068.753 Advanced OT Practice Skills 1(4) Students develop advanced skills in assessment and intervention of occupational performance issues. Students begin to engage in problem solving and intervention methods for clients with complex needs.

068.754 Advanced Enabling and Professional Development Skills 1 (4) This course builds on Enabling and Professional Development 1&2. Emphasis is placed on the integration and consolidation of professional practice knowledge, skills and attitudes.

068.760 Intermediate Fieldwork II (8) Students are placed in practice settings for eight weeks of field experience under the supervision of a registered occupational therapist. Experiences are offered in a wide variety of field sites. Evaluated at an intermediate 2 level.

068.775 Independent Study (6) This course spans Modules V-VII. Students complete an in-depth study of evidence for practice in an area of interest. Students will work with an assigned faculty advisor or clinical research consultant to define and evaluate a particular area of interest in occupational therapy practice.

Year 2 Term 2 (Modules VI, VII and VIII)

068.770 Occupational Therapy Process – Children and Adolescents 2 (4) Students study and apply the occupational therapy process as it relates to selected case scenarios involving children and adolescents. Case scenarios present a variety of complex issues faced by children and adolescents who may benefit from occupational therapy services.

068.771 Occupational Therapy Process – Adults 2 (4) Students study and apply the occupational therapy process as it relates to selected case scenarios involving adults. Case scenarios present a variety of complex issues faced by adults who may benefit from occupational therapy services.

068.772 Occupational Therapy Process – Senior Adults 2 (4) Students study and apply the occupational therapy process as it relates to selected case scenarios involving senior adults. Case scenarios present a variety of complex issues faced by senior adults who may benefit from occupational therapy services.

068.773 Advanced OT Practice Skills 2 (4) Students develop advanced skills in assessment and intervention of occupational performance issues. Students begin to engage in problem solving and intervention methods for clients with complex needs.

068.774 Advanced Enabling and Professional Development Skills 2 (4) This course builds on previous Enabling and Professional Development courses. Emphasis is placed on leadership skills and preparation for entry into the professional community.

068.780 Advanced Fieldwork (6) Students are placed in practice settings for a six week period which can occur in a flexible time frame (i.e. students may initiate this placement at different points in time from July 1 to mid August depending upon availability of placements. Students may participate in part-time experiences over a longer period or other types of flexible arrangements as may arise and are determined to be appropriate learning experiences to meet educational standards). Experiences are offered in a wide variety of field sites. Evaluated at an advanced level.

SECTION 51: Pathology

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Academic Staff

Professors Emeriti

Bowden, D., M.B., Ch.B., M.D. (Bristol), F.R.C.P. (UK), F.R.C.P.C; **Carr**, I., M.B.Ch.B., Ph.D. (Glasgow), M.D. (Sheffield), F.R.C.P. (UK), F.R.C.P.C; **Penner**, D., M.D. (Manitoba), F.C.A.P., F.R.C.P.C.

Professors

Adamson, I., B.Sc., Ph.D. (Glasgow): **Del Bigio,** M., M.D. (Manitoba), Ph.D., F.R.C.P.C.; **Gartner**, J., M.D. (McGill), F.R.C.P.C., Dip. A.B. (Path.); **Nance**, D., B.Sc., Ph.D. (Oklahoma); **Orr**, F., M.D. (Alberta), F.R.C.P.C, Dip.A.B. (Path.); **Pettigrew**, N., M.B.Ch.B. (Glasgow) F.R.C.P. (UK); **Rhodes**, R. B.A., M.Sc., Ph.D. M.D.(U.S.C.); **Shojania**, A., M.D. (Tehran) ; **Watson**, P., M.A., M.B.B.Ch.(Hons.) (Cambridge), F.R.C.P.C.

Associate Professors

Balachandra, T., M.B.B.S. (Ceylon), F.R.C.P.C, F.A.C.P., D.A.B. (Forensic Path); **Gibson,** I., B.Sc., M.B., Ch. B.(Glasgow), F.R.C.P.(UK), M.D.; **Littman**, C., M.D., Ch.B. (Glasgow), F.R.C.P.C.; **Merry**, C., M.B.B.S. (London); **Morales,** C., M.Sc.(Manitoba), M.D.(Madrid), F.R.C.P.C.; **Myal**, Y., B.Sc., M.Sc., Ph.D.; **Quinonez**, G., M.D. (El Salvador), M.Sc. (Ohio State), F.R.C.P.C; **Ravinsky**, E., B.Sc., M.D.C.M. (McGill), Dip. A. B. (Path.), F.R.C.P.C; **Safneck**, J., M.D. (Manitoba), F.R.C.P.C.; **Stark**, R., M.B. Ch.B. (Glasgow); **Vadas**, G., M.D. (Ottawa); **Williams**, G., B.Sc., D.Phil. (Sussex), M.D. (Manitoba), F.R.C.P.C.

Assistant Professors

Ahing, S., B.Sc. (Sir George. Williams), D.D.S. (McGill), M.S.D. (Indiana); **Alowami,** S., M.B. B.Ch. (Lybia), F.R.C.P.C.; **Baker**, P.M., B.Sc., B.M.R.(P.T.), M.D. (Manitoba), F.R.C.P.(C).; **Battistuzzi**, S., B.Sc., M.Sc., M.D. (Manitoba); **de Nanassy**, J., M.D. (Hungary), M.C.D.D.V., F.R.C.P.C; **Guzman**, R., M.D. (Santo Thomas); **Hossain,** D., M.B.B.S. (Bangladesh), F.R.C.P.C.; **Lane**, D., M.D., F.R.C.P.C.; **Liu,** D-T., Ph.D. (Sweden) M.D. (China); **Lucman**, L., M.D. (Santo Thomas); **MacDonald**, K., M.D. (Manitoba), F.R.C.P.C, D.A.B. (Path.); **Phillips**, S., M.D., F.R.C.P.C; **Tsang**, M., M.D. (Manitoba), F.R.C.P.C, D.A.B. (Path.); **Xu**, Z., M.D. (Shanghai), F.R.C.P.C., F.C.A.P.; **Younes**, J.K., B.Sc.(Hons.) (Queens), M.D. (Manitoba).

Adjunct Professors

Hasinoff, B., B.Sc., Ph.D. (Alberta); **Jiang,** J., M.D., M.P.H.(Shangai), M.Sc.; **Liu**, K-Z, M.D., M.Sc. (China), Ph.D.(Manitoba); **Sharp**, C. M.A.(Cambridge), M.Sc. (Aberdeen), Ph.D. (London).

Program Information

The Department of Pathology offers a program of study leading to a M.Sc. degree. Two types of programs are offered. Honours Science graduates with a strong background in biology can carry out course work plus either a) a research based program and thesis, or b) a practicum leading to a paramedical qualification as a Pathologist's assistant.

Fields of Research

Primary research interests of the faculty include pulmonary pathology, neuropathology, immunobiology, breast cancer, cancer metastasis and neuroimmunology.

Research Facilities

Facilities available in the Department and affiliated teaching hospitals include laboratories for light and electron microscopy, molecular biology, biochemistry, cell culture, and immunocytochemistry.

M.Sc. in Pathology

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. Department deadlines are 1 month before the published Faculty of Graduate Studies deadlines.

Program Requirements

Program requirements are those of the Faculty of Graduate Studies as found in the Graduate Studies Regulations Section of this *Calendar*.
Second language reading requirement: none

Ph.D.

The Department of Pathology does not offer a Ph.D. Program. Students interested in further research may continue in the same laboratory but register in the Ph.D. program of another department, or in the interdisciplinary Ph.D. program.

Course Descriptions

088.701 Investigative Pathology (6) The student will complete a supervised project in the field of anatomic and/or clinical pathology, the results to be submitted in an acceptable report. The student will be examined on his/her knowledge in the field relating to his project. *Prerequisite:* 088.702 or departmental consent.

088.702 Introduction to Pathology (6) The course introduces the student to the basic principles of disease processes, using case models to illustrate mechanisms. Student presentations form part of the evaluation.

SECTION 52: Pharmacology and Therapeutics

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Academic Staff

Professor Emeritus

Pinsky, C., B.Sc. (Sir George Williams), M.Sc., Ph.D. (McGill).

Senior Scholar

Weisman, H., B.Sc., M.Sc., Ph.D. (Manitoba)

Professors

Anderson, J. E., B.SC (British Columbia), B.SC.(Med), Ph.D. (Manitoba); **Aoki**, F., M.D. (Manitoba), F.R.C.P.C.; **Begleiter**, A., B.Sc. (Manitoba), M.Sc. (Massachusetts.), Ph.D. (Alberta); **Bose**, D., M.B., B.S., M.D. (Indore), Ph.D. (Manitoba); **Bose**, R., B.Sc. (Vikram), Ph.D. (Manitoba); **Brandes**, L., M.D. (Western), F.R.C.P.C.; **Burczynski**, F., B.Sc., M.Sc., Ph.D. (Manitoba); **Cattini**, P., B.Sc., Ph.D. (London); **Geiger**, J., M.Sc., Ph.D. (North Dakota); **Glavin**, G., Ph.D. (Manitoba); **Hatch**, G., B.Sc. (Winnipeg), M.Sc. (Saskatchewan), Ph.D. (Manitoba); **LaBella**, F., B.A., M.A. (Wesleyan), Ph.D. (Emory); **Lautt**, W., M.Sc. (Manitoba), Ph.D. (Manitoba); **Mink**, S.N., B.Sc.(Albright, Pennsylvania), M.D.(Temple, Pennsylvania); **Minuk**, G., M.D. (Manitoba), F.R.C.P.C.; **Parkinson**, F., B.Sc., Ph.D. (Alberta); **Peeling**, J., B.Sc.(Hons.), Ph.D. (Manitoba); **Penner**, S., M.D. (Manitoba), Ph.D. (Manitoba); **Sitar**, D., B.Sc. (Pharm.), M.Sc., Ph.D. (Manitoba); **Smyth**, D., Ph.D. (Manitoba); **Tenenbein**, M., M.D. (Manitoba), F.R.C.P.C.

Associate Professor

Ariano, R., B.Sc. Pharm. (Manitoba), Pharm. D. (Minnesota); **D'Almeida**, M.S., B.Sc. (Sakatchewan), Ph.D. (Manitoba); **Kirshenbaum**, L.A., B.Sc.(Hons), M.Sc., Ph.D. (Manitoba): **McNicol**, A., B.Sc., Ph.D. (Glasgow).

Assistant Professors

Docherty, J., B.Sc. (Edinburgh), Ph.D. (Leeds); **Forte**, P., M.D.(Venezuala), M.Sc.(Aberdeen), Ph.D. (London) **Glazner**, G., B.Sc. (Southern Colorado), Ph.D. (Colorado State) ; **Jackson**, M., B.Sc.(Hons), M.Sc. (Manchester), Ph.D. (London); **Mayne**, M., B.Sc. (P.E.I.), Ph.D. (Toronto); **McCutcheon**, K., B.Sc. (North Dakota), D.V.M. (Iowa), Dip ACLAM; **Richman-Eisenstat**, J., B.Sc., M.D. (Dalhousie).

Program Information

Pharmacology is a key medical discipline dealing with the mode of action of therapeutic and recreational drugs and how the body metabolizes these drugs. The department offers both M.Sc. and Ph.D. degrees. A joint M.D.-Ph.D. program is available to students in Medicine.

Fields of Research

Research and facilities are provided in several overlapping areas in which the department specializes. Current research interests include cardiovascular pharmacology, clinical pharmacology, hepatic pharmacology, neuropharmacology and renal pharmacology. The department is among very few pharmacology departments in North America that provide expertise and training in whole animal pharmacology.

Research Facilities

The department has a modern, well equipped facility with equipment for experimentation in areas ranging from whole animal to molecular biology. In addition, the department houses a shop responsible for rapid repair of existing equipment and houses up to date student computer facilities.

M.Sc. in Pharmacology and Therapeutics

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. Qualified students holding B.Sc., M.Sc., B.Pharm., D.V.M. or M.D. degrees may apply for entry into Graduate Programs. Ancillary work in Pharmacology may be arranged for students pursuing their major studies in related departments.

Application Deadlines

The Department of Pharmacology allows students to begin their program on either 1 September or 1 January. For admission for each of these start dates, Canadian students should send in their applications with complete supporting documentation to the Department of Pharmacology and Therapeutics no later than four (4) months before the intended start date. Non-Canadian students should send in their applications with complete supporting documentation to the Department of Pharmacology and Therapeutics to arrive no later than seven (7) months before the intended start date.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students enter into the research rotation program of the department in which the student spends two three month terms in separate laboratories in order to gain experience in multiple techniques/areas. Students then choose the laboratory in which they will conduct their research studies. Year 1 courses include Cell Biology 36.709 (6 credit hours), Physiology 90.724 (6 credit hours). Year 2 courses include Pharmacology 89.713 (6 credit hours), Seminar Course 1 (3 credit hours) and a Statistics Course (3 credit hours). In Year 3 and Year 4 the student may have to take seminar courses 2 and 3. In each year of the program students are expected to attend weekly seminars and present an oral research presentation on their work and an oral exam which encompasses the year's course activities. Seminar courses include Cardiovascular Regulation and Drug Action 89.704, Drug Distribution, Metabolism and Excretion 89.706, Neuropharmacology 89.716, Recent Advances in Pharmacology 89.718, Pharmocytokenesis of Drug Disposition 89.719, Liver Pharmacology 89.720, Clinical Trial Design 89.721 and Molecular Pharmacology 89.722

Second language reading requirement: none
Expected time to graduate: 2 – 3 years

Ph.D. in Pharmacology and Therapeutics

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. A joint M.D.-Ph.D. program is available for students enrolled in Medicine.

Application Deadlines

The Department of Pharmacology allows students to begin their program on either 1 September or 1 January. For admission for each of these start dates, Canadian students should send in their applications with complete supporting documentation to the Department of Pharmacology and Therapeutics no later than four (4) months before the intended start date. Non-Canadian students should send in their applications with complete supporting documentation to the Department of Pharmacology and Therapeutics to arrive no later than seven (7) months before the intended start date

Program Requirements

Program requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Second language requirement: none
Expected time to graduation: 3 – 5 years

Course Descriptions

Courses marked with asterisks are open only to graduate students in Pharmacology.

089.713 Pharmacology (6) Three hours a week both terms. Pharmacodynamics of the more important groups of drugs, the factors which control and modify their effects, and the basis for rational selection and administration of drugs in the treatment of disease. *Prerequisite:* permission of the department.

At least one of the following courses will be given each year in the form of seminars and lectures.

089.704 Cardiovascular Regulation and Drug Action (3) The normal homeostatic regulation of the cardiovascular system, its modification by drugs, and the sites and characteristics of drug actions affecting the cardiovascular system.

089.706 Drug, Distribution, Metabolism, and Excretion (3) The mechanisms by which the body handles foreign chemicals and their effects on the characteristics of drug action.

089.716 Neuropharmacology (3) Seminars, tutorials and selected readings on topics concerning the mechanisms whereby drugs alter central and peripheral nervous activity. These will include drug modification of cellular excitability, neurotransmission and brain function.

089.718 *Recent Advances in Pharmacology (3) Lectures given by staff, followed by group discussions on current research, new developments in drugs and re-evaluation of currently employed drugs, their mechanism of action, etc. Three hours per week both terms.

089.719 Pharmacokinetics of Drug Disposition (3) Lectures and problem-solving sessions directed at appropriate modelling of the disposition of drugs in the body.

089.720 Pharmacology of the Liver (3) Seminars, tutorials and selected readings on topcs related to hepatic functions emphasizing the integrative role of the liver in homeostasis including vascular, autonomic and metabolic functions, toxicology and therapeutic aspects.

089.721 Clinical Trial Design (3) Course designed to evaluate the essential elements of clinical trials as the basis for determining the potential value of interventions advocated for the treatment of diseases in humans. The format will include assigned readings, lectures, discussion and assignment preparation. *Prerequisite:* Undergraduate degree in the health sciences - previous related experience or relevant course credits will be considered as surrogate qualification to an undergraduate health sciences degree.

089.722 Molecular Pharmacology (3) Lectures, seminars and selected readings on the mechanism of action of therapeutic and recreational drugs. Topics will include several categories of drug receptors and associated signal transducers in the context of drug action.

SECTION 53: Pharmacy

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Academic Staff

Professor Emeritus

Templeton, J.F., B.Sc.(Hons.), MSc. (Memorial), D.I.C. (Imperial College), Ph.D., D.Sc., (London), F.R.S.C., C.Chem., (UK).

Professors

Briggs, C.J., B.Pharm., Ph.D. (London), F.R.Pharm.S.; **Burczynski,** F.J., B.Sc. (Pharm.), M.Sc., Ph.D. (Manitoba); **Collins**, D.M., Dipl. Pharm. (NZL), M.Sc., Ph.D. (Minnesota); **Hasinoff**, B., B.Sc.(Hons.), Ph.D. (Alberta); **Grymonpre**, R., B.Sc. (Pharm.) (Manitoba), Pharm.D., (Minnesota); **Pierce**, G., B.P.H.E. (Lakehead), M.Sc., (Dalhousie), Ph.D., (Manitoba); **Simons**, K.J., B.Sc. (Pharm.), M.Sc. (Manitoba), Ph.D. (Washington); **Sitar**, D., B.Sc.(Pharm.), M.Sc., Ph.D., (Manitoba); **Zhamel**, G., B.Sc. (Pharm.) (Manitoba), Pharm.D. (Minnesota), Ph.D. (Manitoba).

Associate Professors

Ariano, R., B.Sc.(Pharm.), (Manitoba), Pharm.D., (Minnesota); **Gong**, Y., B.M. (Beijing), M.Sc., (China), Ph.D., (Manitoba); **Metge**, C., B.Sc. (Pharm.) (Alberta), Ph.D. (MD); **McIntosh**, A.R., B.Sc. (Chem.) (Calgary), Ph.D. (Queen's); **Vercaigne**, L., B.Sc. (Pharm.), (Manitoba), Pharm.D. (Toronto); **Zelenitsky**, S., B.Sc. (Pharm.) (Manitoba), Pharm.D. (SUNY Buffalo).

Assistant Professors

Coulter, A.,B.Sc. (Pharm.) (Manitoba), Pharm.D. (Cincinnati.); **Friesen**, M., B.Sc.(Pharm.), M.Sc.(Pharm.) (Manitoba), Pharm.D. (Toronto); **Gin**, A., B.Sc. (Pharm.) (Manitoba), Pharm. D. (SUNY Buffalo); **Gu**, X., B.Sc. (Pharm.), M.Sc., Ph.D., (Nanjing); **Hall**, K., B.Sc. (Pharm.) (Dalhousie), Pharm.D. (SUNY Buffalo); **Honcharik**, N., B.Sc. (Pharm.), Pharm.D. (SUNY Buffalo); **Honcharik, P.**, B.Sc. (Pharm.) (Manitoba), Pharm.D. (SUNY Buffalo); **Kozyrskyj**, A., B.Sc. (Hons.) (Pharm.) (Toronto), M.Sc., Ph.D. (Manitoba); **Namaka**, M., B.Sc., (Pharm.), M.Sc., Ph.D., (Manitoba); **Seifert**, B., B.Sc. (Pharm.) (Saskatchewan), Pharm.D. (Texas); **Thadani**, M., B.Sc.(Pharm.), M.Sc. (Manitoba); **Thomson**, P., B.Sc. (Pharm.) (UBC), Pharm.D. (Wayne State); **Thurmeier**, R., B.Sc., (Pharm.) (Manitoba); **Trozzo**, P., B.Sc.(Pharm.), (Manitoba); **Woloschuk**, D., B.Sc.(Pharm.) (Sask.), Pharm.D., (Cincinnati).

Adjunct Professors

Alessi-Severini, S., (B.Sc.,), (Parma), Ph.D., (Alberta); **Benson,** H.A.E., B.Sc. (Pharm.), Ph.D., (Queen's, Belfast); **Friesen,** A., B.Sc., M.Sc., Ph.D. (Manitoba).

Program Information

Programs are offered leading to the degrees of Master of Science and Doctor of Philosophy. Thesis based research projects may be undertaken in the following fields of pharmaceutical sciences: pharmaceutics, biopharmaceutics, pharmacokinetics, pharmaceutical and medicinal chemistry, pharmaceutical microbiology, toxicology, pharmacognosy and in the clinically related areas of pharmacoeconomics, pharmacoepidemology, and pharmaceutical policy.

Fields of Research

There are three established research groups: drug discovery and development, drug policy,and antibiotic resistance. Expertise in these areas include dosage form development, geriatrics, medicinal chemistry, pharmacognosy and natural products, toxicology, photochemistry, pharmacokinetics and pharmacodynamics, antibiotics, nephrology, pharmacoeconomics, epidemology, health policy, and clinical pharmacy practice. Two teaching hospitals, the Health Sciences Centre and St. Boniface General Hospital, are involved with pharmacy research in the faculty.

Collaborative research programs are conducted among other university departments including Anatomy, Community Health Sciences, Pharmacology, Physiology, Medical Microbiology, Pediatrics and Child Care, Internal Medicine, and Cell Biology. Funding sources include the Canadian Institute of Health Research, health related research grants, and pharmaceutical industry.

Research Facilities

Modern equipment and apparatus are available, including a wide range of biological, biochemical, chemical and microbiological instrumentation and computerization. Relevant pharmaceutical, chemical and medical publications are available in the Science and Medical Libraries; online search facilities are available through the University computer network.

M.Sc. in Pharmacy

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. Students who do not possess the requirements for entry directly into the graduate program must take a pre-Master's program of courses which will be individually prescribed. Please contact the Faculty for further information.

To enter the Master's program directly a student must have a B.Sc. degree in Pharmacy from the University of Manitoba or equivalent. Students from

another faculty with an honours degree in a subject relevant to their research area will also be considered for graduate research.

APPLICANTS ARE ENCOURAGED TO CONTACT THE FACULTY PRIOR TO MAKING AN APPLICATION TO THE FACULTY OF PHARMACY

Application Deadlines

Start Date	Canadian/U.S.	Non-Canadian/US
Regular (September)	June 1	March 1
Winter (January)	October 1	July 1
Spring (May)	February 1	November 1
Summer (July)	April 1	January 1

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this calendar. All programs are established on an individual basis, the following general principles apply:

- Course work and original thesis are required.
- All students are required to complete the Pharmacy Seminar 1 and 2 (046.716 and 046.717)
- Seminar courses by graduate students, post-doctoral fellows, research associates, staff or invited lecturers are considered part of the program and must be attended by all graduate students.
- Students are expected to enrol on a 12-month basis and conduct research during the summer months.
- The minimum period of time necessary for the completion of the program is one year.

Second language reading requirement: none
Expected time to graduate: two years

Ph.D. in Pharmacy

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. The normal procedure for a candidate is to complete a Master's degree first. However, after one year of study towards the Master's degree, if satisfactory performance is evident, a student may transfer to the doctoral program.

APPLICANTS ARE ENCOURAGED TO CONTACT THE FACULTY PRIOR TO MAKING AN APPLICATION TO THE FACULTY OF PHARMACY.

Application Deadlines – as per the M.Sc. program in Pharmacy.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. A minimum of three years is required for the Ph.D. degree. However, the actual time spent is usually somewhat longer. The minimum number of courses required for the Ph.D. is 24 credit hours (18 at the 700 level) beyond the B.Sc. (Hons.) or 12 credit hours at the 700 level beyond the M.Sc. All Ph.D. students are required to present a research seminar annually.

Second language requirement: none
Expected time to graduation: 4 - 5 years

Course Descriptions

046.708 Biopharmaceutics and Relevant Pharmacokinetics (3) Lecture course on biopharmaceutics with particular emphasis on the application of pharmacokinetic principles in the design of conventional and sustained-release drug dosage forms, assessment of drug bioavailability, and selection of dosage regimens.

046.709 Advanced Topics: Antibiotics and the Treatment of Infectious Diseases (3) A seminar course on antibiotics and the treatment of infectious diseases which includes student presentations.

046.710 Analytical Forensic Toxicology (3) A study of the analytical and chemical procedures for the detection of chemicals and medications in body fluids and the identification of drugs of abuse. Some techniques will be emphasized through a practical project.

046.711 Clinical Pharmacy Research Review (3) Graduate students will be assigned a topic in clinical pharmacy to review, write a short manuscript and submit it for publication in a peer review journal.

046.712 Medical and Scientific Writing (3) Lectures and exercises on the preparation of medical and scientific manuscripts, including papers for publication or oral presentation, progress reports, reviews, short papers, grant applications and similar projects.

046.713 Novel Drug Delivery Systems (3) Advanced course dealing with the role of drugs and drug products in the treatment of disease with emphasis on pharmaceutics and physical pharmacy. Current and future status of drug delivery systems, their design and evaluation will also be examined.

046.714 Pharmaceutical Implications of Free Radical Medicinal Chemistry (3) Persistent and stable organic free radicals found in medicinal compounds, unstable and reactive free radicals found in vivo, natural defence mechanisms designed to remove free radicals in vivo, antioxidants as medicinal compounds, important applications of electron paramagnetic spectroscopy of free radicals, spin-trapping of very reactive free radicals, spin label oximetry.

046.715 Rational Drug Design (3) Selected topics on discovery of lead compounds, pharmacophore identification, structural modification, quantitative structure activity relations and computer-aided molecular modelling of biological drug targets will be covered

046.716 Pharmacy Seminar 1 (3) Seminars and lectures on selected topics in pharmacy. Students are required to present both oral and written reports on research topics.

046.717 Pharmacy Seminar 2 (3) Lectures and group discussions on recent developments in pharmaceutical fields. Students are required to give an oral presentation.

SECTION 54: Philosophy

Head: Carl Matheson
Graduate Chair: Bob Bright
General Office: 453 University College
Telephone: (204)474 6878
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E-mail: philgrad@ms.umanitoba.ca
Website: www.umanitoba.ca/arts/philosophy

Academic Staff

Professors

McCarthy, D.J., B.A. (St.Paul's, Washington, D.C.), M.A., Ph.D. (Toronto), L.M.S. (Medieval Institute); **Matheson**, C.A., B.Sc.(Hons.), M.A. (Dalhousie), Ph.D. (Syracuse); **Schafer**, A.M., B.A.(Hons.) (Manitoba), B.Litt. (Oxford); **Shaver**, R.W., B.A. (Toronto), Ph.D. (Pittsburgh).

Associate Professors

Bailey, J.A., B.A. (Gettysburg), M.A., Ph.D. (Pittsburgh); **Jenkins**, J.L., B.A. (Hampshire), M.A., Ph.D. (Pittsburgh); **McLean**, M.R., B.A. (Alberta), L.Th. (St. John's College), M.A. (Birmingham), D.Phil. (Oxford); **Stack**, M.F., B.A., M.A. (Saskatchewan), Ph.D. (Duke); **Warmbrod**, W.K., A.B.(Hons.), Ph.D. (North Carolina).

Assistant Professors

Bright, R.W., B.A., M.A. (Alberta), Ph.D. (Dalhousie); **Caplan,** B.D., B.A.(Hons, McGill), M.A. (UCLA), Cphil (UCLA), Ph.D. (UCLA); **Feld**, M.E., B.A. (Hons.) (Manitoba), M.A., Ph.D. (Brown); **Martens**, R.M., B.A. Distinction (Manitoba), M.A. (Dalhousie), Ph.D.(Western Ontario); **Schroeder**, T.A., B.A. (Lethbridge), Ph.D. (Stanford).

Program Information

At the present time, the University of Manitoba offers only the M.A. degree in philosophy. Graduates of this program have been successful in gaining entry to some of the leading doctoral programs in philosophy in Canada, the USA and other continents. Approximately 40 Manitoba graduates are now in tenure-track faculty positions in philosophy in universities across North America. Other graduates have pursued careers in law, management and other fields.

Fields of Research

The Department of Philosophy offers courses in all the major areas of philosophy: the history of philosophy (including twentieth-century European philosophy), logic, epistemology, metaphysics, ethics, philosophy of religion, philosophy of law, philosophy of history, philosophy of science, philosophy of language, philosophy of education, social philosophy, political philosophy, aesthetics, and the philosophy of mind. The dominant orientation of the Department is analytic. Areas of greatest strength are: history of philosophy, ethics, epistemology, logic, social and political philosophy and philosophy of mind.

M.A. in Philosophy

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. Contact the Department of Philosophy for further information.

Application Deadlines

The Department of Philosophy allows students entering the M.A. program to commence their studies on either 1 September or 1 January. Students entering the Pre-Master's program will usually find it necessary to commence their studies on 1 September. Canadian/U.S. students should send applications for admission, with complete supporting documentation, to the Department of Philosophy, not later than four (4) months prior to the intended start date of their program of study. International students should send applications, with complete supporting documentation, to the Department of Philosophy, not later than seven (7) months prior to their intended start date.

Those applying for major financial awards offered to entering students should apply directly to the Department of Philosophy, using the application form for the University of Manitoba Graduate Fellowship and including a sample of their recent philosophical writing, not later than 31 January for programs of study commencing in September.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students have two options available to them:

- 12 credit hours in Philosophy, and a major thesis; or
- 24 credit hours in Philosophy and comprehensive examinations.

Second Language Reading Requirement: A reading knowledge of one foreign language will be required if the thesis topic requires it.

Expected Time to Graduate: Students with undergraduate concentration in Philosophy equivalent to approximately nine full courses (54 credit hours) can complete the M.A. degree in one year. Students with a lesser degree of undergraduate concentration will need more than one year to complete the degree.

Ph.D.

The Department of Philosophy does not currently offer a Ph.D. Program.

Course Descriptions

015.704 Topics in Value Theory (6) Not currently offered.

015.707 Topics in Social and Political Philosophy (6) Not currently offered.

015.708 Topics in the History of Philosophy (6) A detailed treatment of important figures and movements in the history of philosophy, ancient, modern, and contemporary.

015.711 Graduate Seminar (6) Not currently offered.

015.712 Graduate Reading 1 (3) Fall term. A reading course for graduate students in philosophy. Subject matter may be arranged to suit the special needs and interests of students; the course might, for example, be devoted to modal logic, or the free will problem, the ontological argument, phenomenology, the philosophy of W.V. Quine, etc.

015.713 Graduate Reading 2 (3) Spring term. A reading course for graduate students in philosophy, similar to 015.712.

015.714 Epistemology 1 (3) Fall term. A study of selected topics in epistemology.

015.715 Epistemology 2 (3) Spring term. A study of selected problems in epistemology.

015.716 Metaphysics 1 (3) Fall term. A study of selected topics in metaphysics.

015.717 Metaphysics 2 (3) Spring term. A study of selected problems in metaphysics.

015.718 Graduate Reading 3 (3) Offered Fall and Spring terms. A reading course for graduate students in philosophy, similar to 015.712.

015.719 Graduate Reading 4 (3) Offered Fall and Spring terms. A reading course for graduate students in philosophy, similar to 015.712.

015.720 Topics in Ethics 1 (3) Basic topics in moral theory. Readings will include contemporary articles and books.

015.721 Topics in Ethics 2 (3) Basic topics in moral theory. Readings will include contemporary articles and books.

015.722 Topics in Logic and the Philosophy of Logic 1 (3) Selected topics in mathematical logic, inductive logic, the philosophy of logic, and the methodology of the natural and formal sciences. Students may not hold credit for both 015.722 and the former 015.705. Prerequisite: written consent of department head or M.A. program chair.

015.723 Topics in Logic and the Philosophy of Logic 2 (3) Selected topics in mathematical logic, inductive logic, the philosophy of logic, and the methodology of the natural and formal sciences. Students may not hold credit for both 015.723 and the former 015.705.

015.731 Topics in the Philosophy of Science (3) An historical study of the interaction between science and philosophy since the time of Newton.

SECTION 55: Physical Education and Recreation Studies

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Academic Staff

Professor Emeritus

Hrenchuk, E., B.P.H.E. (Toronto), M.A. (Minnesota).

Director Emeritus

MacDiarmid, J.A., B.P.E. (Manitoba), M.P.E. (Minnesota).

Professors

Alexander, M.J.L., B.P.E. (UBC), M.Sc. (Washington), Ph.D. (Alberta); **Chipperfield**, J., B.A., M.A., Ph.D. (Manitoba); **Gardiner**, P.F., B.P.H.E., M.P.E. (Windsor), Ph.D. (Alberta); **Giesbrecht**, G., B.P.E, M.P.E., Ph.D. (Manitoba); **Harper**, J., Dip.Ed., B.Sc., M.Sc. (N.D.); **Hrycaiko**, D.W., B.P.E., Cert.Ed. (Manitoba), M.P.E., Ph.D. (Alberta); **Janzen**, H.F., B.Sc. (North Dakota), M.P.E., Ed.D. (Colorado); **Kerr**, R., B.Sc., Ph.D. (Oregon), Cert.Ed. (Exeter), Dip.P.E. (Saint Luke's College); **Ready**, A.E., B.A. (Hons.), M.A. (Western), Ph.D. (Alberta).

Associate Professors

Bailis, D.S., B.A. (Berkeley), M.A., Ph.D. (Princeton); **Blais**, C., B.Sc., M.Sc., Ph.D. (Ottawa); **Butcher**, J., B.P.E., Cert. Ed. (Manitoba), M.Sc. (Dalhousie), Ph.D. (Alberta); **Campbell**, M., B.A., M.A. (Manitoba), Ph.D. (Waterloo); **Dixon**, S.D., B.Ed., M.A., Ph.D. (Manitoba); **Halas**, J., B.P.E. (Manitoba), M.Sc. (Ottawa), Ph.D. (Alberta); **Iwasaki**, Y., B.Sc. (Maryland), M.A., Ph.D. (Waterloo); **MacKay**, K., B.A. (Acadia), M.Sc. (Texas A and M), Ph.D. (Illinois); **Mactavish**, J., B.P.E. (UBC), M.Sc. (Manitoba), Ph.D. (Minnesota); **Porter**, M. B.P.H.E. (Laurentian), M.Sc. (Toronto); Ph.D. (Western).

Assistant Professors

Gannon, G.A., HBOR, B.Sc., M.Sc. (Lakehead), Ph.D. (Toronto); **Heine**, M., Staatsexamen (Ruhr-Universitat Bochum, Germany), M.A. (Western), Ph.D. (Alberta).

Adjunct Professor

Bergeron, G., B.P.E. (Manitoba), M.Sc. (Alberta), Ph.D. (Manitoba).

SECTION 55.1 M.Sc. in Exercise and Sport Science

The Master of Science in Exercise and Sport Science provides advance education and research opportunities in exercise and sport science, physical education, health and human performance related research.

Fields of Research

The Faculty offers opportunities for advanced study and research in the following areas: adapted physical education; athletic injuries/athletic therapy; biomechanics; exercise and environmental physiology; psychology of

sport; aging populations/health behaviour; sociology of sport; and philosophy of sport.

Research Facilities

Resources and supports for M.Sc. related research are jointly provided by the Faculty of Physical Education and Recreation Studies and the Health, Leisure and Human Performance Research Institute.

Admission

Admission requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students require:

The completion of a four-year B.E.S.S./B.P.E. degree (or equivalent).

or
Completion of a four-year undergraduate degree other than a B.E.S.S./B.P.E. (or equivalent), with a suitable academic background in the area of study.

or
Completion of the Pre-Master's program. Please visit the website listed above for details.

Application Deadlines

Canadian/U.S. students seeking fall (September) admission should submit their applications, with complete supporting documentation, to the Graduate Program Coordinator in the FPERS by March 1. International students seeking fall (September) admission should submit their completed applications to the Graduate Program Coordinator in the FPERS by January 15th. The FPERS may consider applications from students interested in commencing their programs in January or May. Please contact the Graduate Program Coordinator for further information.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students must:

- Complete a minimum of 18 credit hours of course work approved by the faculty advisor. Of these 18 credit hours, a minimum of 12 credit hours must be at or above the 700 level; six credit hours must be selected from the graduate course offerings in Physical Education of which 057.717 Research in Exercise/Sport Science and Recreation Studies is compulsory; and
- Enter the program with, or complete as part of the approved program of study, a minimum of nine credit hours in research methods and/or statistics. The required course, 057.717 Research in Exercise/Sport Science and Recreation Studies, may be considered for credit towards this requirement.

In addition to the course work requirements, students must complete a thesis, and attend a minimum of eight seminars sponsored by the Health, Leisure and Human Performance Research Institute. NOTE: Seminar attendance is a supplementary regulation; contact the Graduate Program Coordinator for further details or visit the website listed above.

Second language reading requirement: None
Expected time to graduate: Two years

SECTION 55.2 M.A. in Recreation Studies

The Master of Arts in Recreation Studies includes a diverse range of opportunities for advanced education and research in recreation and leisure studies.

Fields of Research

The Master of Arts in Recreation Studies offers opportunities for advanced study and research in the following areas: areas and facilities planning; leisure behaviour; outdoor recreation/education; recreation and leisure management; social psychology of leisure; travel and tourism; recreation for persons with disabilities; and therapeutic recreation.

Research Facilities

Resources and supports for M.A. related research are jointly provided by the Faculty of Physical Education and Recreation Studies and the Health, Leisure and Human Performance Research Institute.

Admission

Admission requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students require:

Completion of a four-year B.R.S. degree (or equivalent)

or
Completion of a four-year undergraduate degree other than a B.R.S. (or equivalent), with a suitable academic background in the area of study.

or
Completion of the Pre-Master's program. Please visit the website listed above for details.

Application Deadlines

Canadian/U.S. students seeking fall (September) admission should submit their applications, with complete supporting documentation, to the Graduate Program Coordinator in the FPERS by March 1. International students seeking fall (September) admission should submit their completed applications to the Graduate Program Coordinator in the FPERS by January 15th. The FPERS may consider applications from students interested in commencing their programs in January or May. Please contact the Graduate Program Coordinator for further information.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students must:

- Complete a minimum of 18 credit hours of course work approved by the faculty advisor. Of these 18 credit hours, nine credit hours must be taken from the 700 level course offerings in Recreation Studies with 123.701 Leisure and Recreation: Concepts and Theory (3) and 123.717 Research in Exercise/Sport Science and Recreation Studies (3) being compulsory; and,
- Enter the program with, or complete as part of the approved program of study, a minimum of nine credit hours in research methods and/or statistics. The required course, 123.717 Research in Exercise/Sport Science and Recreation Studies, may be considered for credit towards this requirement.

In addition to course work requirements, students must complete a thesis, and attend a minimum of eight seminars sponsored by the Health, Leisure and Human Performance Research Institute. NOTE: Seminar attendance is a supplementary regulation; contact the Graduate Program Coordinator for further details or visit the website listed above.

Second language reading requirement: None
Expected time to graduate: Two years

Ph.D.

The Faculty of Physical Education and Recreation Studies does not offer a Ph.D. program.

Course Descriptions

Not all courses are offered every year.

Exercise and Sport Science Courses

057.705 Motor Development and Characteristics of Atypical Children (3) Motor development and motor characteristics of various groups of atypical children. Program design and activity prescription for atypical children. *Prerequisite:* 057.339.

057.706 Social and Psychological Components of Sports and Physical Education (3) The socio-psychological components of movement and the role of physical activity in the socio-psychological development of children. *Prerequisite:* 057.346 plus consent of instructor.

057.708 Individual Study in Selected Area (3) This course, which can be completed twice for a maximum of 6 credits, provides opportunities for in-depth individualized study within a specific area of interest.

057.710 Developmental Human Kinetics (3) The development of human movement from conception to adulthood with particular reference to the effects of development on activity and the effects of activity on development. *Prerequisites:* 057.255 plus additional 3 credit hours of approved coursework in human development.

057.711 Biomechanical Analysis of Movement (3) The theory and techniques of biomechanical analysis of movement and application of the techniques to movement analysis. *Prerequisites:* 057.436.

057.712 Sociological Perspectives of Children's Physical Activity (3) Sociological factors which influence children's physical activity. *Prerequisite:* 057.346 plus consent of instructor.

057.713 Anatomical Biomechanics (3) A study of the biomechanical aspects of muscle and joint forces during human movements as they relate to the mechanics of athletic injuries and injury prevention. *Prerequisite:* 057.306 plus consent of instructor.

057.714 Mechanisms of Athletic Injuries (3) The study and analysis of the causes and mechanisms of injuries in sports and exercise situations, including methods of prevention and rehabilitation. *Prerequisite:* 057.713.

057.715 Current Topics in Exercise Physiology (3) Current research pertaining to factors that affect exercise performance, as well as the physiological adaptations which occur with acute and chronic exercise. *Prerequisite:* 057.441. May not be held for credit with former 057.703.

057.716 Special Topics (3) The study of contemporary research and theory in a selected area. Topics will vary depending on instructor expertise and student need.

057.717 Research in Exercise/Sport Science and Recreation Studies (3) Concepts and issues in designing, implementing and disseminating research in areas broadly related to leisure, exercise and sport science. It is recommended that students complete this compulsory course within their first year of enrolment.

Recreation Studies Courses

123.701 Leisure and Recreation: Concepts and Theories (3) Critical analysis of the dominant concepts, theories, and research associated with the development of basic and applied knowledge in recreation and leisure studies. *Prerequisite:* instructor's permission.

123.703 Issues in Leisure and Recreation Management (3) Current trends and issues in the management of leisure and recreation resources and services. *Prerequisite:* instructor's permission.

123.704 Issues in Leisure for Persons with Disabilities (3) Contemporary issues and research in recreation and leisure services for individuals with disabilities across the lifespan. *Prerequisite:* instructor's permission.

123.705 Issues in Outdoor Recreation (3) Current trends and research related to the social and physical implications of leisure behaviour in the natural environment. *Prerequisite:* instructor's permission.

123.706 Issues in Tourism (3) Contemporary issues and research related to travel behaviour and sustainable tourism. *Prerequisite:* instructor's permission.

123.707 Leisure Across the Lifespan (3) Dominant concepts, theories, and research associated with the study of recreation and leisure across the lifespan. *Prerequisite:* instructor's permission.

123.708 Directed Study in Recreation and Leisure Studies (3) This course, which can be completed twice for a maximum of 6 credits, provides opportunities for in-depth individualized study within a specific area of interest.

123.709 Special Topics in Recreation and Leisure Studies (3) Contemporary research and theory in selected areas of recreation and leisure studies, the topics addressed in this course will vary depending on faculty expertise and student need. *Prerequisite:* instructor's permission.

123.717 Research in Exercise/Sport Science and Recreation Studies (3) Concepts and issues in designing, implementing and disseminating research in areas broadly related to leisure, exercise and sport science. It is recommended that students complete this compulsory course within their first year of enrolment.

SECTION 56: Physics and Astronomy

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Website: www.physics.umanitoba.ca/

Academic Staff

Distinguished Professors

Morrish, A.H., B.Sc.(Hons.) (Manitoba), M.A. (Toronto), Ph.D. (Chicago), F.R.S.C; **van Oers,** W.T.H., Ph.D. (Amsterdam).

Professors Emeriti

Connor, R.D., B.Sc., Ph.D. (Edinburgh); **Duckworth**, H.E., B.A. (Manitoba), B.Sc., Ph.D. (Chicago), F.R.S.C.; **McKee**, J.S.C., B.Sc., Ph.D. (Queen's, Belfast), D.Sc. (Birmingham); **Standing**, K.G., B.Sc.(Hons.) (Manitoba), A.M., Ph.D. (Princeton).

Senior Scholars

Barber, R.C., B.Sc.(Hons.), Ph.D. (McMaster); **Falk**, W., B.Sc., M.Sc. (Saskatchewan), Ph.D. (UBC); **Smith**, G., B.Sc. (Case Institute of Technology), Ph.D. (Case Western Reserve); **Standil**, S., B.Sc., M.Sc. (Queen's), Ph.D. (Manitoba); **Vail**, J.M., B.Sc.(Hons.), M.Sc. (Manitoba), Ph.D. (Brandeis).

Professors

Birchall, J., B.Sc.(Hons.), Ph.D. (Birmingham); **Blunden**, P.G., B.Math. (Waterloo), Ph.D. (Queen's); **Davison**, N.E., B.Sc. (McMaster), Ph.D. (Alberta); **Ens**, E.W., B.Sc. (Winnipeg), Ph.D. (Manitoba); **Loly**, P.D., B.Sc., Ph.D. (London), D.I.C. (Imperial College); **Osborn**, T.A., B.Sc. (Cornell), Ph.D. (Stanford); **Page**, J.H., B.Sc.(Hons.) (Dalhousie), D.Phil. (Oxford); **Page**, S.A., B.Sc.(Hons.), Ph.D. (Queen's); **Roshko**, R.M., B.Sc. (Winnipeg), M.Sc., Ph.D. (Manitoba); **Sharma**, K.S., B.Sc.(Hons.), M.Sc., Ph.D. (Manitoba); **Southern**, B.W., B.Sc. (York), M.Sc., Ph.D. (McMaster); **Svenne**, J.P., B.Sc. (Toronto), Ph.D. (M.I.T.); **Tabisz**, G.C., B.A.Sc., M.A., Ph.D. (Toronto); **Williams**, G., B.Sc.(Hons.) (Bristol), Ph.D. (London), D.I.C. (Imperial College); **Zetner**, P.W., B.Sc.(Hons.), M.Sc., Ph.D. (Windsor).

Associate Professors

Bhakar, B.S., B.Sc. (Agra), M.Sc. (Aligarh), Ph.D. (Delhi); **Bochonko**, R., B.Sc.(Hons.) (Manitoba), M.S., C. Phil., Ph.D. (Michigan).

Assistant Professors

English, J., A.O.C.A. (Ont. Col.Art), B.Sc. (Tor.), Ph.D. (Aust. Nat.U); **Safi-Harb**, S, B.S. (A.U.B.)(Lebanon), M.Sc. (Wisc.), Ph.D. (Wisc. Madison).

Adjunct Professors

Beavis, R., B.Sc.(Hons.), Ph.D. (Manitoba); **Berndt**, A., B.Sc. (Hons.), M.Sc., Ph.D. (Manitoba); **Bews**, B.Sc., M.Sc., Ph.D. (Manitoba); **Davis**, C.A., B.A. (Transylvania, Kentucky), Ph.D. (Wisconsin); **Dong**, R.Y-Y., B.A.Sc.(Hons.) (Toronto), Ph.D. (UBC); **Furutani**, K.M., B.Sc., Ph.D. (Manitoba); **Gallet,** J., B.Sc. (Manitoba), M.Sc. (Toronto), Ph.D. (California [Irvine]); **Hoult**, D., B.A., M.A., Ph.D. (Oxford); **Johnson**, H.M., B.Sc. (Mount Allison), M.Sc. (New Brunswick), Ph.D. (New York [Buffalo]); **Kobes**, R., B.Eng. (Saskatchewan), M.Sc., Ph.D. (Alberta); **Kunstatter**, G., B.A.Sc., M.Sc., Ph.D. (Toronto); **Lewis**, J.S., B.Sc. (Chicago), Ph.D. (New Brunswick); **Mantsch**, H.H., B.Sc.(Hons.), Ph.D. (Cluj-Napoca, Romania); **McCurdy**, B.M.C., B.Ed. (Queen's), B.Sc. (Hons.) Waterloo, M.Sc., Ph.D. (Manitoba); **Pistorius**, S., B.Sc. (Natal), M.Sc., Ph.D. (Stellenbosch); **Ramsay**, W.D., B.Eng. (Carleton), M.A.Sc. (UBC), Ph.D. (Manitoba); **Rickey**, D., B.Sc. (Manitoba), M.Sc., Ph.D. (Western); **Savard**, G., Ph.D. (McGill); **Smith**, I.C.P., B.Sc., M.Sc. (Manitoba), Ph.D. (Cambridge), FilDr. (Stockholm), D.Sc. (Winnipeg); **Somorjai**, R.L., B.Sc. (McGill), Ph.D. (Princeton); **Viggars**, D.A., B.Sc.(Hons.), Ph.D. (Liverpool).

Program Information

The department offers opportunities for graduate study in several experimental and theoretical fields of contemporary interest, leading to the Master of Science and Doctor of Philosophy degrees.

Fields of Research

Condensed Matter Physics: Magnetic properties of materials, including their dependence on crystal structure and morphology; surface magnetism of fine particles or thin films; crystalline transformations of amorphous magnetic materials; phase transitions and critical phenomena in ferromagnetics, spin-glasses and site- disordered systems; high Tc superconductors; acoustic phonon localization in disordered materials; structural phase transitions.

Mass Spectrometry: Precise atomic mass determinations of stable and unstable nuclides; time-of-flight mass spectrometry of large molecules (particularly biomolecules) and molecular clusters.

Atomic, Molecular and Optical Physics: Study of atomic and molecular interactions in dense fluids by laser light scattering and far infrared absorption; atomic collision dynamics studied using electron energy-loss spectroscopy, laser excitation techniques and time-correlated particle detection.

Subatomic Physics: Properties of nuclei far from stability (decay energies, atomic masses, nuclear structure); nucleon-nucleon systems (spin observables, particle production); tests of symmetry principles (charge symmetry, parity); strange quark structure of the proton.

Theoretical Physics: Low temperature excitations in ordered crystalline magnets; investigations of reduced dimensionality on the magnetic and electronic properties of solids; the effects of disorder on the physical properties of solids as studied using renormalization group methods, fractal geometry, and random matrix theory; phase transitions and critical phenomena; theory and computer simulation of defect processes in crystalline materials; relativistic dynamics of composite system; Kaluza-Klein theory and string dynamics; evolution problems in quantum, classical and semi-classical mechanics using the rigorous methods of mathematical

physics; few-body scattering theory; electromagnetic interactions in both few-body systems and complex nuclei; relativistic approaches to the nuclear many-body problem.

Medical Physics: Through adjunct appointments, graduate studies are also carried out at CancerCare Manitoba and at the National Research Council Institute for Biodiagnostics. Dosimetry of therapeutic electron beams of energies up to 32 MeV; quantification of cerebral blood flow and metabolism using X-ray Computed Tomography (CT) and Single Photon Emission Computed Tomography (SPECT); precision radiotherapy; radiation dosimetry and quality control for diagnostic X-rays and Nuclear Medicine; hyperthermia; biomedical Magnetic Resonance Imaging.

Research Facilities

As an integral part of the research programs outlined above, a variety of major research facilities exist within the Department of Physics and Astronomy. These include a JEOL 100CX-II transmission electron microscope and an ISI-100B scanning electron microscope with EDAX energy-dispersive X-ray spectrometer, a high resolution mass spectrometer, two time-of-flight mass spectrometers for large ions and biomolecules with masses up to approximately 10,000 u, a S.H.E. dilution refrigerator for the production of millikelvin temperatures, a Philips X-ray diffraction and fluorescence unit, a Nicolet 7900 Fourier transform infrared spectrometer equipped for operation in the far-infrared, a Jarrell-Ash double monochromator optical spectrometer for Raman experiments, a Quantum Design PPMS 6000 magnetometer/susceptometer and a custom-designed SQUID-based magnetometer, and a local network of computers connected to the university's central computer facilities.

A good machine shop and electronics shop are located in the Physics Department. Both liquid nitrogen and helium are produced locally for low temperature research.

Research in medical physics is carried out at CancerCare Manitoba and at the National Research Council of Canada Institute for Biodiagnostics. In addition, research facilities at various national and international laboratories, including Argonne National Laboratory (Chicago), TRIUMF (Vancouver), Los Alamos National Laboratory (Los Alamos, N.M.), and the Thomas Jefferson National Accelerator Laboratory (Newport News, VA) are extensively used by members of the subatomic physics research group.

M.Sc. in Physics

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. To enter the Master's program directly, a student must have an Honours B.Sc. degree in Physics and Astronomy, Mathematics and Physics, or Engineering Physics from the University of Manitoba or the equivalent. Students without the degree entrance requirements will have their undergraduate program evaluated and may be required to complete a pre-Master's program of selected University of Manitoba undergraduate courses.

Application Deadlines

The Department of Physics and Astronomy allows students to begin their program on either 1 September, 1 January, 1 May, or 1 July. For admission for each of these start dates, Canadian/U.S. students should send their applications with complete supporting documentation to the Department of Physics and Astronomy no less than three (3) months before the intended start date. Non-Canadian students should send their applications with complete supporting documentation to the Department of Physics and Astronomy to arrive no later than six months (6) before the intended start date.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. The Department of Physics and Astronomy has certain supplementary regulations. Information about these regulations as well as a description of research programs in Physics is available at: www.physics.umanitoba.ca

A Master's degree in physics normally consists of both coursework and a thesis. For students in the medical physics M.Sc. program, the course load is increased and the thesis requirement is replaced by a practicum.

The Master's program with thesis consists of two or three courses from the 700 series offered by the department or from another department offering courses suitable for the candidate's program. In special cases, courses may be drawn from the 400 series as listed. The program of study extends through a minimum period of twelve months. Frequently two summers of research work plus one winter of research and coursework are required to complete the program. In addition to coursework, these students must submit a thesis and defend it orally.

The M.Sc. program in medical physics is a two-year (18-month, course work, 6-month, practicum) program which requires 36 credits. A practicum in an approved laboratory and the submission of a research report is also required. On completion of the coursework and practicum, the student will be required to pass a comprehensive oral examination.

Second language reading requirement: none
Expected time to graduate: 2 - 3 years

Ph.D. in Physics

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*, the normal procedure to be a candidate for a Ph.D. degree is to complete an M.Sc. degree first. However, students with an honours degree from the University of Manitoba or equivalent may be accepted directly into the PhD program.

Application Deadlines

The Department of Physics and Astronomy allows students to begin their program on either 1 September, 1 January, 1 May, or 1 July. For admission for each of these start dates, Canadian/U.S. students should send their applications with complete supporting documentation to the Department of Physics and Astronomy no less than three (3) months before the intended start date. Non-Canadian students should send their applications with complete supporting documentation to the Department of Physics and Astronomy to arrive no later than six months (6) before the intended start date.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. The Department of Physics and Astronomy has certain supplementary regulations. Information about these regulations as well as a description of Research Programs in Physics is available on the web: www.physics.umanitoba.ca

All students entering the Ph.D. program must write and obtain minimum grade of 650 on the GRE examination within one year of the date of first registration. Students are strongly encouraged to write the examination before their initial registration.

The main program of studies is selected from one of the major fields of research listed above in Section 2.2, and is supplemented by an ancillary program which takes into account the student's interests and breadth of experience.

Ancillary subjects must be chosen from a field of physics distinct from the major area of study or from other departments (e.g., Mathematics) offering suitable courses. In consultation with the student, a program of study is decided by a committee with the student's advisor as chair.

Students must pass a candidacy exam and submit a thesis which describes their research work and which will be examined according to the general regulations.

Second language requirement: none
Expected time to graduation: 4 - 5 years

Course Descriptions

016.725 Seminar course in Advanced Physics (6) Selected topics in advanced physics may be offered from time to time by the faculty or visiting lecturers. Credit for this course will be determined by the Head of the Department of Physics and Astronomy. *Prerequisite:* consent of instructor.

016.726 Mass Spectroscopy (3) Two lectures per week for one term. The course covers the techniques and applications of mass spectroscopy. Special emphasis is given to the general principles of ion optics for use in the design of modern instruments.

016.742 Quantum Mechanics (6) Concepts and mathematical foundations, theory of angular momentum, symmetry principles, scattering theory, systems of particles, Dirac electron theory. Not to be held with the former 016.716. *Prerequisite:* 016.437 or consent of instructor.

016.744 Advanced Topics in Physics (3) Selected topics in advanced physics. This course may be offered from time to time by the faculty or visiting lecturers. *Prerequisites: consent of instructor.*

016.750 Condensed Matter Physics 1 (3) The principles of electrical and vibrational properties of primarily crystalline structures. Topics include free electron theory, electron-electron interactions, screening, phonons, electron-phonon coupling and transport properties. Not to be held with the former 016.712.

016.751 Condensed Matter Physics 2 (3) A comprehensive survey of advanced topics in condensed matter physics. The topics may change from year to year but include collective excitations, defects, localized states, superconductivity, Josephson effect, superfluids, quantum Hall effect. Not to be held with the former 016.712. *Prerequisite:* 016.750 or consent of instructor.

016.752 Condensed Matter Physics 3 (3) An advanced treatment of cooperative phenomena which occur in various condensed phases of matter. Topics may change from year to year but include liquids, liquid crystals, incommensurate structures, magnetically ordered systems, amorphous solids, quasicrystals. *Prerequisites:* 016.750 and 016.754 or consent of instructor.

016.753 Physics of Magnetism (3) A comprehensive survey of magnetism and magnetic materials. Topics include the origins of magnetic interactions, types of magnetic order, domain structures, magnetization processes, dynamics, thin films, applications. Not to be held with the former 016.721. *Prerequisite:* 016.750 or consent of instructor.

016.754 Statistical Mechanics (3) The principles of statistical mechanics. Topics include statistical ensembles, entropy, Fermi gas, Bose-Einstein condensation, superfluidity, phase transitions and equilibria, fluctuations, Fluctuation-Dissipation and Wiener-Khintchin theorems, liquids and dense gases. Not to be held with the former 016.719. *Prerequisite:* 016.437 or consent of instructor.

016.755 Advanced Statistical Mechanics (3) An advanced treatment of phase transitions and critical phenomena in a variety of systems. Topics include solvable models, mean field theory, Landau theory, scaling laws, series methods, renormalization group methods, linear response theory, generalized rigidity. Not to be held with the former 016.719. *Prerequisite:* 016.754 or consent of instructor.

016.756 Relativistic Quantum Mechanics (3) Relativistic single particle equations for bosons and fermions, quantization of fields, interacting fields, elementary quantum electrodynamics, covariant perturbation theory and Feyman diagrams. Not to be held with the former 016.743. *Prerequisite:* 016.742 or consent of instructor.

016.757 Nuclear Physics (3) Hadron and lepton scattering, the nucleon-nucleon interaction, nuclear structure, nuclear shell model, nuclear excitations and decay, hadronic interactions and decays, the quark model. Not to be held with the former 016.705. *Prerequisite:* 016.451 or consent of instructor.

016.758 Advanced Topics in Nuclear Physics (3) A selection of advanced topics in nuclear and intermediate energy physics. Not to be held with the former 016.706. *Prerequisite:* 016.757 or consent of instructor.

016.759 Electromagnetic Theory (3) Maxwell's equations, electromagnetic potentials, gauge conditions, conservation laws, Green function methods, diffraction theory, simple radiating systems, Lagrangian derivation of Maxwell's equations and the covariant structure of electromagnetism. Not to be held with the former 016.715.

016.760 Applied Electromagnetism (3) Wave guides and resonant cavities, charged particle collision theory, Bremsstrahlung, radiation of moving charged particles, multipole radiation. Not to be held with the former 016.715. *Prerequisite:* 016.759 or consent of instructor.

016.761 Experimental Methods in Materials Science (3) A course covering many of the experimental techniques used in materials science. Topics will change from year to year but will be selected from the following: vacuum techniques, cryogenic techniques, data acquisition, optical and electron microscopy, x-ray diffraction, electrical and optical measurements, superconducting and magnetic properties, ultrasonic measurements.

016.762 Experimental Methods in Physics (3) A course covering many of the experimental techniques used in physics. Topics will change from year to year but will be selected from the following: laser, optical and electron spectroscopic techniques (applied to atoms and molecules), mass spectrometry (of large biological molecules and atomic nuclei), general aspects of detector and instrumental designs, cryogenic techniques and targets, basics of particle accelerators, data acquisition.

016.763 Particle Physics (3) Basic particles and interactions, symmetries and conservation laws, the quark model, deep inelastic scattering, electroweak theory, introduction to QCD. Not to be held with the former 016.730. *Prerequisite:* 016.742 or consent of instructor.

016.764 Introduction to Quantum Mechanics for Advanced Students 1 (3) An introduction to the fundamentals of quantum mechanics for students in engineering and sciences other than physics, in the context of modern materials. Postulates of quantum mechanics, harmonic oscillator, angular momentum, one-electron and many-electron systems. *Prerequisites:* 016.105 (or the former 016.118), 016.107 (or the former 016.106), 136.130, 136.150, 136.170 (or both 136.151 and 136.171 or 136.169), or equivalents.

016.765 Introduction to Quantum Mechanics for Advanced Students 2 (3) A continuation of 764. Electron spin, approximation methods for stationary states, time-dependent perturbation theory, term project. *Prerequisite:* 016.764.

016.771 Quantum Optics (6) Matter-radiation interaction, spectral line broadening, quantization of the radiation field, degree of coherence of light; number, coherent, chaotic and squeezed states of light, quantum theory of detection, laser theory, resonance fluorescence, light scattering, non-linear quantum optics. Not to be held with the former 016.708.

016.782 Photonics (6) A survey of photonic devices and their physical principles. Optics, optical fibres, lasers, LEDs, photo-detectors, electro-optic modulators, liquid crystal displays, acousto-optics, photon switching and computing, and fibre-optic communication. *Prerequisite:* 016.452, or 024.360, or consent of instructor.

Medical Physics Courses

016.736 Medical Radiation Physics (3) The relevant physics of the production and interaction of radiation beams used in both diagnostic and therapeutic medicine will be covered. Such beams included X- and gamma-rays, particle beams, visible and I.R. radiation, microwaves, and ultrasound. *Prerequisite:* 016.456 or consent of instructor.

016.737 Radiotherapy Physics (3) The calculations and measurements necessary to determine the radiation dose distribution in patients receiving radiotherapy will be presented. Newer treatment modalities, e.g., pion therapy and hyperthermia will be discussed. *Prerequisites:* 016.451, 016.456, or consent of instructor.

016.738 Radiation Biology (3) The interaction of ionizing and non-ionizing radiations with living systems. The relevance to Radiotherapy. Nuclear medicine and diagnostic radiology. *Prerequisite:* 016.102/016.103 (or the former 016.121) or consent of instructor.

016.739 Radiation Protection (3) Ionizing radiation including X-rays, gamma-rays, neutrons, alpha-, beta-, and heavy ion-particle sources, bioeffects, and protection principles are covered. Non-ionizing radiation, including laser light, radio- frequency waves, ultraviolet and infrared light, and ultrasound, sources, bioeffects, and exposure protection guidelines are studied. *Prerequisites:* 016.736 and 016.738 or consent of instructor.

016.740 Medical Imaging (3) Fundamental principles of image formation, analysis of the characteristics of medical images, parametric description of image quality; application to transmission radiography. *Prerequisite:* consent of instructor.

016.741 Diagnostic Methods (3) Medical imaging in terms of signal acquisition, data processing, image reconstruction, special techniques; applications in fluoroscopy, computed tomography, radionuclide imaging, ultrasound, nuclear magnetic resonance imaging. *Prerequisite:* 016.740.

016.746 Methods in Medical and Health Physics 1 - (Medical Imaging and Radiation Protection) (3) This practical course is designed to give students hands-on experience with equipment, clinical techniques and methods of analysis in medical imaging and health physics. Topics such as: dosimetry of unsealed sources, radiation shielding design and surveys, meter calibration, decontamination and plume dispersal, CT, Ultrasound, X-ray and Nuclear Medicine imaging techniques, mammography and quality assurance in medical and health physics will be covered. Students are required to take both 016.746 and 016.747 which will be offered in consecutive years. NOTE: only students accepted to the Medical Physics Program will be allowed to register for this course.

016.747 Methods in Medical and Health Physics 2 - (Radiotherapy and Radiation Biology) (3) This practical course is designed to give students hands-on experience with equipment, clinical techniques and methods of analysis in radiotherapy and radiation biology. Topics such as: error analysis and data reduction, dosimetry of ionizing radiation, radiotherapy treatment planning, calibration, HDR brachytherapy, microdosimetry and quality assurance in medical physics, will be covered. Students are required to take both 016.746 and 016.747 which will be offered in consecutive years. **NOTE**: only students accepted to the medical physics program will be allowed to register for this course.

016.770 Research Project in Medical Health Physics (0) Students undertake a relevant research project in an approved laboratory. At least six months of full-time research is expected. The research project report shall be submitted in a style and length as specified by the department. A comprehensive oral examination will follow the submission of the project report.

Astrophysics & Astronomy Courses

016.766 Astronomy 1: The Phenomenology of Galaxies (3) Describes astronomical standards such as intensity magnitudes, colour and metalicity; the properties of stars and the interstellar medium; galactic structure, kinematics, and the evolution of galactic components.

016.767 Astronomy 2: Galactic Dynamics (3) A continuation of 016.7B1, this course provides mathematical descriptions of potential theory, disk dynamics and spiral structure, collisions between galaxies, and dark matter. Additional topics are galaxy evolution, large-scale structure of the universe and cosmology. *Prerequisite:* 016.766

016.768 Astrophysics 1: Stars (3) Covers the basic physical concepts required to extract qualitative estimates of astrophysical parameters, describes several aspects of observational astronomy, and it emphasizes in a more mathematical way the astrophysics of stellar structure and evolution.

016.769 Astrophysics 2: Interstellar Matter and Galaxies (3) Emphasizes the physics of interstellar matter and dust grains, gaseous nebulae, basic hydrodynamics, shock waves, and supernova remnants. *Prerequisite:* 016.768

SECTION 57: Physiology

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Website: www.umanitoba.ca/medicine/physiology/

Academic Staff

Distinguished Professor

Dhalla, N., B.Sc. (Punjab), M.Sc. (Pennsylvania), Ph.D. (Pittsburgh).

Professors Emeriti

Friesen, H., B.Sc.(Med.), M.D. (Manitoba), F.R.C.P.C., F.R.S.C.; **Gaskell**, P., M.D. (Western Ontario), Ph.D. (Physiol.) (London).

Professors

Angel, A., B.Sc.(Med.) (Manitoba), M.Sc. (McGill), M.D. (Manitoba), F.R.C.P.C.; **Carter**, S., M.D., M.Sc. (Manitoba); **Cattini**, P., B.Sc., Ph.D. (London); **Hughes**, K., B.A., M.A. (Manitoba), Ph.D. (Chicago); **Jordan**, L., B.A., M.A., Ph.D. (Texas); **Kardami**, E., Ph.D. (London); **Kroeger**, E., M.Sc., B.Sc. (Wheaton College), Ph.D. (Manitoba); **McCrea**, D., B.Sc., Ph.D. (Manitoba); **Murphy**, L., B.Sc.(Med.), B.M., B.S. (Sydney); **Nagy**, J., B.Sc., Ph.D. (UBC); **Naimark**, A., O.C., M.D., B.Sc.(Med.), L.L.D., F.R.C.P.C., F.R.S.C.; **Pierce**, G., B.P.H.E. (Lakehead), M.Sc. (Dalhousie), Ph.D. (Manitoba); **Shefchyk**, S., B.S., M.S., Ph.D. (Manitoba); **Shiu**, R., B.Sc., M.Sc., Ph.D. (McGill); **Singal**, P., B.Sc., M.Sc. (India), Ph.D. (Alberta); **Stephens**, N., B.Sc., M.B., M.D. (Lucknow), F.R.C.P. (London), D.Sc. (Punjab).

Associate Professors

Dixon, I., B.Sc.(Hons.), M.Sc., Ph.D. (Manitoba); **Dodd**, J., B.Sc., M.Sc., Ph.D. (Toronto); **Duckworth**, M., B.Sc.(Hons.), M.Sc., Ph.D. (Manitoba); **Hicks**, G., B.Sc., M.Sc., Ph.D. (Manitoba); **Hryshko**, L, B.Sc., Ph.D. (Manitoba); **Kirshenbaum**, L., B.Sc., M.Sc., Ph.D. (Manitoba); **Lukas**, A., B.Sc., Ph.D. (Manitoba); **Mai**, S., Ph.D.; **Zahradka**, P., B.Sc.(Hons.), Ph.D. (Western Ontario).

Assistant Professors

Eisenstat, D., M.D. (Toronto); **Fedirchuk**, B., BSc(Hons), MSc, PhD (Manitoba); **Halayko**, A., B.Sc., Ph.D. (Manitoba); **Myal**, Y., B.Sc., M.Sc., Ph.D. (Manitoba); **Netticadan**, T.J., B.Sc., M.Sc., Ph.D. (India); **Watson**, P., B.A., M.A., M.B., F.R.C.P.C.

Adjunct Professors

Bashor, D.P., B.Sc., Ph.D. (Florida State); **Brownstone**, R., B.Sc., M.D., Ph.D. (Manitoba); **Coombs**, K, B.A. (U Coll. Genesio, NY), Ph.D. (Texas); **Deslauriers**, M., B.Sc. (Laval), Ph.D. (Ottawa); **Gilchrist**, J.S.C. B.Sc., M.Sc., Ph.D. (UBC); **Hochman**, S., B.Sc.(Hons.), M.Sc., Ph.D. (Manitoba); **Kriellaars**, D., M.Sc. (Dalhousie), Ph.D. (Manitoba); Malisza, K., B.Sc, Ph.D. (McMaster); **McIntyre**, M., B.A. (N.Y.), Ph.D. (Minnesota); **Plummer**, F., M.D.; **Rigatto**, H., M.D. (Brazil); **Schmidt**, B., B.Sc.(Med.), M.D. (Manitoba); **Stroman,** PW., B.Sc.(Hons.), (U. Victoria), Ph.D. (U Alberta); **Szturm**, AJ., B.Sc. (Biology), B.Sc. (Physical Therapy) (Western Ontario), Ph.D. (Manitoba); **Tian**, G., M.D., M.Sc. (China), Ph.D. (Ottawa).

Program Information

Programs of study leading to the Master of Science and Doctor of Philosophy degrees are offered in several major areas of physiology. A combined M.D./Ph.D. program is available for students who have been admitted to the Faculty of Medicine.

The programs are designed to provide qualified graduates in science and medicine with the background of experience suitable for a career in physiology teaching and research or a research career in clinical medicine.

Fields of Research

The Department of Physiology offers specialized programs of study and research in cardiovascular sciences, molecular endocrinology, gene technology, respiratory and smooth muscle physiology, the cell and molecular biology of cancer, and neurosciences. Updated information on research and training programs are available on the Internet.

Research Facilities

The research laboratories of physiology department members are found in multiple locations. The core laboratories of the department are situated in the Basic Medical Sciences Building of the University of Manitoba Bannatyne Campus (Medical School). Other locations include the Institute of Cell Biology, the National Research Council Institute of Biodiagnostics and the St. Boniface General Hospital Research Centre.

M.Sc. in Physiology

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

A minimum of fifteen (15) credit hours in 700 level courses in Physiology. In most cases, students will be required to complete 090.724 Medical Physiology (6 cr. Hrs.)

Second language reading requirement: none
Expected time to graduate: 2 - 5 years

Ph.D. in Physiology

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Twelve (12) credit hours beyond the requirments for the M.Sc. degree. Additional courses as deemed appropriate by the Students's Advisory Committee, with the approval of the Physiology Graduate program Committee. Advanced Topics in Physiology (090.718) (3) is a required course for Ph.D. students.

Second language requirement: none
Expected time to graduation: 3 - 7 years

Course Descriptions

165.709 Cell Biology (6) Comprehensive introduction to the structure and function of cells. *Prerequisite:* consent of instructor. (Tuesdays and Thursdays, 9:00 – 10:45, Physiology Library)

165.718 Molecular Approaches in Medical Research (3) For students who wish to understand advances made in medicine/biology through molecular and developmental approaches. Topics for discussion will be selected from the recent literature in consultation with participating students. The course will consist of lectures and discussions as well as written and oral presentation of papers by the students. *Prerequisite:* consent of instructor. Offered in 2000-2001 and alternate years.

090.701 Readings in Physiology (6) Tutorial course covering recent contributions in an area of physiology related to a student's research interests.

090.703 Special Physiology (6) Seminar and reading course on physiology of particular systems.

090.715 Cardiac Physiology (3) Tutorial and reading course on cardiac physiology; emphasis on the energetics of cardiac contraction and its relationship to ultrastructural and biochemical properties of the heart.

090.716 Vascular Physiology (3) Lectures and seminars on physiology of blood vessels including hemodynamics, rheology of blood, and the function and structure of smooth muscle.

090.717 Endocrine and Metabolic Physiology (3) Special topics in endocrine and metabolic physiology emphasizing current concepts.

090.718 Advanced Topics in Physiology (3) Advances in selected areas of physiology, research proposals related to the students' area of interest, procedures for grant writing and refereeing grant proposals, evaluation of citations and impact factors.

090.719 Research Topics in Physiology (3) Seminars on research presentations by staff and senior students in physiology.

090.723 Molecular and Cellular Aspects of Organ Physiology (3) Tutorial course: Function of various organs in the light of current concepts regarding structure and function at the molecular and cellular level.

090.724 Medical Physiology (6) Lecture, seminar, tutorial, and demonstration course dealing with fundamental biophysical processes, the function of major organ systems, physiological control mechanisms. Pathophysiological functions and their relation to disease will be discussed where appropriate.

090.726 Advanced Neurological Sciences (3) Seminar, readings and lecture course

covering original research papers leading to the most significant advances in the neurological sciences. Emphasis is placed on student comprehension of major research directions in the broad field of neurological sciences. *Prerequisite:* 090.728 or equivalent and consent of instructor.

090.727 Physiology of Striated Muscle (3) A lecture and seminar course dealing with the physiology and biophysics of skeletal and cardiac muscle.

090.729 Physiology of the Airways (3) A lecture and seminar course dealing with the physiology of the airways in the intact animal and with the role of smooth muscle in controlling airway function. The fundamental properties of airway smooth muscle in controlling airway function will be emphasized. *Prerequisite:* 090.724 or equivalent and consent of instructor.

090.730 Molecular Endocrinology (3) A lecture and seminar course on advances in molecular and cellular aspects of endocrine and other systems. The course is taught by members of the Gene Technology Group and topics will reflect current research interests. These include the roles of hormones/growth factors in cancer, growth and development, and reproduction, and the regulation of hormone gene families. This course is designed for individuals with knowledge in the areas of molecular and/or cellular biology. *Prerequisite:* consent of instructor.

090.731 Principles of Electronics for Life Sciences (3) Lectures on basic principles of electricity and electronics of particular application to electrophysiology.

090.732 Instrumentation for Electrophysiology (3) Lectures on the application of principles of electricity and electronics to electrophysiology. *Prerequisite:* 090.731.

090.733 Physiology of Smooth Muscle (3) A lecture and seminar course dealing with the biophysics, electrophysiology, pharmacology and biochemistry of the smooth muscle in the major organ systems.

090.734 Cardiovascular Electrophysiology (3) A comprehensive lecture and seminar course on the electrical properties of cardiac and vascular muscle cell membranes, currents and channels as studied by intracellular microelectrodes, voltage clamp and patch clamp techniques.

090.735 Cardiovascular Pathophysiology (3) A comprehensive lecture course on disease in the cardiovascular system. Topics to be covered include methods of analysis of cardiac viability, heart failure, arrhythmias, heart diseases (congenital, valvular, pericardial, cardiomyopathy), hypertension, stroke, atherosclerosis and myocardial infarction. *Prerequisite:* 090.724.

090.736 Trends in Cardiovascular Sciences (3) A comprehensive seminar-based course dealing with recent advances in cardiovascular research given by local fellows and prominent scientists. Students will be expected to participate in the series and present their own research data seminar. *Prerequisite:* 090.724.

090.737 Cardiovascular Molecular Biology (3) A lecture course dealing with the structure and regulation of genes responsible for normal cardiac muscle and vascular system functions as well as a survey of the genetic contribution to cardiovascular disease (atherosclerosis, hypertension, heart failure). *Prerequisite:* 090.724.

090.738 Cardiovascular Cell Biology (3) A comprehensive lecture course on morphology, biochemical composition and function of the cardiac and smooth muscle cell, with particular emphasis on developmental and injury-related issues. Topics include the description of various cardiac cells and their immediate extracellular environment, intercellular communication, cardiac development, control of cell cycle, hyperplasia and hypertrophy, cardiac growth factors, mechanism of injury and cell death, regeneration, heat shock proteins and cardioprotection.

090.739 Gene Therapy (3) Advanced course detailing new frontiers in the application of gene therapy and technological protocols currently utilized in treating cardiovascular diseases such as cardiomyopathy, hypertension, congenital birth defects and restenosis. *Prerequisites:* 090.737, 090.738 or 082.724 or permission of the course coordinator.

090.740 Cellular and Molecular Biology of the Vascular System (3) This course provides current concepts in vascular biology at the molecular level as well as the pathogenesis and treatment of vascular diseases for the purpose of graduate studies. Students may also learn up-to-date techniques in research of vascular cell biology and the diagnosis of vascular diseases through laboratory demonstrations.

SECTION 58: Plant Science

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Academic Staff

Professors Emeriti

Evans, L.E., B.S.A. (Saskatchewan), M.Sc., Ph.D. (Manitoba); **Larter**, E.N., B.Sc., M.Sc. (Alberta), Ph.D. (Washington).

Professors

Ballance, G.M., B.Sc.(Hons.), M.Sc. (Manitoba), Ph.D. (Heriot-Watt); **Brûlé-Babel**, A.L., B.S.A., Ph.D. (Saskatchewan); **Dronzek**, B.L., B.Sc., M.Sc., Ph.D. (Manitoba); **Entz**, M.H., B.S.A., M.Sc. (Manitoba), Ph.D. (Saskatchewan); **Hill**, R.D., B.Sc., M.Sc., Ph.D. (Manitoba); **McVetty**, P.B.E., B.Sc., M.Sc. (Queen's), Ph.D. (Manitoba); **Pritchard**, M.K., B.S.A., M.Sc. (Manitoba), Ph.D. (Purdue); **Remphrey**, W.R., B.Sc. (Hons)., Ph.D. (Saskatchewan); **Scarth**, R., B.A., M.Phil., Ph.D. (Cambridge); **Vessey**, J.K., B.Sc.(Hons.), M.Sc., (Dalhousie), Ph.D. (Queen's).

Associate Professors

Fernando, W.G.D., B.Sc. (Peradeniya), M.Sc. (Kelaniya), Ph.D. (Oregon State); **Fristensky**, B.W., B.A. (Cornell), Ph.D. (Washington State); **Lamari**, L., B.Sc. (Institut de Technologie Agricole), M.Sc., Ph.D. (Manitoba); **Van Acker**, R.C., B.Sc., M.Sc. (Guelph), Ph.D. (Reading).

Assistant Professors

Daayf, F., B.Sc. (Marrakech), M.Sc., Ph.D. (Montpellier), D.d'État (Marrakech); **Froese**, J.C., B.S.A. (Manitoba), M.Sc. (Iowa State), Ph.D. (Maryland).

Adjunct Professors

Brown, P.D., B.S.A., M.Sc. (Manitoba), Ph.D. (Wisconsin); **Campbell**, C.G., B.S.A., M.Sc. (Saskatchewan), Ph.D. (Guelph); **Chong**, J., B.Sc., M.Sc. (Carleton), Ph.D. (Manitoba); **Daun**, J.K., B.Sc., M.Sc., Ph.D. (Manitoba); **Derksen**, D.A., B.Sc., Ph.D. (Guelph); **Fetch**, T.G., Jr., B.S., M.S., Ph.D. (North Dakota State); **Humphreys**, D.G., B.Sc. (Queen's), M.Sc. (Guelph), Ph.D. (McGill); **Rashid**, K.Y., B.Sc. A., Agr. Eng., (American University of Beirut), Ph.D. (Manitoba); **Smith**, S.R., B.S. (Asbury College), M.S., Ph.D. (Georgia); **Somers**, D.J., B.Sc., M.Sc., Ph.D. (Toronto); **Tekauz**, A., B.Sc. (Hons.), M.Sc., Ph.D. (Toronto); **Xue**, A.G., B.Sc. (Heilongjiang), M.Sc. (Shenyang), Ph.D. (Guelph).

Program Information

The Department of Plant Science is one of seven departments in the Faculty of Agricultural and Food Sciences and draws together expertise in both the applied and basic sciences. Since its origin in 1937, the Department has maintained a leading role in agricultural research in Canada. Its achievements in rapeseed and canola breeding and in cereal breeding and cytogenetics are known world-wide. Faculty members have major research programs in agronomy and plant protection, horticulture, plant breeding and genetics, and plant physiology-biochemistry (elaborated below). The graduate program of coursework offers considerable choice to the student and is based mainly on the student's primary interests and previous scholarly training. In general, a series of graduate courses in the student's chosen field offered by the Department of Plant Science is required for the major credit. A wide range of courses in ancillary fields (e.g., botany, chemistry, statistics, soils, etc.) may be chosen to complete the graduate coursework.

Fields of Research

Programs of study and research are offered in the following areas, leading to the M.Sc. and Ph.D. degrees.

Agronomy and Plant Protection: Cropping systems research with emphasis on crop water use, integrated pest management, and agricultural and environmental sustainability; annual and perennial crop agronomy including rotational benefits of traditional, new and novel legumes; organic and pesticide free (PFP) crop production systems. Farming systems research integrating crop, soil, water, animal, pest and economic components; farm diversification; agricultural technology transfer between analogous agroclimatic zones; international agriculture with emphasis on the former Soviet Union. Weed science and agronomy; weed seedling ecology and recruitment biology; pesticide-free production (PFP); cultural and herbicidal weed control. Canola and wheat pathology: disease resistance; applied and molecular approaches to understanding ecology and epidemiology of plant pathogens; biological control and mode of action by antagonists on plant pathogens; microbial interactions in the phyllosphere and rhizosphere; IPM in sustainable agricultural systems. Genetics of host-parasite interactions in leaf spot diseases of wheat, with emphasis on tan spot and septoria leaf blotch; breeding for disease resistance; epidemiology and control of potato diseases; diseases of pulse crops; application of image analysis to disease quantification; development of research and educational software. Biochemical and molecular aspects of plant defense reactions to microbial infections; bio-control: use of natural products and beneficial microorganisms to induce plant resistance to pathogens; development of classical and DNA-based techniques for disease diagnosis in horticultural crops.

Horticulture: Morphology and development of woody horticultural plants and the role of cultural management factors; analysis and modelling of shoot ontogeny and crown architecture; management of saskatoons.

Plant Breeding and Genetics: Wheat breeding and genetics; modelling crop development and yield; genetics of resistance to leaf spotting diseases; development and evaluation of breeding methodologies; genetics of herbicide resistance; development of Fusarium Head Blight resistant germplasm. Hybrid and conventional cultivar canola/rapeseed breeding; herbicide resistant canola/rapeseed breeding; agronomy and genetic studies in canola/rapeseed. Breeding for special oil quality in canola/rapeseed; application of biotechnology in canola breeding. Gene expression in plants during resistant or susceptible interactions with fungal or bacterial pathogens; evolution and differential regulation of multigene families; genetic engineering of disease resistance; bioinformatics.

Plant Physiology-Biochemistry: Biochemical and molecular analyses of host-fungal pathogen interactions in wheat with emphasis on tan spot disease; fungal toxin structure and mode of action; phenylpropanoid and lignin pathway induction. Effects of mineral N on nodulation, plant development and N_2 fixation in grain legumes; effects of rhizosphere micro-organisms on nutrient uptake in grain legumes; the abundance, efficiency and diversity of rhizobium in Manitoba; investigation of N_2 - fixing bacteria associated with grass crops.

There is a wide range of employment opportunities for M.Sc. and Ph.D. graduates from the Department of Plant Science, including research and teaching positions at universities throughout the world, research and extension positions with the federal and provincial governments and positions in private industry.

Research Facilities

The Department of Plant Science has excellent research facilities including well-equipped laboratories, ample greenhouse space and controlled-environment chambers, and a horticultural-research storage building. A 60 hectare field research station is situated on campus within walking distance of the Plant Science Building. As well the Department has a 100 hectare field-research station located at Carman on prime agricultural soil.

M.Sc. in Plant Science

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Admission Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Research and thesis

A minimum of 15 credit hours of coursework (including 039.725 Plant Science Seminar) of which at least 6 credit hours will be courses at the 700 level. The 6 credit hours at the 700 level cannot include 039.725 Plant Science Seminar or 035.750 Methodology in Agricultural and Food Sciences.

Second language reading requirement: none
Expected time to graduation: two years

Ph.D. in Plant Science

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Admission Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Minimum Program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. In addition, students must take 039.742 Advanced Plant Science Seminar for which they must register each year of their Ph.D. program. The 12 credit hours at the 700 level cannot include 035.750 Methodology in Agricultural and Food Sciences, or the former 035.726 Methodology in Animal Science Research.

Second language reading requirement: none
Expected time to graduation: three years

Course Descriptions

039.709 Topics in Genetics (3) Advanced materials in the field of genetics. *Prerequisite:* written consent of department head.

039.710 Topics in Plant Breeding (3) Theory and practice for special plant breeding problems. *Prerequisite:* written consent of department head.

039.716 Advanced Genetics (3-0:0-0) 3 Procedures and designs in genetic experimentation, the fundamentals of gene action, mutation and mutagens, linkage and recombination, extranuclear inheritance. *Prerequisite:* 039.433 or consent of instructor.

039.717 Advanced Plant Breeding (3-L:0-0) 3 Advanced training in modern methods of plant breeding. *Prerequisite:* 039.352 or consent of instructor.

039.725 Plant Science Seminar (1-0:1-0) 3 Principles of oral and poster presentations, visual aid design and organization are discussed and then applied by students in presentations of their current research, and agricultural issues.

039.734 Advanced Weed Science (3-0:0-0) 3 Weed biology and ecology in the context of weed management, covering theory, current information, investigative approaches and experimental techniques. Topics explored include: weed population biology, modelling, weed community ecology, herbicide efficacy and herbicide resistant weeds. *Prerequisite:* 039.354 or equivalent or consent of instructor.

039.735 Special Problems in Plant Science 1 — Crops (3) Reading and assignment or research on special aspects of the culture of specific crops. *Prerequisite:* Written consent of department head.

039.736 Special Problems in Plant Science 2 — Plant Protection (3) Reading and assignment or research on specific aspects of weed science or plant pathology as they affect crop production. *Prerequisite:* written consent of department head.

039.737 Special Problems in Plant Science 3 — Biochemistry — Physiology (3) Reading and assignment or research on specific chemical problems associated with crop production or the quality of crop products. *Prerequisite:* written consent of department head.

039.738 Research Methodology (3-L:0-0) 3 Instruction, reading, and assignment on research planning and data collection, analysis, and presentation.

039.742 Advanced Plant Science Seminar (3) The development of a research proposal, instruction and practice in scientific writing and presentation of a seminar. For Ph.D. students only.

039.748 Epidemiology of Plant Disease (0-0:3-L) 3 Lectures, seminars and discussions relating epidemiological principles to plant disease development and control. The course examines in depth the interrelationships of host, pathogen and environment. Measurement of epidemiological parameters is stressed in relation to disease assessment, disease forecasting and disease management.

039.749 Storage of Horticultural Crops (3-0:0-0) 3 Types of storage available for fruits, vegetables and ornamentals will be discussed in relation to their effects on post-harvest physiology and stored crop quality.

039.752 Plant Growth Regulation (3-0:0-0) 3 Relationship of hormones and plant growth regulators to growth and development with special reference to their control of metabolism and patterns of growth. Mechanism of action of hormones and growth regulators. Phytochrome structure, synthesis and control of phytomorpho-genetic responses.

039.754 Breeding for Plant Disease Resistance (3) A study of the theoretical and practical factors involved in breeding for plant disease resistance. Emphasis will be on host-parasite interactions, the genetics of host resistance, and strategies for breeding disease resistant cultivars. A background in genetics, plant breeding and plant disease control is necessary. *Prerequisite:* consent of instructor.

039.755 Physiological and Molecular Plant Pathology (3) Physiological and molecular aspects of pathogenesis of plants by fungal and bacterial plant pathogens and incited host responses to infection are examined in lectures, seminars and discussion of the literature. A background in plant physiology, plant pathology, biochemistry and molecular biology is necessary. *Prerequisite:* consent of instructor.

039.761 Topics in Crop Physiology (3) An in-depth study of selected topics of current interest in the field of Crop Physiology. For Ph.D. students. *Prerequisite:* written consent of department head.

039.762 Topics in Agronomy (3) An in-depth study of selected topics of current interest in the field of Agronomy. For Ph.D. students. *Prerequisite:* written consent of department head.

039.763 Topics in Plant Pathology (3) An in-depth study of selected topics of current interest in the field of Plant Pathology. For Ph.D. students. *Prerequisite:* written consent of department head.

039.764 Physiology of Crop Plants (3-0:0-0) 3 Examination of current concepts of regulation and limitations of photosynthesis, nitrogen metabolism, and assimilate partitioning in field and horticultural crops. Content will include the mode of action of plant growth regulators and herbicides in these processes. *Prerequisites:* 039.350, 039.452 or consent of instructor.

039.765 Specialized Plant Pathology (3) A laboratory course permitting the student to work directly under one of the plant pathology specialists of the Agriculture and Agri-Food Canada Research Centre. It includes the study of assigned literature and

preparation of seminars in specialized fields. *Prerequisite:* written consent of department head.

039.766 Advanced Crop Production (0-0:3-0) 3 A lecture-seminar course to investigate environmental, crop management and genetic limitations to growth, yield formation, yield, water use efficiency and quality of field, forage and horticultural crops. Interactions will be stressed and emphasis will be placed on sustainable crop production systems. Simple and complex relationships will be demonstrated using models. *Prerequisite:* consent of instructor.

039.767 Quantitative Genetics and Plant Breeding (0-0:3-0) 3 The theoretical basis of quantitative genetic variation. The genetic structure of plant breeding populations. Estimation, interpretation and use of genetic parameters in cross-pollinated and self-pollinated plant species. Variance components, genotype x environment interaction, inbreeding, heterosis, selection, heritability and combining ability. *Prerequisite:* 039.352 and 039.433 or consent of instructor. Offered in 2003-2004 and alternate years thereafter.

039.768 Plant Molecular Genetics (0-0:3-0) 3 A synthesis of the knowledge gained from the application of molecular and classical genetics to the study of plant biology, and its impact on biotechnology. Areas of emphasis include development and physiology, plant pathology, transposition and structure and evolution of plant genomes. Offered in 2003-2004 and alternate years thereafter.

039.769 Bioinformatics (0-0:3-0) 3 An introduction to the theory, strategies, and practice of data management, analysis and utilization in molecular biology. Topics include DNA and protein sequence analysis, biological databases, genomic mapping and analysis of gene expression data. The course will include problem-solving exercises using Unix server-based software. *Prerequisite*: 039.314 or 039.450 or 060.341 or consent of instructor. Offered in 2004-2005 and alternate years thereafter.

SECTION 59: Political Studies

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Academic Staff

Duff Roblin Professorship of Government

Thomas, P.G., B.A.(Hons.), M.A. (Manitoba), Ph.D.(Toronto).

Senior Scholars

Daycock, D.W., B.A.(Hons.), M.A. (Manitoba), Ph.D. (London); **Peterson**, T.E., B.A., M.A. (Manitoba); **St. John**, O.P., B.A.(Hons.) (UBC), M.Sc., Ph.D. (London).

Professors

Buteux, P.E., B.Sc.(Econ.)(Hons.), Ph.D. (London); **Debicki**, M., LL.M.(Warsaw), Ph.D. (Carleton); **Thomas**, P.G., B.A.(Hons.), M.A. (Manitoba), Ph.D. (Toronto).

Associate Professors

Fergusson, J.G., B.A.(Hons), M.A. (Manitoba), Ph.D. (UBC); **Knysh**, G. D., B.A.(L.PH.), M.A. (Manitoba), Ph.D. (London); **Lambert**, G., B.A.(Hons.) (Manchester), M.A., Ph.D.(Minnesota); **MacLean**, G.A., B.A.(Hons.) (Dalhousie), M.A. (McMaster), Ph.D. (Queen's); **Neville**, W.F.W, B.A.(Hons.) (Manitoba), M.A. (Oxford); **Ogrodnick**, M., B.A., M.A. (Alberta), Ph.D. (York); **Santos**, C.R., B.A., B.A.U., M.P.A. (Philippines), LL.M. (Harvard), Ph.D. (Michigan); **Stewart**, D., B.A.(Hons.), M.A. (Acadia), Ph.D. (UBC).

Assistant Professors

O'Neill, B. L., B.A.(Hons.) (Brock), M.A.(Economics), M.A.(Public Policy) (McMaster), Ph.D. (UBC); **Yellon**, R. A., B.A.(Hons.) (McGill).

Adjunct Professor

Hebert, R., B.A., M.A., Ph.D. (Manitoba).

Program Information

The Department of Political Studies offers students Pre-Masters and Master of Arts degree programs, as well as a Masters in Public Administration program jointly offered with the University of Winnipeg (see Section 16 in this calendar). The research and teaching expertise of the faculty are wide but the majority of students enroled in the graduate program concentrate in either the Canadian Politics or International Relations fields. Faculty members are actively engaged in research, publish regularly, and several are recognized as experts in their field. This expertise is recognized in that faculty members are frequently sought out to comment on national and provincial political issues in the media, to participate in colloquia and international conferences, and to deliver lectures and workshops to various groups. The program itself provides a solid basis for those wishing to continue on with doctoral studies, for those interested in a career in the legal field or for those seeking solid training for careers in government and international organizations, among others.

With a dozen full-time faculty members and approximately thirty graduate students per year, the low student to faculty ratio provides an excellent opportunity for students to work closely with faculty in the department and for flexibility in the design of programs of study. A further attraction lies in the department's links with the Centre for Defence and Security Studies which offers a teaching curriculum and research program focused on the area of Security, Strategic and Defence Studies. Since 1985, the graduate students in the department have organized a conference on a wide variety of topics which relate to International Relations and National Security matters with invited speakers including distinguished academics and specialists from across Canada and from abroad. The Conference is unique in Canada since it is organized and managed by graduate students themselves. Finally, established in 1998, the Duff Roblin Professor of Government and the Duff Roblin Political Studies Fellowship uniquely advance the study of Canadian politics within the department and amongst its students.

Fields of Research

The department offers courses at the pre-Master's and Master's levels in five areas of concentration: Canadian politics, international relations, public administration, political theory and comparative politics.

Faculty research interests are wide and include: multilateralism and Canadian foreign policy goals; human security and its implications; strategic studies, missile defence and European security; Senate reform and the role of political and administrative skills in government leadership; the Charter of Rights and Freedom and anti-discrimination law; Canadian public opinion; Canadian political parties and political leadership; Canadian political cultures; the gender gap in voting and opinion; the political philosophy of William of Ockham; and autobiography and political philosophy, especially Jean Jacques Rousseau.

Research Facilities

As a provincial capital, Winnipeg offers important advantages for undertaking research in politics. Key research libraries are housed at the University of Manitoba and the Manitoba Legislative Library, both official repositories for Canadian publications. The University of Manitoba Archives and Special Collections, and Provincial Archives provide a wealth of material on Manitoba, Prairie and Canadian politics. Additionally, the university's data library and the Inter-University Consortium for Political and Social Research provide access to electronic data sources, including Statistics Canada and Census data, as well as public opinion and election surveys. On-campus computer facilities are also widely available. Finally, the Centre for Defence and Security Studies supports an extensive library of journals, periodicals, and texts in the fields of international relations, security studies, and foreign policy.

M.A. in Political Studies

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*, students who have a B.A.(Adv.) with a course selection pattern comparable in quality to that of a B.A.(Hons.) student, will have to meet the same performance requirement as an Honours graduate: at least a "B+" average in their last 36 credit hours in Political Studies courses, with a course in Political Theory, and at least a "B" average overall.

Applicants with a B.A. are normally expected to have completed a Major in Political Studies (i.e., a minimum of five courses, including one in political theory), with at least a "B" average overall and a "B+" average in their Political Studies courses. This qualifies a student for entry to a pre-Master's year. Contact the Department of Political Studies for further information about the pre-Master's year.

Application Deadline

Department deadline for applications for Regular Session (September) for International students is February 1 and for Canadian/U.S. students is June 1.

Program Requirements

In addition to the minimum course requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*, students must complete either: two 700-level courses (12 credit hours) in Political Studies and a thesis requiring some original research in primary sources; or four 700-level courses (24 credit hours), a research paper demonstrating familiarity with secondary sources, and a comprehensive written and oral examination. All students must maintain an overall average of "B+" with no grade below a "B."

Second Language Reading Requirement: Yes
Expected Time to Graduate: Two years

Ph.D.

The Department of Political Studies does not offer a Ph.D. Program.

Course Descriptions

019.601 The Manitoba Legislative Internship Seminar (6) This credit is granted to six individuals who annually complete the assignment as Legislative Interns within the Manitoba Legislative Assembly.

019.712 Politics of Modernization (3-0:3-0) 6 A comparative study of political patterns and problems in developing nations. Students may not hold credit for both 019.712 and the former 019.774.

019.723 Selected Topics in Political Analysis (6) A reading and research course in a selected special field.

019.727 Selected Issues in Public Administration (3) An analysis of current issues involving the practice of public administration in Canada. Topics will vary and the course will be taught by both academic staff and senior public servants.

019.728 Directed Readings in Politics (3) An independent reading and/or research course on a selected topic in political studies, undertaken and arranged in consultation with the prospective instructor, upon the approval of the Graduate Committee.

019.736 Urban Government and Politics (6) Comparative evaluation of Urban government institutions, processes, and public policies. Students may not hold credit for both 019.736 and the former 019.770.

019.737 Seminar in the Theory and Practice of Public Administration (6) The intent of this course is to provide insight into the exigencies of actual public administration. The course will be conducted on a topical basis within the framework of certain trends facing Canadian governments today. (The course will attempt to utilize, to the fullest extent possible, the particular expertise of students in the program, faculty members, and of both elected and appointed public officials.) Students may not hold credit for both 019.737 and the former 019.731.

019.741 Selected Topics in Political Behaviour 1 (3) A systematic examination of empirical research in the area of political socialization and political culture. Students may not hold credit for both 019.741 and the former 019.725.

019.742 Seminar in Communist Political Systems (3-0:3-0) 6 An analysis of selected problems in communist politics and political theory. Students may not hold credit for both 019.722 and the former 019.775.

019.751 Selected Topics in Political Behaviour 2 (3) An intensive examination of research and theory in one of three areas: elites and stratification; political leadership; judicial behaviour. Students may not hold credit for both 019.751 and the former 019.726.

019.771 The Political Classics (6) A thorough study of selected works, with special attention to methodology, historical context, theoretical position, and universal significance.

019.772 Comparative Government (6) Three hours a week, both terms. The primary focus of this course will be on the major Western "democracies" (e.g., United Kingdom, United States, and Western Europe). Phenomena to be examined include political participation and the problems of social change in industrial societies.

019.773 International Relations (6) A study of contemporary theoretical approaches and research in international relations.

019.776 Canadian Government (6) A study of selected problem areas; such as party and voting behaviour, executive-legislative procedures, or federal provincial relations.

019.777 Seminar in Public Administration (6) An inquiry into the relationship between politics and administration, including regulatory public administration, the process of bureaucratization, and the interplay of administrative authority, responsibility, and accountability.

019.781 Regression Models of Political Behaviour (3) Survey of multivariate research methods as applied to a specific area of study such as political participation, recruitment, or health care. Students may not hold credit for 019.781 and either the former 019.733 or the former 019.778.

019.783 Armed Force and International Security (6) An advanced course in Strategic Studies. The evolution of strategic thought in the modern period will be examined, and particular emphasis will be placed on the role of armed force in relation to the problem of international security. Normally, students will be expected to have taken 019.473, or its equivalent, as prerequisite.

019.791 Multivariate Research Methods (3) Introduction to the theory and application of multivariate regression models in political analysis. Students may not hold credit for 019.791 and either the former 019.732 or the former 019.788.

SECTION 60: Postgraduate Medical Education

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Postgraduate medical education (PGME) at the University of Manitoba is comprised of a variety of training programs. Programs are usually organized to be in one of three categories:

- Programs accredited by the Royal College of Physicians and Surgeons of Canada (RCPSC).
- Programs accredited by the College of Family Physicians of Canada (CFPC).
- Other training and fellowship programs approved by the Faculty of Medicine.

Programs in the first two categories are most likely to be recognized towards obtaining a license to practice medicine. The RCPSC and CFPC provide accreditation for the training program content and evaluative processes. After the successful completion of their training, candidates are eligible to challenge the appropriate national speciality exams for their particular programs. The complete listing of these programs follows in this section under the heading, Description of Programs. The specific and detailed national requirements for individual programs may be obtained from the Office of Postgraduate Medical Education.

The University of Manitoba is accredited every six years by the RCPSC and the CFPC to administer the training programs, and supports all training programs in a variety of ways.

Several hospitals and healthcare facilities in Winnipeg and rural areas outside of Winnipeg are used as training sites. The main teaching sites include: Health Sciences Centre, St. Boniface General Hospital, Seven Oaks General Hospital, Dauphin General Hospital, and Brandon General Hospital.

General Regulations

Once accepted into a training program the student (now usually referred to as a "resident") must pay a registration fee to the University of Manitoba. Each resident must register every subsequent year of his or her training program in person at the PGME office.

The resident must also register with the College of Physicians and Surgeons of Manitoba so that his or her name is entered onto the education register for licensure in the Province of Manitoba.

The resident must obtain malpractice insurance, usually from the Canadian Medical Protective Association or its equivalent.

Residents enrolled in postgraduate residency programs are expected to conform to such new requirements as may be adopted from year to year.

Residents must apply directly to either the Royal College of Physicians and Surgeons or the College of Family Physicians of Canada for evaluation of training and for permission to sit the college examinations. Being a resident in a program does not automatically enrol the resident for such examination or certification.

Eligibility

Graduates of Canadian medical schools are eligible for consideration of PGME training, and are required to challenge the Medical Council of Canada Qualifying Examination, Part I prior to commencing their residencies.

Generally, Canadian citizens or landed immigrants are eligible for provincial funding for residency training under the contract established with the Professional Association of Residents and Interns of Manitoba (PARIM).

International medical graduates (IMGs) are eligible to apply for admission after they have challenged the Medical Council of Canada Qualifying Examination, Part 1. IMGs must be Canadian or permanent residents to be eligible to apply for postgraduate medical training. IMGs may apply for possible residency positions through the second iteration of the CaRMS match (see below).

Visa-trainees represent a special training category for entrance to postgraduate medical training. The visa -trainee applicant must pass the Medical Council of Canada Evaluating Examination and be sponsored by an agency which has entered into a contract with the University of Manitoba for such training.

All residents must receive remuneration from an institution recognized by the Government of Manitoba while registered in a training program in PGME.

Criteria for Selection

Selection for admission to the various training programs will be made primarily on the basis of scholastic, personal and professional attributes as determined by academic records, personal interviews, letters of reference and in-training evaluation reports. The selection process is determined by each particular training program through a set selection process. The admission to the postgraduate training year one (PGY1) for most programs is through the CaRMS PGY1 match outlined below.

University Registration

All postgraduate trainees and fellows (not registered with the Faculty of Graduate Studies for M.Sc. or Ph.D. degrees) are required to register on arrival and annually as postgraduate trainees in the Faculty of Medicine. The normal registration period is June 15 to July 1 each year. Registration is carried out each year at the office of Postgraduate Medical Education, Faculty of Medicine, S204 Medical Services Building. The registration fee is approximately $730 or $1,340 for visa trainees (2002-03 year).

Program Administration

The departments which provide PGME training programs in the Faculty of Medicine are: Anesthesia, Community Health Sciences, Family Medicine, Biochemistry and Human Genetics, Intemal Medicine, Medical Microbiology, Obstetrics, Gynecology and Reproductive Sciences, Otolaryngology, Pathology, Pediatrics and Child Health, Psychiatry, Radiology and Surgery. Some departments offer more than one program, and may also offer training in sub-specialty areas.

Each program has a program director and a resident program committee to administer the training program. There are also program coordinators at each training site. The program director of each program reports both to the department head and the associate dean of PGME.

Beyond the program level, administrative matters pertaining to postgraduate residency training programs are the responsibility of the associate dean for PGME and the Faculty PGME Executive Committee and its subcommittees. These committees are responsible for reviewing programs, allocation of residency positions, hearing resident appeals, and other duties as outlined in the terms of reference for each committee. The committees make recommendations to both the dean of the faculty and the Faculty Executive Committee.

Description of Programs

Postgraduate medical education will generally follow one of two pathways leading to licensure eligibility as described below.

College of Family Physicians of Canada Accredited Programs

The training program for family physicians offers a two-year basic program in outpatient, in-hospital and community settings. This program is composed of two streams (one urban and the other rural) and the program leads to eligibility for certification with the College of Family Physicians of Canada (CFPC).

A small number of positions are also available from time to time for enhanced training within the Family Medicine Training Program for a third year of training in Emergency Medicine, Anesthesia and Palliative Care. Some of these enhanced positions may be associated with a return of service requirement. A six month training program in the Care of the Elderly is also available from time to time.

Royal College of Physicians and Surgeons of Canada Accredited Programs

The Faculty of Medicine offers a wide range of specialty and sub-specialty programs leading to eligibility for certification with the Royal College of Physicians and Surgeons of Canada. Programs vary in length from 2-7 years of medical training.

Primary Specialties:

Anatomical Pathology	Anesthesia
Cardiac Surgery	Community Medicine
Diagnostic Radiology	Emergency Medicine
General Pathology	General Surgery
Internal Medicine	Medical Genetics
Neurology (Adult)	Neurosurgery
Nuclear Medicine	Obstetrics and Gynecology
Orthopedic Surgery	Otolaryngology
Pediatrics	Physical Medicine and Rehabilitation
Plastic Surgery	Psychiatry
Radiation Oncology	Thoracic Surgery
Urology	Medical Microbiology

Subspecialty Programs* (available only with completion in a primary specialty):

Cardiology (Adult)	Clinical Immunology and Allergy (Child & Adult)
Critical Care Medicine	Endocrinology and Metabolism (Adult)
Gastroenterology	Geriatric Medicine
Gynecologic Oncology	Hematology (Child & Adult)
Infectious Diseases(Child & Adult)	Maternal and Fetal Medicine
Medical Oncology	Neonatal-Perinatal Medicine
Nephrology(Child & Adult)	Respiratory Medicine (Adult)
Rheumatology(Adult)	Vascular Surgery
Palliative Medicine	

NOTE: These programs require different primary speciality credits, and may not be offered every year at the University of Manitoba.

Application Procedures:

All applicants for the PGY1 year of programs accredited by the RCPSC and CFPC must apply through the Canadian Residency Matching Service (CaRMS). Only graduate of Canadian medical schools who have had no prior postgraduate medical training are eligible for the first iteration of the CaRMS match. In the second iteration, medical graduates, residents, and international medical students who have challenged the Medical Council of Canada Qualifying Examination Part I are eligible.

Applications for positions beyond the entry PGY1 year should be made at the PGME Office, S204, Medical Services Building or to Program Director for the specific program. Availability of positions will vary from year to year and are not guaranteed for any program. No resident can be accepted unless a funded position is available.

The Canadian Resident Matching Service (CaRMS)

This matching service is an autonomous, national organization of the Association of Canadian Medical Colleges. It is designed to match graduates of Canadian Medical Schools (in the first iteration) with postgraduate training positions in the anglophone Medical Schools of Canada. It provides an orderly method for students to select where to pursue postgraduate medical education and for program directors to rank the applicants they wish to enrol. A second matching process (the second iteration) by CaRMS to medical students not matched in the first iteration, IMG's and other medical graduates who have already received some prior postgraduate training. All information about registration and matching processes is available on the CaRMS website: www.CaRMS.ca or by phoning CaRMS at 1-800 291 3727. There are listings of all programs on the website. Further information may also be obtained from the undergraduate and PGME education offices in S204 Medical Services Building of the Faculty of Medicine, 750 Bannatyne Avenue Winnipeg, Manitoba, R3E OW2.

Evaluation of Residents in Postgraduate Medical Education Programs

Evaluation at all levels is based primarily on clinical performance in the patient care setting. The program director and the Resident Program Committee in each program are responsible for the implementation of the evaluation process in their own program. At the end of each clinical rotation or at other appropriate stages of the program, each trainee is evaluated by an in-training evaluation report appropriate to that program and training

level. The evaluator(s) discusses the evaluation with the trainee and the report is forwarded to the program director. The written evaluation report should be signed by the resident to indicate that he or she has seen the report. This ongoing evaluation process may be supplemented by written examinations, oral examinations, supervised history and physical examination and by direct observation of clinical and technical skills.

When a resident receives an unsatisfactory evaluation or examination result, the program director will review the evaluation with the resident. Unsatisfactory evaluations will also be discussed in a confidential manner at the Resident Program Committee meeting. The committee will make recommendations regarding remedial training. If a subsequent remedial period is also evaluated as being unsatisfactory, the program director will contact the associate dean for postgraduate Medical Education and the Probation Protocol and Procedure will be instituted. A failed probation period may result in a resident being discharged from his or her training program.

The Faculty Executive Council reserves the right to require any student to withdraw from the program of enrolment when it believes the student to be unsuited, on general considerations of scholarship, professional fitness or professional conduct for post-graduate medical education. However, the Faculty of Medicine does not have a professional unsuitability by-law. The right to require a student to withdraw on the basis of professional unsuitability may arise through the professional unsuitability by-law of the College of Physicians and Surgeons. This right prevails notwithstanding any other provision in the faculty regulations.

Appeals

A postgraduate trainee who wishes to appeal the results of any aspect of the evaluation procedure must follow the written guidelines established by the PGME Committee and the Faculty of Medicine. These guidelines may be obtained from the PGME Division.

SECTION 61: Psychology

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Academic Staff

Professor Emeritus

Adair, J.G., B.Sc., M.Sc. (Trinity,Texas), Ph.D. (Iowa);

Senior Scholars

Aftanas, M.S., B.A., M.A. (Manitoba), Ph.D. (Alberta); **Kaye**, S.M., B.Sc.(McGill), M.A., Ph.D. (Dalhousie); **McIntyre**, J.S., B.A. (Alberta), M.A. (Calgary), Ph.D. (Illinois).

Professors

Chipperfield, J., B.A.(Hons.), M.A., Ph.D.(Manitoba); **DeLuca**, R., B.A.(Hons.)(Winnipeg), M.A., Ph.D. (Manitoba); **Eaton**, W.O., B.A. (Stanford), M.A., Ph.D. (Illinois); **Keselman**, H.J., B.A. (Farleigh Dickinson), M.Sc., Ph.D. (Oklahoma); **Keselman**, J.C., B.A., M.A., Ph.D. (Manitoba); **LeBow**, M.D., B.A.(UCLA), M.A., Ph.D. (Utah); **Leventhal**, L.Y., B.A. (UCLA), M.A., Ph.D. (Southern Illinois); **Martin**, D.G., B.A. (Albion), M.A., Ph.D.(Chicago); **Martin**, G.L., B.A. (Colorado), M.A., Ph.D. (Arizona); **Nickels**, J.B., B.A. (Occidental College), M.A., Ph.D. (Missouri); **Pear**, J.J., B.S. (Maryland), M.A., Ph.D. (Ohio); **Perry**, R.P., B.A. (UBC), M.Sc., Ph.D.(Calgary); **Schludermann**, E.H., B.Sc., M.A. (Manitoba), Ph.D. (Chicago); **Schludermann**, S.M., B.A. (Agra), M.A. (Lucknow), Ph.D. (Chicago.); **Singer**, M., B.Sc.(McGill), M.S., Ph.D. (Carnegie); **Tait**, R.W., B.A., M.A. (Queen's), Ph.D. (Iowa); **Wilson**, L.M., A.B. (Mt. Holyoke College), M.A., Ph.D. (Kent State).

Associate Professors

Altemeyer, R.A., B.Sc. (Yale), M.S., Ph.D. (Carnegie); **Brodsky**, M.J., B.A. (New York), Ph.D. (Texas); **Forest**, J.J., B.A.(Hons.) (Alberta), M.Sc. (Washington), Ph.D. (Alberta); **Holborn**, S.W., B.A. (Victoria), M.A., Ph.D. (Iowa); **Huynh**, C-L., M.P.A. (Brigham Young), M.A. (Simon Fraser), M.A., M.S., Ph.D. (Iowa); **Jakobson**, L., B.A.(Hons.) (Manitoba), M.A., Ph.D. (Western Ontario); **Johnson**, E., B.A.(Hons.) (Queen's), Ph.D. (Waterloo.); **Mondor**, T., B.A.(Hons.) (Winnipeg), M.A., Ph.D. (Waterloo); **Niemi**, R.R., B.A.(Hons.), M.A., Ph.D. (Queen's); **Sande**, G.N., B.A.(Hons.) (Victoria), M.A., Ph.D. (Waterloo); **Schallow**, J. R., B.S.(Hons.) (Northwestern), Ph.D.(Texas); **Shapiro**, L. J., B.A. (Colgate), M.A., Ph.D. (Texas Christian); **Tefft**, B. M., B.A. (Cornell), Ph.D. (Roch.); **Thomas**, M., B.A. (Texas), M.A., Ph.D. (Tennesee); **Whiteley**, J.H., B.A.(Hons.) (Toronto), M.A. (Western Ontario), Ph.D. (Iowa); **Vorauer**, J., B.A. (UBC), M.A., Ph.D. (Waterloo); **Wilson**, J.R., B.A. (Northern Illinois), M.S. (Kansas State), Ph.D. (Kent State).

Assistant Professors

Freeman, W.S., B.A. (Regina), M.A., Ph.D. (British Columbia); **Hiebert-Murphy,** D., B.S.W., M.A., Ph.D. (Manitoba); **Ivanco**, T.L., BASc. (Lethbridge), Ph.D. (McMaster); M.A. (Saskatchewan), Ph.D. (Vanderbilt); **Leboe**, J., B.A.(Hons.), M.A. (Simon Fraser), Ph.D. (McMaster); **Morry**, M., B.A.(Hons.) (Alberta), M.A., Ph.D. (Iowa).

Adjunct Professors

Bailis, D., B.A. (UCLA), M.A., Ph.D. (Princeton); **Clark**, J., B.A., M.A., Ph.D. (Western Ontario); **Cox**, B., B.A.(Hons.), (Winnipeg), M.A., Ph.D. (York); **Fehr**, B., B.A.(Hons.) (Winnipeg), M.A., Ph.D. (UBC); **Kerr**, M.K., B.Sc., M.Sc., Ph.D. (Minnesota); **Norton**, G., B.Sc., M.Sc., Ph.D. (Utah); S**chonwetter**, D., B.A.(Hons.), M.A., Ph.D.(Manitoba); **Vincent**, N., B.Sc., B.A., M.A., Ph.D. (Manitoba); **Walker**, J., B.A.(Hons.), M.A., Ph.D. (Manitoba).

Program Information

Graduate study in the Department of Psychology is offered at both the M.A. and the Ph.D. levels. The primary purpose of the program is to provide training in several specialized areas of psychology for individuals desiring to advance their level of knowledge, their research skills, and their applied capabilities. The M.A. program is designed to provide a broad foundation in the scientific approach to psychology, as well as specialized skills. The Ph.D. program provides a higher degree of specialization coupled with more intensive training in research and application. With their advanced training graduates make careers in a variety of work settings such as self-employment, universities and colleges, government, private for-profit companies, schools, and private not-for-profit-organizations.

An on-line brochure entitled Graduate Study in Psychology, which details staff interests, the areas in which students may study, and the offerings and requirements in each area, is available at: *www.umanitoba.ca/arts/ psychology*

Fields of Research

Research interests of staff include animal behaviour, applied behaviour analysis, behavioural, clinical, cognition, community, developmental, environmental, learning, measurement, memory, neuroscience, personality, psychopathology, quantitative, sensory processes, and social psychology.

Research Facilities

The department has a variety of research facilities in virtually all areas of psychology. These facilities are housed in over 100 different research rooms that include: A microcomputer laboratory and local area network; a biofeedback laboratory; operating and histological rooms and equipment; animal laboratories for research with ducks, rats, pigeons, fish, rabbits, mice, and parakeets; one way vision rooms for small group research; closed circuit television systems; a laboratory for studying college teaching; a sleep and dreams laboratory; vision laboratories; the Avian Behaviour Laboratory, a field station/laboratory complex to study the behaviour of mallard ducks and Canada geese; the Psychological Services Centre, a training clinic for clinical psychology graduate students, social work students, and psychiatric residents; specialized electronics and woodworking work shops.

M.A. in Psychology

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadline

All applicants should send their applications with complete supporting documentation to the Department of Psychology no later than January 15.

The normal requirement for admission is an Honours B.A. or B.Sc. in Psychology or its equivalent. Students seeking admission with other degrees will usually be required to complete a pre-Master's year to the satisfaction of the department.

Program Requirements

The basic requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. Additional requirements are detailed in the brochure entitled Graduate Study in Psychology, which is available on-line at www.umanitoba.ca/arts/psychology

Second Language Reading Requirement: Not required
Expected Time to Graduate: Two years

Ph.D. in Psychology

Admission

Students may be admitted to the doctoral program if they have the equivalent of an M.A. degree in Psychology from the University of Manitoba.

Application Deadline

All applicants should send their application with complete supporting documentation to the Department of Psychology no later than January 15.

Program Requirements

The basic requirements are those of the Faculty of Graduate Studies. Additional requirements are detailed in the brochure entitled Graduate Study in Psychology. Students in the clinical training program have a more extensive program of study, including clinical practice at the Psychological Service Centre, and must complete an internship year at an accredited training site. A formal candidacy exam is set by the advisory committee. Following successful completion of the candidacy examinations, the student completes a Ph.D. thesis.

Second language requirement: Not required
Expected time to graduation: Non-Clinical Programs, three years; Clinical Program, four years.

Course Descriptions

Not all courses are offered annually. Students not enrolled in the Psychology graduate program must obtain written permission from the course instructor and the associate head for graduate studies before registering for a graduate course in Psychology.

017.602 Organizational Psychology (3) Group and individual factors as related to understanding complex organizations.

017.731 Current Topics 1 (3) An intensive study of the contemporary research and theory in a selected field of psychology.

017.732 History of Psychology (3) The history of psychology up to the mid-20th century.

017.733 Systems of Psychology (3) A discussion of the main conceptual systems of psychology.

017.734 Sensory Processes 1 (3) An intensive review of current research and theories in visual processes. Both behavioural and physiological aspects of vision will be considered.

017.735 Sensory Processes 2 (3) An intensive review of current theories and research in audition, smell, taste, and the cutaneous senses.

017.736 Perception (3) A survey of theories of perception.

017.737 Cognitive Processes (3) A study of thinking and related areas.

017.738 Advanced Research Design (3) The use of randomized subjects, block, factorial, latin square, and repeated measures designs in psychological research is discussed. Ancillary topics considered are unbalanced designs, multiple linear regression, magnitude estimation and simultaneous inference. Students will also use statistical packages to analyze data from psychological experiments. Prerequisite: 017.842 or permission of instructor.

017.739 Scaling (3) Methods and theory of scaling. Scaling models and issues in current psychophysical research. Prerequisite: 017.842 or permission of instructor.

017.740 Measurement and Scaling Theory (3) Discussion of measurement theory, data theory, and scaling models. Prerequisite: 017.739 and 017.842 or permission of instructor.

017.741 Advanced Psychometric Theory (3) Current theory and research in psychometrics. Prerequisite: 017.842 or permission of instructor.

017.742 Multivariate Methods in Psychology (3) Designing and analyzing behavioural science experiments containing multiple dependent (criterion) and independent (predictor) variables is discussed. The use of statistical packages is illustrated. Prerequisite: 842 or permission of instructor.

017.743 Advanced Physiological Psychology (3) The physiological correlates of sensation, perception, learning, motivation, and complex behaviour.

017.744 Social Influence on Behaviour (3) An examination of the influence of social variables on aggression, imitation, conformity, acculturation, and individual behaviour in general.

017.745 Psychology of Group Behaviour (3) An examination of the methodology, results, and interpretations of studies of the structural properties of groups, group formation, leadership, communication, problem-solving, and other group processes.

017.746 Attitude Development and Change (3) A critical review of research involving attitude measurement, with emphasis on the experimental analysis of variables influencing the formation and modification of attitudes.

017.747 Advanced Developmental Psychology (3) Theory and research in contemporary developmental psychology.

017.748 Advanced Learning (3) Current research and literature in selected areas of learning.

017.753 Research in Psychopathology (3) A survey of the literature and a critical examination of methodological problems arising from studies of psychiatric milieu, psychotherapy, and the epidemiology of mental illness.

017.754 Theories in Psychotherapy (3) An introduction to current approaches to psychotherapy and their underlying theories.

017.758 Advanced Motivation (3) Theory and methodology in contemporary studies of motivation.

017.759 Instrumentation in Psychology (3) Construction and use of psychological laboratory equipment.

017.761 Psychopharmacology (3) The concepts of neuropharmacology as they explicate drug effects on behaviour. Sedatives, stimulants, tranquillizers, anti-depressants, autonomic drugs will be considered. Prerequisite: one course in neuro-anatomy, physiology, or zoology. Some organic chemistry knowledge preferred.

017.763-764 Seminar in Social Psychology (3) An examination of current methods, research, and theory in selected topics in the area of experimental social psychology.

017.765 Theory and Research in Personality (3) A lecture and reading course designed to familiarize the student with the concepts and operations associated with various approaches to the study of individual differences and patterns of difference in behaviour; emphasis is placed on research and that function of theory which generates research.

017.767 Seminar in Personality 1 (3) An intensive examination of the current methods and research arising from the classical theories of personality.

017.768 Seminar in Personality 2 (3) An examination of individual difference variables suggested by the various personality theories. Particular emphasis will be given to current research and theory.

017.769 Seminar in Physiological Psychology (3) An examination of significant physiological processes underlying human and animal behaviour. The more recent experimental work on such areas as human brain function and central and autonomic nervous system activity will be considered in their theoretical contexts.

017.770-017.777 Problems in Psychological Research (3)

017.780 Seminar in Quantitative Methods in Psychology 1 (3) Special topics and recent advances in the design and analysis of behavioural science data will be discussed. Prerequisite: 842 or permission of instructor.

017.781 Seminar in Quantitative Methods in Psychology 2 (3) An extension of the material covered in 017.780 with particular emphasis on quantitative techniques typically employed in such areas as discrimination learning, personality, etc. Prerequisite: 017.842 or permission of instructor.

017.787 Psychopathology (3) Advanced study of abnormal behaviour and related research. Prerequisite: 017.346.

017.788-017.789 Seminar in Clinical Problems (3) Discussion and consideration of current problems associated with clinical service, teaching, research, and administration. Prerequisite: 017.754.

017.791-017.795 Clerkship-Practicum in Clinical Psychology (0) Supervised practice in a clinical service facility operated by the university. Testing, case observation, and role-playing at early levels of training and direct responsibility for working with assigned cases at later levels. Prerequisite: consent of instructor.

017.796-017.798 Internship in Clinical Psychology (0) Supervised practice in a clinical setting outside the university involving more responsible, more autonomous, and more professional work than is present in either clerkship or practicum. Prerequisite: four terms of 017.791-017.795.

017.799 The Psychology of Language (3) Examination of recent advances in the study of human language use. Topics such as memory for meaning, language development and language comprehension will emphasize the interactions between modern cognitive psychology and linguistics.

017.801 Intergroup Behaviour (3) An investigation of intergroup processes, with particular emphasis on intergroup conflicts and the role of leadership in affecting these processes. Large social movements will receive particular attention.

017.802 Theory and Methods in Social Psychology (3) The presentation of a number of broad theoretical overviews in social psychology and an introduction on the graduate level to the particular methodological problems encountered in social psychological research.

017.803 Organizational Psychology (3) Group and individual factors as related to understanding complex organizations.

017.804 Psychology of Aging (3) An intensive review of current research and theory.

Biological, psychological, and social aspects of aging are related to each other.

017.805 Human Brain Functions (3) The physiological basis of human cognitive processes is discussed from various perspectives. Different theories and different research strategies are discussed critically.

017.806 Advanced Adolescent Development (3) A critical evaluation of current theory and research in adolescent development. Topics covered include cognitive social development, self-concepts, sex roles, family relationships, etc.

017.807 Profession of Clinical Psychology (3) Study of professional issues in clinical practice. The historical development and current status of the profession; discussion of ethical considerations, licensure, professional standards, public and private practice, public education, and legal decisions affecting clinical psychology.

017.812 Current Topics 2 (3) An intensive survey of the contemporary research and theory in a selected field of psychology.

017.813 Principles of Ethology (3) A critical examination of the principles and the current research in ethology. The methods used by ethologists to study organisms will be reviewed. Discussion of the behaviour of organisms in zoological parks. An ethogram on an animal of the student's choice located at Assiniboine Park Zoo will be required.

017.814 Seminar in Ethology (3) An intensive examination of the research relating to various topics of ethology. Articles relating to the schools of thought, conflicting viewpoints, synthesis of thought, and present orientation of these topics will be discussed.

017.815 Personality and Intellectual Assessment 1 (3) Introduction to the theory and practice of psychological evaluation with emphasis on administration and interpretation of individual intelligence tests and some objective personality tests. Preference given to clinical students. If space permits, non-clinical psychology students may enroll. Prerequisite: consent of instructor.

017.816 Personality and Intellectual Assessment 2 (3) Examination of projective and other personality tests and their use for investigating diagnostic problems in adults and children, and an evaluation of theory, research, and practice in this area. Preference given to clinical students. If space permits, non-clinical psychology students may enroll. Prerequisite: 017.815 and/or consent of instructor.

017.817 Community Psychology (3) The role and strategies of the community psychologist; community psychology's historical and philosophical underpinnings as well as methods of community-based assessment. Topics to be covered include prevention of problems in living; community need analysis; epidemiology.

017.818 Community Psychology 2 (3) Study of methods of community-based intervention and evaluation. Included are topics such as methods of mental health consultation, social action, and methodological models of evaluation.

017.819 Social Psychology of Psychological Research (3) Recent studies of the problems raised by the social nature of psychological research. Readings and class discussion on such topics as experimenter bias, deception, subject awareness and attitudes towards research, subject sampling biases, and the relationship between research ethics and methodological problems. Alternatives to traditional methods will be evaluated.

017.820 Development and Its Deviations 1 (3) Developmental deviations will be related to such factors as genetic influences, physiological development, early experiences, language, intellectual and mental abilities, social and ethnic influences, parent-child interactions, and peer group interactions. Methods of special treatment will be considered.

017.821 Development and Its Deviations 2 (3) A continuation of 017.820. It will focus on developmental processes during later childhood and adolescence emphasizing concurrently the range and significance of deviations from normal behaviour and conditions contributing to these problems. Methods of special treatment will also be considered. Prerequisite: 017.820.

017.822 Topics in Abnormal Psychology (3) An in-depth study of various areas in the field of psychopathology.

017.823 Clinical Neuropsychology (3) The understanding and evaluation of cognitive, sensory, and motor functions as they relate to cerebral dysfunction.

017.824 Seminar in Behaviour Modification (3) This seminar deals with a variety of specific topics in behaviour modification.

017.825 Practical Applications of Behaviour Modification (3) This course deals with the design, implementation, and evaluation of program packages, based on behaviour modification, to different population and problem areas.

017.826 Individual Organism Research Methodology (3) An extensive coverage of the methods by which behaviour can be studied in individual organisms, including the rationale for the use of such methods as opposed to methods involving the averaging of group data.

017.827 Seminar in Basic Operant Research (3) This seminar deals with selected topics in basic operant research.

017.828 Supervised Field Study in Behaviour Modification 1 (3) Supervised training will take place in a service facility typically located off the University campus. Students will work closely with a supervisor in assessing a problem, designing and executing an intervention program and conducting a follow-up. Prerequisite: permission of the instructor.

017.829 Supervised Field Study in Behaviour Modification 2 (3) Supervised training will take place in a service facility typically located off the University campus. Students will work closely with a supervisor in assessing a problem, designing and executing an appropriate intervention program and conducting a follow up. Prerequisite: permission of the instructor.

017.830 Behavioural Assessment (3) This course teaches students how to conduct behavioural assessment as a necessary feature of the three interrelated processes of problem identification, program design and outcome evaluation in the application of behaviour modification techniques. Prerequisite: permission of the instructor.

017.831 Pavlovian Principles and Techniques (3) The empirical, methodological, and theoretical bases for the conditioning of emotional responses are explored. Selective topics covered provide the rationale for the use of Pavlovian procedures in behaviour modification. Prerequisites: consent of instructor.

017.832 Behaviour Modification in Institutional Settings (3) A treatment of the application of behaviour modification in such settings as mental hospitals, homes for geriatric patients, special education and normal classrooms, group homes for juvenile offenders, and prisons. Emphasis will be placed on the development of effective procedures for obtaining generalization to non-institutional environments. Prerequisite: consent of instructor.

017.833 Family Therapy Seminar (3) This course deals with both family theory and practice by reviewing the current literature on family systems and providing case discussions, peer supervision and small group simulated tasks. Co-requisite: current enrolment in 017.791-017.795 Clerkship Practicum in Clinical Psychology or 069.703 M.S.W. Practicum or permission of the instructor.

017.834 Cognitive Behaviour Modification (3) An overview of the empirical and theoretical status of cognitive events and their role in behaviour change will be undertaken. The techniques of cognitive behaviour modification as applied to various problem behaviours will be surveyed and evaluated. Prerequisite: written consent of the instructor.

017.835 Developmental Psychobiology (3) An examination of environmental and biological influences on development. Models and studies of animal and human behaviour are considered. Topics may include, for example, biological constraints on development, early experience effects, the ontogeny of learning and memory, and physiological substrates of ontogenetic changes.

017.836 Research Methods in Developmental Psychology (3) A survey of concepts, strategies, and methods in the study of behavioural development, with emphasis on the problems encountered in the measurement of age-related change in humans.

017.837 Logic of Research Design (3) A survey of non-statistical issues in research design, focusing on precise formulation of research questions and implication for research design. Design problems from various psychological areas are solved by students in the laboratory the purpose being to strengthen critical ability and to identify commonalities across areas in methodological approach. Broader philosophical issues relevant to research design, such as the meaning of causality, are also addressed. Prerequisite: 017.842 or permission of instructor.

017.838 History and Theory in Developmental Psychology (3) A history of fundamental concepts in developmental psychology with consideration of important philosophical, theoretical, and empirical influences on the contemporary field.

017.839 Development of Learning and Cognition (3) An overview of theory and research on the development of learning, problemsolving, and memory during infancy and childhood. Both normal and exceptional development of these processes will be considered.

017.840 Behaviour Therapy (3) The theory and practice of utilizing learning principles in behaviour change will be explained and exemplified. Goals of the class are for students to recognize that behaviour therapy is dynamic and to learn the mechanics of including behaviour therapy in work with patients. Students may not hold credit for 840 and the former 017.782, 017.783 and 017.784.

017.841 Verbal Psychotherapy (3) An examination of the psychotherapeutic methods utilized with individuals. Particular emphasis will be given to non-behaviour modification approaches. Students may not hold credit for 017.841 and the former 017.782, 017.783 and 017.784.

017.842 Quantitative Methods in Psychology (3) The use of analysis of variance, multiple comparison procedures, linear regression and contingency table analysis is discussed as it relates to data gathered in behavioural science research. The use of statistical packages is illustrated. Prerequisite: permission of instructor.

SECTION 62: Public Administration

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Academic Staff

Duff Roblin Professorship of Government

Thomas, P.G., B.A.(Hons.), M.A.(Manitoba), Ph.D.(Toronto).

Senior Scholar

Peterson, T.E., B.A., M.A.(Manitoba)

Professors

Debicki, M., LL.M. (Warsaw), Ph.D. (Carleton); **Leo**, C., M.A., Ph.D. (Toronto); **Mills,** A.G., B.A. (Hons.) (Dublin), M.A. (Toronto), Ph.D. (Western Ontario); **Silver,** J.B., B. Comm. (Manitoba), B.A. (Hons.) (Winnipeg), M.A. (Carleton), D.Phil. (Sussex); **Wright**, C., B.A., M.A., Ph.D. (Claremont).

Associate Professors

Fergusson, J.G., B.A.(Hons.), M.A.(Manitoba), Ph.D.(UBC); **Gibbons**, K., A.B. (Marshall), M.A. (Western Ontario), Ph.D. (Carleton); **Lambert**, G., B.A.(Hons.) (Manchester), M.A., Ph.D.(Minnesota); **Neville**, W.F.W., B.A.(Hons.) (Manitoba), M.A. (Oxford); **Santos**, C.R., B.A., B.A.U., M.P.A. (Philippines), LL.M. (Harvard), Ph.D. (Michigan); **Sheldrick**, B., B.A. (Hons.), LL.B. (Toronto), M.A., Ph.D. (York); **Stewart**, D., B.A.(Hons.), M.A. (Acadia), Ph.d. (UBC).

Assistant Professors

Boucher, J., B.A.(Hons.), M.A., Ph.D. (York); **Grace**, J., B.A.(Victoria), M.P.A.(Manitoba/Winnipeg), Ph.D. (McMaster); **O'Neill**, B.L., B.A.(Hons.) (Brock), M.A. (Economics), M.A. (Public Policy) (McMaster), Ph.D. (UBC).

Program Information

This master's program is offered jointly by the Department of Politics at the University of Winnipeg and the Department of Political Studies of the University of Manitoba. Unless otherwise specified by particular agreements attached to its own creation, it is governed by the general procedures and regulations devised by the two universities for joint masters' programs.

The objective of the program is to provide students, both full and part-time, with a sound knowledge of public administration. The approach is interdisciplinary; although courses in Politics/Political Studies are emphasized. The core exposes all students to a common set of courses designed to encourage both innovative and integrative perspectives. The public administration emphasis allows those interested students to obtain knowledge of both the theory and the practice of government organizations, including knowledge of the political, economic, social and other contexts in which they operate.

Master of Public Administration

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, applicants for admission to the program must be one of the following:

- Persons holding a recognized three-or four-year General or Advanced Bachelor's degree (B.A., B.Sc., B.E.S., etc.)

or

- Persons holding a recognized four-year honours Bachelor's degree (or equivalent)

or

- Persons who do not hold an undergraduate degree, but have attained positions of marked responsibility in either public or private sector management, and who have a demonstrated record of outstanding performance in their career. Admissions in this category will normally be restricted to one or two students per academic year.

It is preferred, but not required, that applicants have some formal course background in public administration,political science or economics. Students from other disciplines are also encouraged to apply.

Application Deadline

Department deadline for applications for Regular Session is January 15

Contact the department for additional application procedures.

Program Requirements

Two-Year MPA Program

Students who are admitted as graduates of a general bachelor's degree program or who are admitted as exceptional candidates not holding an undergraduate degree are required to satisfactorily complete an academic program consisting of a minimum of 48 credit hours. Within the 48 credit hours, 30 hours of credit must be taken from among the Core Courses and a further 18 hours of credit from among the approved options. All students must complete at least 18 hours of credit at the 700/7000 level, including the 700/7000 level core courses. A student may elect, with permission, to write a Master's thesis in lieu of 12 hours or 700/7000 level credit.

One-Year MPA Program

Students who are admitted as graduates of an Honours bachelor's degree (or equivalent) are required to satisfactorily complete an academic program consisting of a minimum of 24 credit hours. Students who, prior to admission, have not completed 24 credit hours in courses equivalent to those designated as 400/4000 level Core Courses, or have not completed appropriate option course equivalents, will normally be required to complete the appropriate course(s) in addition to the 24 credit hour program minimum. All students must complete at least 18 hours of credit at the 700/7000 level, including the 700/7000 level core courses. A student may elect, with permission, to write a Master's thesis in lieu of 12 hours of 700/7000 level credit. A student may elect, with permission to write a Master's thesis in lieu of 12 credit hours of 700/7000 level course-work.

Co-op Education Option in Public Administration

The Co-operative Education Option in the Master of Public Administration program combines full-time academic study with the benefits of practical work experience, largely in the public sector. A full-time student who has completed one academic year in good academic standing will be eligible to engage in full-time employment. The program requires the successful completion of two work-terms of 13 weeks each. The work terms provide students with practical experience, enriched knowledge in an area of policy specialization, industry-standard remuneration, and guidance in career choices.

Students engaged in full-time study in the M.P.A. program are eligible to apply for the full-time co-operative education option on satisfactory completion of their first year of full-time M.P.A. studies (24 credit hours). The co-op option consists of two 13-week work terms which can be taken consecutively or separately. Each work term carries three hours of course credit and each must be satisfactorily completed as part of the co-op option. Co-op credits do not replace academic credits, thus students in the two-year M.P.A. program with a co-op option must therefore complete a minimum of 54 credit hours as part of their degree requirements. Students in the one-year M.P.A. program with a co-op option must complete a minimum of 30 credit hours as part of their degree requirements. Students intending to apply for the M.P.A. co-op option should read the detailed option description below.

Application and Eligibility

Application for the Co-operative Education Option in the Master of Public Administration (M.P.A.) program is part of the normal application process for the M.P.A. program as a whole. The Co-operative Education Option is restricted to those who apply for full-time study in the M.P.A. Students who are accepted into the M.P.A. with a co-operative option must, in their first academic year, successfully complete required non-credit courses in addition to their full-time academic course load.

Work Terms and Continuance

On entry to the M.P.A. program, applicants accepted for the co-op option must arrange their program with the director of co-operative education in the MPA program and take part in a competitive job-matching process conducted in an Employers' Forum. Students who are eligible for co-op, but who are not matched with a co-op work term, will be able to continue in the regular M.P.A. program. Co-op students who have successfully completed one full academic year of coursework, and the required non-credit courses, and who have satisfied the M.P.A. requirements for continuation in the program, will be eligible to engage in their first work term placement. They must also complete relevant workshops, etc. to maintain co-op eligibility.

Each work term is 13 weeks duration and each work term carries three hours of course credit for which registration is required. Co-op students are considered to have full-time student status while engaged in a work term placement. Co-op students must successfully complete two work terms in addition to their academic program. Work terms are evaluated in terms for job performance and assigned written work (project or practicum). The final grade for each work term will employ the GPA scale which is used by

the M.P.A. program. The course and grade requirements ("B" average overall and no course less than "C+") for the co-operative education option are those which govern the M.P.A. program as a whole. If a co-op student fails to maintain these requirements, s/he will be permitted one make-up work term attempt. If a student fails to meet the requirements on the make-up attempt, s/he will be required to withdraw from the M.P.A. program. Graduates of the M.P.A. program with the co-operative education option will have their co-operative education experience acknowledged on their M.P.A. (C.E.) parchment.

Co-op Education Work Term Courses

Students in the co-operative education option must complete six credit hours:

019.650 Co-operative Education Work Term 1
019.651 Co-operative Education Work Term 2

Course Descriptions

Core Courses (30 credit hours)
Students must take any two of:
019.390 Research Design and Measurement (3)
019.487 Government and Public Sector Unionism (3)
027.603 Organizational Theory and Behaviour (3)
Students must take:
41.4301 Administrative Theory (6)
In addition, students must take six credit hours from:
14.3303 Economics of Public Expenditures (3)
14.3304 Economic Taxation (3)
018.337 Public Finance (6)
019.466 The State in the Economy (6)
41.4415 The State and the Economy (6)
Plus six credit hours from:
019.486 Canadian Policy Process (6)
41.7320 Seminar in the Public Policy Process (3)
41.7325 Seminar in Public Policy Issues (3)
and six credit hours from:
019.737 Seminar in Theory and Practice of Public Administration (6)
019.777 Seminar in Public Administration (6)
41.7300 Seminar in Theory and Practice of Public Administration 1 (3)
41.7305 Seminar in Theory and Practice of Public Administration 2 (3)

Further Optional Coursework

With the approval of the chair of the JDC, and other approval as may be required, courses may be chosen from the following list or from, for example, designated offerings in Economics, Geography, Management, Psychology, Sociology, etc.

019.457 Public Organizational Management (6)
019.476 Manitoba Politics and Voting Behaviour (6)
019.601 Manitoba Legislative Internship Seminar (6)
019.723 Selected Topics in Political Analysis (6)
019.776 Canadian Government (6)
019.781 Regression Models of Political Behaviour (6)
019.791 Multivariate Research Methods (6)
41.4220 Canadian Political Thought (6)
41.4305 Administrative Law (3)
41.4310 Equity in Human Resources (6)
41.4400 Seminar in Canadian Politics (6)
41.4405 Seminar in Manitoba Politics (6)
41.4410 Seminar in Women in Politics (3)
41.7331 Directed Readings in Public Administration (6)
41.7335 Directed Readings in Public Administration (3)
41.7310 Special Topics Seminar in Public Administration (6)
41.7315 Special Topics Seminar in Public Administration (3)
*a student may elect, with permission to write a Master's thesis in lieu of 12 credit hours of 700/7000 level coursework.

Ph.D. in Public Administration

Public Administration does not offer a Ph.D. Program

SECTION 63: Religion

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Academic Staff

Distinguished Professor Emeritus

Klostermaier, K.K., Dr. Phil. (Gregorian, Rome), Ph.D. (Bombay).

Professor Emeritus

Harland, H.G., B.A. (Manitoba), B.D. (United College), Ph.D. (Drew), D.D.(hon.c.) (Winnipeg), D.D.(hon.c.) (Queen's).

Professors

Grislis, E., B.A.(Gettysburg), B.D. (Lutheran Theological Seminary, Gettysburg), Ph.D. (Yale), Dr.(h.c.) (Latvia), D.D. (h.c.) (St. John's College); **McCance**, D., B.Sc., M.A., Ph.D. (Manitoba).

Associate Professors

Kirk, A., B.A., M.A. (Calgary), Ph.D. (Toronto); **Stern**, M.S., B.A. (Brooklyn College), M.H.L. (Yeshivah), Ph.D. (UCLA); **Wolfart,** J.C., B.A.(Hons.), Ph.D. (Cambridge).

Assistant Professors

Blackstone, K., B.A. (Lethbridge), M.A., Ph.D. (McMaster); **Whicher**, I., B.A. (Queen's), M.A. (Concordia), Ph.D. (Cambridge).

Adjunct Professors

Burke, D., B.A. (Wilfrid Laurier), M.A., Ph.D. (Toronto School of Theology)

Program Information

Introduction

The Department of Religion, founded in 1968, introduced its M.A. program in 1976 and its Ph.D. program in 1993. The M.A. is offered as a Joint Program in co-operation with the Department of Religious Studies at the University of Winnipeg. The Ph.D. is offered solely by the Department of Religion, University of Manitoba.

These highly successful programs have graduated students in Biblical studies, history of Christianity, world religions, Asian religions, women and religion, hermeneutics and other religion and culture fields.

Fields of Research

Research interests of the department include: World religions; Bible, Christian Origins, religions and cultures of Western antiquity; medieval, early modern and modern Christianity; Christianity and culture; Buddhism; Hinduism; south Asian religion and culture; Judaism and Islam; religion in Canada; ethics; body history; critical theory.

Research Facilities

Department programs are supported by substantial library holdings. Required research languages are offered either through the Department or through affiliated units. Research space and computer resources are available on a limited basis.

M.A. in Religion

Admission

The Department of Religion at the University of Manitoba and the Department of Religious Studies at the University of Winnipeg offer a joint Master of Arts program. Eligible for admission are graduates of the University of Manitoba holding a B. A. (Honours) degree in Religion; graduates of the University of Winnipeg holding a B.A. (four-year) in Religious Studies; students who hold degrees equivalent to the B.A. (Honours) in Religion from other recognized universities or colleges; students who have completed a

recognized pre-Master's program in Religion. Students who have courses with equivalent content or cognate courses in recognized departments or faculties other than Religion or Religious Studies may be given credit for up to 12 credit hours towards admission. To be eligible for admission, applicants must have achieved a cumulative grade point average of at least 3.0 (on a 4.0 point scale) in their last 60 credit hours of study and they must have completed a total of 60 credit hours in Religion. Breadth in preparation is expected as indicated by the description of the B.A. (Honours) in Religion in the University of Manitoba *Undergraduate Calendar*, or the four-year B.A. in Religious Studies in the University of Winnipeg *Calendar*. Applications will be considered from B.A. (Honours) graduates in other disciplines with a strong background in Religion. Such students may be admitted at the pre-Master's level and required to complete a program of study as specified by the department. Contact the Department of Religion for further information.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the department at least 7 months prior to their intended start date.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students completing the Joint M.A. Program in Religion may elect to receive their degrees from either of the participating universities. Two types of program are available:

Thesis Option: a minimum or 12 credit hours of coursework including:

a) Major courses: a minimum of six credit hours at the 700(UM)/7000(UW) level;

b) Ancillary courses: a minimum of six credit hours at the 700(UM)/ 7000(UW), 400(UM)/5000(UW), or in special cases, at the 300(UM)/ 3000(UW) level; and

c) A thesis.

Course and Comprehensive Option: a minimum of 24 credit hours beyond the level required for admission to the M.A., with at least 6 credit hours to be ordinarily taken from each of the two departments involved in the JMP in Religion, at least 18 credit hours to be taken at the 700(UM)/ 7000(UW) level, and at least 18 credit hours to be in Religion. Students may take 6 credit hours at the 400(UM)/5000(UW) level or in exceptional circumstances at the 300(UM)/3000(UW) level, and this is usually chosen from an extra-departmental field or ancillary. Students can, however, elect to take all 24 credit hours from within the two departments of the JMP in Religion. Students must demonstrate competence in Western religions, world religions and religion and culture, with one of these areas to be designated the major area from which graduate courses amounting to 12 credit hours are normally chosen. The other two are designated as minor areas, and usually a student will take graduate courses amounting to 6 credit hours in each of these areas. An Ancillary may be substituted for one of the minor areas of study.

Students must have 6 credit hours in Methodology from a recognized university or college. A student who does not have this training in methodology will be required to take either 020.477 Method and Theory in the Study and Interpretation of Religion UM, or 47.5000-1 Method and Theory in the Study of Religion UW or 020.451 and 020.452 Hermeneutics Western Traditions and Hermeneutics Eastern Traditions UM, in addition to normal credit hours required for their program.

Second Language Reading Requirement: Yes
Expected Time to Graduate: two years

Ph.D. in Religion

The Department of Religion of the University of Manitoba offers a Ph.D. program in the following areas: Religions of south and east Asia with a special emphases in Hinduism and Buddhism; Bible, Christian Origins; religions and cultures of Western antiquity; Reformation and aspects of early modern/modern Christianity; Christianity, culture and society; Christian texts; methodology, hermeneutics and critical theory.

Admission

Admission requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Normally a thesis based M.A. in Religion (with a minimum cumulative GPA of 3.5) or its equivalent will be required for entry into the Ph.D. program. Applicants are also to submit a statement of intent, a representative sample of written academic work, and three references.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the department at least 7 months prior to their intended start date.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students accepted into the program will be required to complete a minimum of 18 credit hours of coursework at the 700 level. Students must be able to demonstrate not only proficiency in written and spoken English but also a reading knowledge of two other modern languages, determined by the advisory committee according to the program of studies.

Before submitting their thesis proposal students will be required to demonstrate competence in the primary research language(s) specified by their thesis advisor.

Second language requirement: yes
Expected time to graduation: approximately 4 years

Course Descriptions

NOTE: University of Manitoba Religion courses bear a "020" prefix; University of Winnipeg courses carry a "47" prefix.

020.700/47.7301-1 Seminar in the History of Religions (6)
020.701/47.7501-1 Seminar in Religion and Culture (6)
020.702/47.7901-5 Special Topics 1(3)
020.703/47.7902-5 Special Topics 2 (3)
020.704/47.7101-1 Seminar in Biblical Religions (6)
020.705/47.7201-1 Seminar in the History of Christian Thought (6) A study of a selected period, major figures, texts, or issues in the history of Christianity.
020.706/47.7701-1 Seminar in Comparative Religion (6) A comparative examination of themes, texts, personalities or movements in the history of religions.
020.707/47.7801-1 Seminar in Religion in the Modern World (6) A seminar dealing with specific aspects of the interaction between religions and modern culture with an emphasis on spiritual and ethical issues.

For doctoral students only:

020.708 Seminar in Research Methods and Theory (3)
020.709 Seminar in Hinduism (6)
020.710 Seminar in Reformation History (6)
020.711 Seminar in Christian Origins (6)
020.712 Seminar in the History of Christianity (6)

SECTION 64: Social Work

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Academic Staff

Professor Emeritus

Jehu, D., B.A. (Reading), Dip.Soc..Sc., Dip.App.Soc.Studies (Liverpool), F.B.Ps.S. (London).

Senior Scholars

Grosser, S.J., B.A., M.S.W. (Manitoba); **Hudson**, P., B.A. (London), M.S.W. (Toronto); **Hutton,** M., B.Sc., B.S.W., M.S.W., Ed.D. (Toronto); **Penner,** A.G., B.A., B.S.W. (Manitoba); **Ryant,** J.C., B.Comm., M.A., M.S.W., Ph.D. (McGill).

Professors

Fuchs, D.M., B.A. (Regina), M.S.W. (Calgary), Ph.D. (Toronto); **McKenzie,** B., B.A. (Saskatchewan), M.S.W. (Manitoba), Ph.D. (Arizona State); **Roy,** R.,F.R.C.S., B.A. (Delhi), A.A.P.S.W. (London), Adv.Dip. S.W. (Toronto); **Trute,** B., B.A. (Saskatchewan), M.S.W. (McGill), Ph.D. (Berkeley).

Associate Professors

Bracken, D.C., B.A. (Holy Cross College), M.A. (Toronto), Ph.D. (London); **Clare,** K.A., B.S.W. (Manitoba), M.S.W. (Carleton); **Ferguson,** E.B., B.A., M.S.W. (Manitoba), Ph.D. (Toronto); **Frankel,** H., B.S.W. (Manitoba), M.S.W. (McGill), Ph.D. (Berkeley); **Frankel,** S.I., B.S.W., M.S.W. (Manitoba), Ph.D. (Berkeley); **Heinonen,** T., B.A. (Alberta), B.S.W. (Calgary), M.S.W. (McGill), D.Phil. (Sussex); **Kaminski,** L.E., B.A., M.S.W. (Manitoba); **Newman,** P.R., B.A., M.S.W. (Manitoba); **Reid,** J.G.W., B.A. (Saskatchewan), M.S.W. (Toronto), Ph.D. (Manitoba); **Spearman,** L.B., B.A., M.S.W. (Nebraska), D.S.W. (Washington).

Assistant Professors

Bacon, B.L., B.S.W. (Regina), M.S.W. (Toronto), Ph.D. (Texas); **Bonnycastle,** C.R. Dip. Ren Res. (Saskatchewan), B.H.J., M.S.W. (Regina); **Blum,** E.R., B.A. (McGill), M.S.W. (Toronto); **Cheung,** M., B.Soc.Sc., M.Soc.Sc. (Hong Kong) Ph.D. (Wilfrid Laurier); **Deane,** L.J., B.S.W., M.S.W. (Manitoba); **Fidler,** G., B.A. (Manitoba). M.S.W. (Victoria); **Hiebert-Murphy,** D., B.S.W., M.A., Ph.D. (Manitoba); ; **Milliken,** E.J., B.S.W. (Manitoba), M.S.W. (Calgary); **Pompana,** Y., B.A.Adv., M.S.W. (Manitoba); **Selinger,** G.F., B.S.W. (Manitoba), M.P.A. (Queen's), Ph.D. (London); **Rodgers,** J., B.A., B.S.W., M.S.W. (Manitoba); **Taylor-Henley,** S., B.A. (St.Thomas), M.S.W. (Dalhousie); **Wright,** A. B.A. (College Universitaire de St. Boniface), BSW, MSW (Manitoba).

Adjunct Professors

Adkins, M.E., B.A., M.A., Ph.D. (Manitoba); **Bond,** J., B.S. (Illinois), M.S., Ph.D. (Indianna); **Chambon,** A.S., B.A., M.A. (Paris), B.S.W. (Halifax), Ph.D. (Chicago); **Dustan,** L., B.A. (Calagar), M.S.W. (Manitoba): **Jones,** K., B.S.W. (Ryerson), M.A. (Toronto), Ph.D. (Manitoba); **Peters,** C., B.S.W., M.S.W. (Manitoba); **Quesnel,** B., B.S.W., M.S.W. (Manitoba); **Richert,** M., B.S.W., M.S.W. (Manitoba); **Robb,** P., B.S.W. (Ryerson), M.S.W. (Manitoba), .C.F.P., F.R.C.P.C.; **Tefft,** B., B.A., M.S.W. (Manitoba); **Thomas,** K, B.S.W., M.S.W. (Manitoba).

Program Information

The Faculty has operated since 1943 and there are two different concentrations available through which students may receive M.S.W. degrees. They are addressed to the differing interests that are common within social work practice and reflect the poles of the continuum of practice. The M.S.W. degree is fully accredited and recognized internationally as both a professional and academic qualification.

Social Services Administration Stream

The program's aim is to produce progressive administrators, program evaluators, and policy analysts within the public, voluntary and private sectors. A political economic approach is used for a critical examination of power, oppression and resistance. A range of organizational theories, strategies and means of evaluation of social service administration is examined. Students acquire strong analytical and practice skills. Through critical review of theories, techniques and case study applications, students learn to develop and apply models of planning and evaluating social policies and programs.

Social Clinical Stream

This stream is based on an eco-systemic perspective. Drawn from social ecology and general systems theory, this view provides a broad context for clinical social work practice by emphasizing the interrelatedness of individuals, families and groups to illuminate their connections to social institutions, cultural forces and physical space. In applying the eco-systemic perspective to social work practice the family unit is given a central focus.

Program Description

Graduates of this program currently occupy a wide range of positions within the human services in Canada and throughout the world. While the majority of graduates work within the service sector others have become active as politicians, scholars, senior civil servants, private consultants and are also active in a wide range of fields such as international development work and the creation of information systems.

While the program covers the core material which is essential to social work practice there has been particular attention given to issues relevant to women and the Aboriginal communities. Many graduates are Aboriginal persons and are actively involved in the creation and operation of the Aboriginal human services organizations.

Considerable attention is given to issues of educational equity. In addition to treating these matters as course content, every effort is made to ensure that people from disadvantaged groups have access to the M.S.W. program. The purpose of this initiative is to achieve equality in professional education so that no person shall be denied educational opportunities or benefits for reasons unrelated to ability. In the fulfilment of this goal the aim is to correct the conditions of disadvantage in professional education experienced by Aboriginal peoples, persons with disabilities, immigrants and refugees to Canada, and persons other than Aboriginal peoples who are members of a visible minority in Canada. Educational equity means more than treating persons in the same way, it also requires special measures and the accommodation of difference.

Fields of Research

The faculty are involved with research in virtually all areas of the human services covering clinical, administrative and planning issues. Particular emphasis has been devoted to child and family services and related matters. A partial list of current research includes questions of gender, ethnicity, the justice system, the colonization of Aboriginal people, rural and northern development, family violence, day care, issues concerning disabled persons, the immigrant experience, the development of clinical services, the political economy of the welfare state, archival research, research concerning the nature and treatment of pain, and risk assessment in child welfare.

Master of Social Work

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, the deadline for submission of applications to the program is: February 1 for persons residing in Canada; and for persons residing outside of Canada is December 1.

M.S.W. Admissions Criteria

• Possession of a B.S.W. degree (by May of the application year) from an accredited university which is recognized by the University of Manitoba.

• A Minimum Grade Point average of 3.0 (B) is required in the last 60 credit hours of a B.S.W. degree

• If courses have been taken subsequent to the degree as a Special Student and/or Occasional Student and/or in a subsequent degree or Pre-Master's program, they will be calculated into the Grade Point Average as part of the last 60 credit hours.

• Applicants who are members of one or more of the educational equity priority groups and who possess a Grade Point Average between 2.5 and 2.99 will be reviewed for special consideration. Applicants with Adjusted Grade Point Averages below 2.5 will not be considered. Special consideration applications will be scored on their non-academic components; paid and unpaid work experience (see application package for details).

• Applicants with B.S.W. degrees or who have completed a Pre-M.S.W. program before 1967 will be considered on a case by case basis, taking into consideration their educational and professional experience.

Pre-M.S.W. Admissions Criteria

• Possession of, or eligible for the granting of, a degree other than Social Work at point of application from an accredited university which is recognized by the University of Manitoba. Persons who plan to graduate in May of the year of application are not eligible for admission.

• One year (1540 hours) of relevant social work experience paid or volunteer (see application package for details).

• A minimum Grade Point Average of 3.0 (B) is required in the last 60 credit hours of the degree.

• Applicants who self-identify as members of one or more of the educational equity priority groups and who possess a Grade Point Average between 2.5 and 2.99 will be reviewed for special consideration. Applicants with adjusted grade point averages below 2.5 will not be considered. Special

consideration applications will be scored on their non-academic components; paid and unpaid work experience. (see application package for details)

• If courses have been taken subsequent to the degree as a Special Student and/or Occasional Student and/or in a subsequent degree or Pre-Master program, they will be calculated into the Grade Point Average as part of the last 60 credit hours.

Occasional Students

Courses available to Occasional and Non-Social Work Students

An Occasional Student in Social Work is one who wishes to take graduate courses with no intention of proceeding to a Pre-M.S.W. program or a Master degree in social work at the present time. Courses available to Occasional Students holding a previous 4 year degree in a discipline other than social work (e.g., B.A., B.Ed.)

047.310Systematic Inquiry in Social Work 3

047.601* Data Analysis for Social Work Research 3

047.603 Canadian Welfare Social Policy 6

N.B. *Prerequisite 047.310 or equivalent

The maximum number of credit hours permitted is six credit hours, plus 047.310 (3) and 047.601 (3).

Courses available to Occasional Students holding a previous degree in social work and non-social work students currently registered in another graduate program.

047.601	Data Analysis for Social Work Research	3
047.729	Change and Stability: Implications for Direct Intervention	6
047.730	Clinical Evaluation for Social Work	3
047.731	Social Service Administration Practice	6
047.740	Theoretical Foundations of Social Service Administration	3
047.742	Theoretical Foundations of Social Policy Analysis, Planning and Evaluation	3
047.723	Problem Seminar (Several topics are offered each year. Consult timetable for current titles being offered).	3
047.739	Advanced Social Work Practice Seminar	3
047.743*	Evaluation Research in social Work Practice	3
047.744	Policy Analysis in Social Work Practice	3

The maximum number of credit hours permitted is 6 credit hours plus 047.601 (3 credit hours).

All Occasional and non-social work students are required to abide by the same pre/co-requisite policy that applies to Social Work students.

047.601 has a five year shelf life (M.S.W. Program Committee, June 5/92).

*Pre/co-requisite 047.601

Educational Equity Initiative

For the purpose of identification the definitions for the educational equity priority groups are:

Aboriginal Peoples: Are all indigenous peoples of Canada including: First Nations, Métis, Déné and Inuit.

Visible Minorities: Persons other than Aboriginal peoples who, because of their colour are a visible minority in Canada.

Immigrants: Immigrants are those who do not record Canadian citizenship by birth, and whose native tongue is NOT English.

Refugees: A refugee is an individual who has left his/her country of residence because of persecution for belonging to a particular social, cultural, religious and/or national group, and/or for holding political beliefs and has been accepted for residence in Canada.

Persons with Disabilities: Persons with disabilities are those who would consider themselves disadvantaged by reason of any physical, intellectual, mental, sensory or learning impairment.

Above definitions are subject to change.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. All students accepted for the social services and administration stream, and the social clinical stream, of the Master's degree subsequent to 1991 are required to complete course 047.601 Data Analysis for Social Work Research or equivalent. For those individuals pursuing the social services administration stream it is preferable to complete these prior to registration for the fall-winter session. These courses are normally offered in summer session (evening) each year. A minimum grade of "C+" must be attained in each course.

Students may elect to take the program on a part-time basis. There is a six-year time limit to complete the M.S.W. program. The following are requirements for students in each stream:

The Pre-Master's Program

The purpose of the Pre-M.S.W. program is to build on students' background experiences to prepare them for specialization and completion of the M.S.W. program and to round out their knowledge and skill base relative to their areas of specialization.

Program Requirements

047.310	Systematic Inquiry in Social Work	3
047.412	Field Instruction 2	12
047.601	Data Analysis for Social Work Research	3
047.602	Social Work Practice Seminar	6
047.603	Canadian Social Welfare Policy Analysis	6
	Maximum credit hours load	30

The Social-Clinical Intervention Stream

Students must complete 24 credit hours of seminar and tutorial work. The program requires at least 12-18 months of full-time study. Students may elect to take the program on a part-time basis. There is a six-year time limit.

The program includes 15 credit hours of core material which, must be completed within 24 months of date of admission. Those electing to do full time study will complete the remaining nine credit hours concurrently with the core. Otherwise the remaining nine credit hours must be completed within the six-year time limit. Completion of a thesis or practicum is also a degree requirement.

The nine credit hours of "non-core" are identified as clinical electives. The clinical electives include Advanced Social Work Practice Seminar and a series of seminars on areas of clinical practice. In addition to the one Advanced Social Work Practice Seminar required, students take nine hours of electives (up to six hours may be taken outside of the Social Work faculty). Clinical area seminars may be taken as electives.

Course 047.729 is prerequisite or co-requisite to final approval of thesis or practicum proposal.

Social-Clinical Intervention Stream

Core Courses

047.601	Data Analysis for Social Work Research	3
047.729	Change and Stability: Implications for Direct Intervention	6
047.730	Clinical Evaluation	3
047.739	Advanced Social Work Practice Seminar	3
	Required Elective (choose one from three offered)	
Electives*		9
Thesis or Practicum		
Total Credit Hours		24

NOTE: * Electives may be chosen from 047.739 Advanced Social Work Practice Seminars; and/or 047.723 Problem Seminars (which include a number of seminars on different areas of clinical practice); and/or 047.722 Selected Topics in Social Work; and/or 047.728 Readings in Social Work and Social Welfare Research.

The Social Services Administration Stream

Students must complete 24 credit hours of seminar and tutorial work. An additional three credit hours of coursework will be required if the student has not taken 047.601 Data Analysis for Social Work Research, prior to admission to the program. The program requires at least 12-18 months of full-time study. Students may elect to take the program on a part-time basis. There is a six-year limit to complete the M.S.W. program.

The program includes 18 credit hours of core content, which must be completed in the first two calendar years. Those electing to do full-time study may complete all 18 hours of core material as well as the six credit hours of "non-core" electives in one calendar year. Otherwise the remaining six credit hours of electives and the thesis or practicum must be completed within the six-year limit. Part-time students are required to complete a minimum of nine credit hours of core coursework per year for the first two years. All core courses are prerequisite or co-requisite to the final approval of the thesis or practicum proposal.

Social Services Administration Stream

Core Courses

047.601	Data Analysis for Social Work Research	3
047.731	Social Service Administration Practice	6
047.740	Theoretical Foundations for Social Service Administration	3
047.742	Theoretical Foundations of Social Policy Analysis, Planning and Evaluation	3
047.743	Evaluation Research in social Work Practice	3
047.744	Policy Analysis in Social Work Practice	3
	Non-Core Electives	6
	Practicum or Thesis	
	Total credit hours	27

NOTE: Students are encouraged to take 047.601 prior to admission to the program. However, those students who do not have this course will be required to take it as a core course. 047.731/740 and 047.742/047.743/ 047.744 are most effectively taken together.

Professional Unsuitability Bylaw

The Senate has approved a bylaw granting authority to the faculty to require a student to withdraw for reasons of professional unsuitability (see General Academic Regulations and Requirements in the *Undergraduate Calendar*). Copies of this bylaw may be obtained from the office of the dean. Students are reminded of their obligation to be familiar with all regulations governing their continued progress.

Second language reading requirement: none
Expected time to graduate: six years

Ph.D. in Social Work

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*, a Master of Social Work degree, or equivalent, from an accredited degree-granting university, with a minimum 3.0 Grade Point Average (as defined by the University of Manitoba) is required for admission. (Equivalence to an M.S.W. degree from the University of Manitoba is defined as: possession of an M.S.W. degree from an accredited program at another accredited university OR possession of a Masters-level social work degree other than an M.S.W, which is defined as one delivered by an academic unit possessing the mandate of preparing social workers for professional practice, accredited by the relevant social work education authority and which would render its holders eligible for registration with the Manitoba Institute of Registered Social Workers.)

Selected candidates who possess a B.S.W. degree and a non-social work Masters degree would be admitted to a qualifying year composed of the core courses of the relevant stream. Also, the successful completion of any course would be required to meet the core M.S.W. course requirements in the Stream that is consistent with the applicant's Ph.D. focus of study, where courses completed in a prior non-social work Masters degree are not recognized as meeting equivalency standing criteria for required core courses in the M.S.W. program. Equivalency standing of prior courses will be assessed by a committee that includes representatives from the Ph.D. Admission Committee and the M.S.W. Stream consistent with the applicants' Ph.D. focus of study. Candidates holding a non-social work Masters degree are encouraged to apply least one year prior to when they intend to enter the Ph.D. program.

In addition, a minimum research competency in qualitative or quantitative methods equivalent to the level required for the Master of Social Work degree from the University of Manitoba, with a minimum 3.5 (B+) Grade Point Average. Although the minimum requirement is for one course, applicants will be expected to have basic competency in both qualitative and quantitative methods.

Demonstrated evidence of scholarly ability, through publications in refereed journals, other scholarly work of equivalent standard, or courses taught in accredited university programs.

A minimum of two years' professional practice experience in social work.

Students are admitted in alternating years, into either Family-Focused Intervention or Social Welfare Policy Analysis and Planning. Applicants for Social Welfare Policy Analysis and Planning will be admitted in 2003-2004. Applicants for Family-Focused Intervention will be admitted in 2004-2005.

The Faculty of Social Work must have staff with demonstrated scholarship in an applicant's proposed area of dissertation research. If the Faculty lacks the required expertise in the proposed area of dissertation research, applicants who meet minimum criteria entry requirements will have an opportunity to change their proposed area of research.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. A minimum of two consecutive terms of full-time study is required. To complete the required course work, students will normally be resident for between one and two years.

Candidacy

Each student is assigned a three person Ph.D. study committee of social work faculty who are appointed to the Faculty of Graduate Studies. The study committee assists the student with developing an individualized study plan, designates courses required to prepare for candidacy examinations, approves bibliographies necessary for each of the three written candidacy examinations, prepares the student's candidacy examinations and evaluates the student's performance. Candidacy examinations will normally be taken after two years of full-time study.

Candidacy examinations consist of: three separate written take-home examinations - in the profession of social work, the student's area of practice specialization, and the student's chosen field of social services; and a comprehensive oral examination.

Dissertation Research

A student's Ph.D. dissertation committee - composed of three faculty advisors who are appointed to the Faculty of Graduate Studies, including a chairperson, one additional member from the Faculty of Social Work, and one faculty member from another school or faculty in the University of Manitoba - provides advice and guidance for the dissertation research phase of the program.

Course Requirements

Students must complete a minimum of 18 credit hours of approved 700-level course work beyond the M.S.W. degree. A student's study program will not normally exceed 21 credit hours.

Students may be required to undertake a supervised practice internship - if they do not enter the program with sufficient practice experience in their area of specialization.

Students may be required to undertake an internship of teaching a three credit hour course under the supervision of a faculty member - if the student has not had sufficient university-level teaching experience prior to program entry.

Second language requirement: none
Expected time to graduation: seven years

Course Descriptions

Pre-Master Program Courses

047.310 Systematic Inquiry in Social Work (3-0:0-0) or (0-0:3-0) 3 Relates systematic methods of scientific inquiry to social work practice; theory building for practice; information collection; descriptive data for decision-making, understanding technical research material, introduction to issues of research design.

047.412 Field Instruction 2 (12) An educationally directed practice experience in which the student will have the opportunity to carry a sustained professional role in situations which require the integration of values, knowledge, and skill at the level of a beginning professional practitioner. The required hours are calculated as 28 weeks x 2 days per week x 8 hours or 450 hours. This time commitment includes involvement with the agency in planning for, and engaging in practice activity, and evaluation of performance. It also includes educational contact time with the field instructor in individual and/or group sessions. *Pre-co-requisite:* 047.602

047.601 Data Analysis for Social Work Research (3) An intermediate course in the analysis of social work data. Course will emphasize application and interpretation of analytical techniques useful in the practice of social work. A course in elementary statistics such as 005.220 is strongly recommended prior to taking this course. *Prerequisite:* 047.310 or equivalent. May not hold with 047.411.

047.602 Social Work Practice Seminar (6) Introduces students to ecological and other generalist practice models in the provision of social services. Attention is given to key contextual aspects of social work practice such as gender, poverty, and culture in the study of professional roles and ethics. Intervention modalities considered range from direct practice with individuals to strategies of community change.

047.603 Canadian Social Welfare Policy (6) An examination of the elements of ideology, and the application of competing ideological systems in the study of social welfare policy. This course also examines the history of Canadian social welfare from European contact to contemporary developments.

Master Program Courses

047.601 Data Analysis for Social Work Research (3) An intermediate course in the analysis of social work data. Course will emphasize application and interpretation of analytical techniques useful in the practice of social work. A course in elementary statistics such as 005.220 is strongly recommended prior to taking this course. *Prerequisite:* 047.310 or equivalent. May not hold with 047.411.

047.722 Selected Topics in Social Work (3) A tutorial approach which permits the graduate student to develop an area of concentration independently but with assistance and mutual work with a faculty member. *Prerequisite:* written permission of instructor.

047.723 Problem Seminar (3) Students focus on the theory, social policy and social work practice implications of a given social problem area.

047.728 Readings in Social Work and Social Welfare Research (3) A tutorial in specialized research methodology to be offered only to students who have highly specialized research interests which are not commonly offered in other courses. Prerequisite: an introductory research course and consent of the instructor.

047.729 Change and Stability: Implications for Direct Intervention (6) Theories of human behaviour are considered from an ecological perspective as they relate to family focused social work practice. Intervention methods are studied with special attention given to developmental issues and social contextual factors in the assessment and treatment of distressed human systems.

047.730 Clinical Evaluation of Social Work Interventions (3) Methods of evaluating clinical social work intervention with individuals, couples, families, and other small groups. *Prerequisite:* 047.310 or 047.411 or their equivalents.

047.731 Social Service Administration Practice (6) This course will focus on the development of skills in the analysis and implementation of organizational models for social service delivery, and administration methods for the effective delivery of social services. Students may not hold credit for 047.731 and the former 047.735 or 047.736.

047.738 Field Study in Social Service Evaluation (3) Students will work closely with a supervisor to develop their knowledge and applied skill in the design and execution of the evaluation of social services. The supervised knowledge and skill development will take place in the context of social services agencies. *Prerequisite:* 047.310 or 047.411, or 047.601 or their equivalents.

047.739 Advanced Social Work Practice Seminars (3) Study of social work practice organized by size of client system. Students must select one seminar from several which are offered. Remaining seminars may fulfil elective requirements. For clinical students only *Prerequisite:* 047.729.

047.740 Theoretical Foundations of Social Service Administration (3) An examination of organizational theories and strategies and evaluation of their relevance for the administration of social services agencies.

047.741 Social Work Practice in Policy Analysis, Planning and Evaluation (6) Presentation of the knowledge and skills necessary in the application of models and methods of planning and evaluating social policy and social programs. Analytical and practice skills are developed through a critical review of a variety of theories and techniques and case study applications. *Prerequisite:* 047.601. Not recommended students hold credit with 047.741 and the former 047.734. For students admitted prior to 1998-1999 only. May not hold with 047.743 and 047.744.

047.742 Theoretical Foundations of Social Policy Analysis, Planning and Evaluation (3) An advanced course in the welfare state in Canada - the relationship between ideology, economics and the existing structure of the welfare state in Canada, with a focus on the attempts to roll it back and the consequent tasks of social work in the preservation and advancement of social security. Students may not hold credit for the former 047.737 and 047.742.

047.743 Evaluation Research in Social Work Practice (3) Presentation of the knowledge and skills necessary in the application of models and methods of planning and evaluating social policy and social programs. Analytical and practice skills are developed through a critical review of a variety of theories and techniques and case study applications. Pre-co-requisite: 047.601. Applicable to students admitted subsequent to 1997-1998. May not hold with the former 047.741.

047.744 Policy Analysis in Social Work Practice (3) Presentation of the knowledge and skills necessary in the application of models and methods of planning social policy and social programs. Analytical and practice skills are developed through a critical review of a variety of theories and techniques and case study applications. Applicable to students admitted subsequent to 1997-1998. May not hold with 047.741.

Ph.D. Courses

The core courses described below are subject to change and not all courses are offered annually.

Core Program Courses

047.745 Advanced Research Methods 1 (3) An overview of design and methodology options in quantitative and qualitative social work research, with special emphasis on practice in community settings.

047.746 Advanced Research Methods 2 (3) Advanced quantitative analysis of social work policy and practice, with emphasis on multivariate analysis techniques.

047.747 Advanced Research Methods 3 (3) Advanced qualitative analysis of social work policy and practice, with emphasis on analyzing appropriate case studies, and interview and documentary information.

Core Courses in Family-Focused Intervention

047.748 Advanced Family-Focused Practice (3) Study of the family as a client system, using theoretical approaches within an ecological paradigm.

047.749 Advanced Family-Focused Practice with Special Populations (3) Special issues in family-focused practice, including supervision of practice.

Core Courses in Social Welfare Policy Analysis and Planning

047.750 Advanced Practice in Policy Analysis Planning and Evaluation - Theoretical Foundations (3) A foundation course for program policy analysis, design, and implementation of social work programs, and evaluation of social work services.

047.751 Advanced Practice in Policy Analysis Planning and Evaluation - Applications (3) Issues in consultation, planning, design, and implementation of programs for vulnerable and marginalized community populations.

Additional Courses

Students from both concentrations will complete at least two additional courses:

047.752 Dissertation Seminar (0) A required non-credit course on special issues to support students in preparing their formal dissertation proposals. Topics include scholarly findings, research methodology, and data analysis.

047.753 Critical Issues in Social Work (3) Taken as a tutorial or as a graduate-level course in social work. When sufficient numbers of students share an interest in a field of service, the Faculty of Social Work may offer the topic as a Ph.D. seminar.

SECTION 65: Sociology

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Academic Staff

Dean Emeritus

C**urrie,** R.F., M.A., Ph.D. (Fordham).

Professor Emeritus

Driedger, L., A.B. (Kansas), B.D. (Bethany Biblical Seminary), M.A. (Chicago), Ph.D. (Michigan State).

Senior Scholars

Boldt, E.D., B.Sc., B.A.(Calgary), M.A., Ph.D.(Alberta.); **Goldstein**, J.E., B.A. (San Francisco), M.A., Ph.D. (Washington State); **Rennie**, D. L., B.Sc., B.A. (Sir George Williams), M.A. (McGill), Ph.D.(Yale); **Tavuchis**, N., B.A. (Columbia College), M.A., Ph.D. (Columbia).

Professors

Albas, D.C., B.A. (Alberta), Ph.D. (Colorado); **Comack**, A.E., B.A. (Winnipeg), M.A. (Queen's), Ph.D. (Alberta); **Halli**, S. S., B.Sc., M.Sc. (Karntak), Ph.D. (Western Ontario); **Kwong**, J., B.A. (Hong Kong), M.Ed. (Alberta), Ph.D. (Toronto); **Linden**, E.W., B.A., M.A. (Alberta), Ph.D. (Washington); **Ramu**, G.N., B.A., M.A. (Mysore), M.A., Ph.D. (Illinois); **Roberts**, L., B.A., M.A., Ph.D. (Alberta); **Segall**, A., B.A., M.A. (Manitoba), Ph.D. (Toronto); **Smandych**, R.C., B.A. (Saskatchewan), M.A. (Simon Fraser), Ph.D. (Toronto); **Strain**, L.A., B.A. (Brandon), M.N.R.M. (Manitoba), Ph.D. (Toronto).

Associate Professors

Axelrod, C.D., B.A.(Sir George Williams), M.A., Ph.D.(York); **Baureiss**, G., B.Ed. (Austria), B.A.(Hons.) (Toronto), M.A. (Calgary), Ph.D. (Alberta); **Brickey**, S.L., B.A. (Wm. Penn.), M.A., Ph.D. (Iowa); **Grant**, K.R., B.A., M.A. (Manitoba), Ph.D. (Boston); **Kueneman**, R., B.A. (Waterloo), M.A., Ph.D. (Ohio State); **Olsen**, G. M., B.A. (Windsor), M.A., Ph.D. (Toronto); **Payne**, B.J., B.A. (York), M.Sc., Ph.D. (Toronto); **Prentice**, S.L., B.A. (Toronto), M.E.S., Ph.D. (York); **Taylor**, K.W., B.A.(Hons.), M.A. (Saskatchewan), Ph.D. (Southern Illinois); **Ursel**, E.J., B.A., M.A. (Manitoba), Ph.D. (McMaster).

Assistant Professor

Wilkinson, L., B.A., M.A. (Saskatchewan), Ph.D. (Alberta); **Woolford**, A., B.A. (Hons.) (Victoria), M.A. (Western Ontario), Ph.D., (British Columbia).

Program Information

The Department of Sociology offers programs at the Master and Ph.D. levels. Both programs provide training in the core areas of the discipline (theory and research methods) as well as in the department's major areas of specialization: criminology; gender, sexuality and family/intimate relations; health and aging; and inequality and social transition. The relatively low graduate student/faculty ratio creates an informal learning environment in which students receive considerable individual attention. Faculty members are actively involved in research, including some projects that readily lend themselves to the production of student theses/dissertations. Many students who have completed their Sociology degrees at the University of Manitoba have gone on to successful careers in the academic community, in the private sector, and in government service.

Fields of Research

The major areas of research of the Sociology faculty include criminology and criminal justice, health care and aging, gender studies, inter-group (race/ethnic) relations, power and inequality, social change and development, and social psychology. Some faculty who share research interests have established working groups within the department such as the Criminology Research Group, Women and Social Justice Research Group and the Women and Health Research Group. Several department members have affiliations with research centres and institutes at the University of Manitoba, including the Centre on Aging, RESOLVE (a centre for research and education for solutions to violence and abuse), the Disaster Research Institute, the Health, Leisure, and Human Performance Institute, and the Centre for Higher Education Research and Development.

Research Facilities

In addition to housing a number of research centres and working groups, the Department of Sociology has been the home of the Winnipeg Area Study (WAS) since 1981. The WAS conducts an annual survey of 750 randomly selected Winnipeg households and serves as an important research vehicle for faculty members in various disciplines as well as community service agencies. The survey consists of some basic demographic and quality of life questions that are included annually, as well as questions submitted by researchers on topics they wish to study (for example, attitudes toward crime and the police, parental use of physical discipline, wife abuse, deinstitutionalizing the mentally ill, and unions and management).

M.A. in Sociology

Admission

Admission requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students who have completed a University of Manitoba Honours B.A. (or equivalent) in Sociology may enter directly into the Master of Arts program. Students with other degrees or backgrounds may be eligible for admission to a pre-Master's program to the satisfaction of the department. Contact the Sociology Department for further information.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. The Master of Arts program in Sociology requires 12 credit hours of coursework (700 level) beyond the pre-Master's requirements. Students must also complete and successfully defend a thesis.

Second Language Reading Requirement: None

Expected Time to Graduate: Two years

Ph.D. in Sociology

Admission

Admission requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students who wish to enter the Doctor of Philosophy program must have completed the equivalent of a University of Manitoba Master of Arts in Sociology.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students must complete:

- A minimum of 21 credit hours of coursework (including 3 credit hours in Theory and 6 credit hours in Research Methods;
- A passing grade in three comprehensive examinations (theory and two areas of specialization);
- Successful defense of a dissertation proposal; and
- Successful defense of the completed dissertation.

Second language requirement: yes

Expected time to graduation: three years

Course Descriptions

077.446 Advanced Sociological Theory (3) A critical examination and analysis of selected sociological theories. Course content may vary from year to year depending upon the instructor's interest.

077.447 Research Methods 1 (3) An introduction to the logic of the scientific method and a survey of the techniques of sociological research.

077.448 Research Methods 2 (3) The application of quantitative methods in social and behavioural sciences. Processes of data collection, analysis, and numerical presentation. Interpretation of statistical data. Emphasis on the development of a research design.

077.452 Current Issues in Criminology And Corrections (3) An advanced course designed to examine current controversies and issues in the Canadian system of criminal justice and corrections. Emphasis will be placed upon contemporary theory and research.

077.453 Readings in Sociology (3) A reading course for undergraduate and pre-masters in sociology.

077.454 Sociology of Health Care Seminar (3) An analysis of theory and research in health care including topics such as: Explanatory models of health and illness; the sick role, self-care health beliefs and behaviour; professionalism and health care.

077.455 Sociology of Aging Seminar (3) This course deals with selected aspects of aging including: Socio-economic status, ethnicity and gender of the aged in Canada; their family and housing situations; work and retirement patterns; use of social and health services.

077.456 Advanced Sociological Theory (3) A critical examination and analysis of selected sociological theories. Course content may vary from year to year depending upon the instructor's interest.

077.711 Seminar in Sociology of Religion (3) A comparative and analytical study of religion with particular reference to such areas as integration, change, ideology, value orientation, normative structures, social class, intergroup relations, personality systems.

077.712 Seminar in Sociology of Education (3) An analytical treatment of the influence of education, as a basic social institution, on society its functions in socialization, change, control, social mobility, social progress, etc. and the influence of society on the organization, content, and goals of education.

077.713 Seminar in Sociology of Developing Countries (3) An intensive study of developing countries vis-à-vis their formulation and implementation of policies of guided societal transformations and international implications of modernization of traditional societies.

077.716 Selected Topics (3) An intensive study of the contemporary research and theory in a selected field of sociology.

077.719 Seminar in Selected Topics in Sociological Theory (3) Feminism and Sociological Theory: A critical examination of how gender has been addressed in classical and

contemporary sociological theories, with consideration of how sociological inquiry is being transformed through feminist theory and practice.

077.724 Seminar in Selected Topics in Research and Methods (3) The content of this course may vary from year to year, depending on interest and need.

077.725 Advanced Seminar (3) Seminar with reference to one or more selected problems in sociology.

077.726 Seminar in Selected Problems in Social Psychology (3) Examination of the major concepts, assumptions, findings, and implications of one or more substantive areas within social psychology.

077.728 Seminar in Theories of Criminal Behaviour (3) An advanced course dealing with theory and research in the field of criminology with emphasis placed on an evaluation of existing theories of crime and criminal behaviour.

077.730 Seminar in the Sociology of Law and Social Control (3) A detailed examination of the criminal justice system, with special emphasis on the Canadian situation.

077.731 Seminar in Intergroup Relations (3) This seminar will provide an opportuni-

ty for detailed study of intergroup (religious, racial, and ethnic) relations in contemporary Canadian society.

077.732 Seminar in Political Sociology (3) A critical examination of classical and contemporary sociological theories and current empirical research concerned with the relationship between politics and society. Particular emphasis is placed upon the origin, development, nature and future of the welfare state from a comparative perspective.

077.734 Seminar in the Sociology of the Family (3) This seminar investigates various conceptual frameworks which are developing in the study of the family today, including research problems and procedures unique to such study. Various approaches will be examined.

077.735 Advanced Reading and Research 1 (3) Directed study of a selected area within the general field of sociology.

077.736 Advanced Reading and Research 2 (3) Directed study of a selected area within the general field of sociology.

077.737 Issues in Health Care Seminar (3) An advanced seminar designed to examine current issues in health care. The content of this course may vary from year to year depending on interest and need. Prerequisite: a grade of "C+" or better in 077.454 or written consent of the department head.

077.738 Issues in Aging (3) An advanced seminar designed to examine current issues in aging. The content of this course may vary from year to year depending on interest and need. Prerequisite: a grade of "C+" or better in 077.455 or written consent of the department head.

077.739 Survey Research Methods (3) Through the vehicle of the Winnipeg Area Study, students learn all aspects of survey research. Topics covered include: sampling, question and questionnaire construction, index construction and scaling methods, techniques for establishing validity and reliability, order effects, conducting interviews, coding, data analysis, and budgeting. Course includes interviewing experience.

077.740 Advanced Quantitative Research Methods (3) This course emphasizes the understanding and application of advanced quantitative data analysis techniques to sociological research problems. Issues in regression decomposition, path analysis, log-linear analysis, discriminant function analysis, principal components and factor analysis, as well as non-parametric statistical tests are covered as they relate to sociological research concerns. Statistical packages are used to illustrate sociological examples. Prerequisite: 077.448 or written consent of the department head.

077.741 Selected Topics in Quantitative Research Methods (3) This course emphasizes the understanding and application of selected quantitative data analysis procedures as they apply to sociological research concerns. Statistical packages are used to illustrate sociological applications. Topics covered will vary but may include logistic regression, multiple classification analysis, multivariate analysis of variance and covariance, canonical correlation, recursive and nonrecursive models, and LISREL. The course emphasizes issues related to the sociological use of these techniques. Prerequisite: 077.448 or written consent of the department head.

077.742 Qualitative Research Methods (3) This course provides an overview of the methods of qualitative research. Discussion focuses on the philosophical foundations of qualitative methods, the variety of techniques available within interpretive and conflict paradigms, issues of sampling, analysis, validity, and report writing.

077.743 Seminar in Classical Sociological Theory (3) A critical examination of certain central aspects of the sociological tradition. The content of this course may vary from year to year depending on interest and need.

077.744 Seminar in Contemporary Sociological Theory (3) An examination of current trends in sociological theory. The content of this course may vary from year to year depending on interest and need.

077.745 Selected Topics in Criminology (3) Crimes of Power: Genocide and War Crimes - The 20th Century has been described as the "Age of genocide". The seeming frequency of this most horrible of crimes in recent history presents a challenge to criminologists: What does criminology have to say about genocide and what does genocide

teach us about criminology? Through the works of Arendt, Jaspers, Bauman, Tester, Doubt, Barkan, Milgram and others, through case studies of the Holocaust, Rwanda, and Bosnia, as well as through novels and videos, we will explore the phenomenon of mass violence from its origins to attempts to repair the harm it causes.

077.746 The Sociology of Comparative Industrial Relations (3) An advanced course in industrial relations in Europe and North America from a macro-sociological approach which will introduce the student to theoretical and empirical work on the nature of power and conflict in capitalist society.

077.747 Evaluating Social Programs (3) Designed as a course in applied sociology, students will review the models and methodologies used for evaluating social programs. The course will introduce the necessary conceptual and analytic tools to design and carry out program evaluations. Students may not hold credit for both 077.747 and the former 077.733.

077.748 Social Inequality (3) A critical examination of classical and contemporary theories and current empirical research concerned with various dimensions of social inequality (such as class, gender and race) and social stratification from a comparative perspective.

077.749 Globalization (3) A sociological examination of the globalization of trade, production and finance, including the creation of multilateral trading blocs (e.g., APEC, EU, NAFTA) and international organizations (e.g., WTO, IMF, the World Bank) and their impact upon social inequality, the welfare state and the environment in developed and developing nations.

SECTION 66: Soil Science

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Academic Staff

Professor Emeritus

Soper, R.J., B.A., B.S.A., M.Sc. (Saskatchewan), Ph.D. (McGill), F.A.I.C.

Senior Scholars

Racz, G.J., B.S.A., M.Sc. (Saskatchewan), Ph.D. (Manitoba); **Shaykewich,** C.F., B.S.A., M.Sc.(Manitoba), Ph.D.(McGill).

Professors

Goh, T.B., B.AgSc. (Hons.) (Malaya), M.Sc. (Ghent), Ph.D. (Saskatchewan).

Associate Professors

Burton, D.L., B.Sc.(Hons.) (Dalhousie), M.Sc. (Guelph), Ph.D. (Alberta); **Flaten**, D.N., B.S.A. (Saskatchewan), Ph.D. (Manitoba).

Assistant Professor

Akinremi, O., B.Agri. (Nigeria), M.Sc., Ph.D. (Manitoba); **Bullock**, P., B.Sc., M.Sc. (Saskatchewan), Ph.D. (Australia); **Farenhorst**, A., B.Sc., M.Sc. (Amsterdam), Ph.D. (Toronto); **Lobb**, D.A., B.Sc. (Toronto), M.Sc., Ph.D. (Guelph); **Tenuta,** M. B.Sc. (Toronto), M.Sc. (Guelph), Ph.D. (Western Ontario).

Adjunct Professors

Blair, D.E., B.Sc., M.Sc. (Regina), Ph.D., (Manitoba); **Eilers**, R.G., B.S.A., M.Sc. (Manitoba); **Fuller**, L.G., B.S.A., M.Sc. (Saskatchewan), Ph.D. (Manitoba); **Grant**, C.A., B.S.A., M.Sc., Ph.D. (Manitoba); **Halloway,** P., B.Sc. (Waterloo), Ph.D. (Guelph); **Huffman**, C.T., B.AgSc. (Hons.) (Guelph), M.A. (Carleton), Ph.D. (Waterloo); **Karamanos,** R.E., B.Sc. (Greece), M.Sc., Ph.D. (Saskatchewan); **Lafond,** J.G.P., B.Sc. (Hons.), M.Sc. (Manitoba), Ph.D. (Saskatchewan); **McConkey**, B.G., B.Sc. (Manitoba), M.Sc. (Alberta), Ph.D. (Washington); **Moulin,** A.P., B.Sc., M.Sc., Ph.D. (Saskatchewan)**; Raddatz**, R.L., B.Sc. (Saskatchewan), B.Ed. (Regina), M.Sc. (Alberta); **Stern,** G.A., B.Sc., M.Sc, Ph.D. (Manitoba).

Program Information

The Department of Soil Science offers graduate instruction leading to M.Sc. and Ph.D. degrees. Students will select one of the following four programs:

- Environmental Science
- Fundamental Soil Science
- Agricultural Science
- Agrometeorology

Studies related to these four programs include fundamental and applied studies on the management of soil resources for crop and animal production, soil fertility and nutrient management, pest control management, chemical use in agriculture and food quality, effects of weather and climate on agricultural production, soil erosion, tillage practices, precision agriculture, pesticide fate in the environment, environmental monitoring, manure and waste management, remediation of contaminated or degraded soils, land use suitability assessment, soil genesis and classification, soil mineralogy, soil microbiology and biochemistry, soil and pesticide chemistry, soil physics and agrometeorology.

Graduate students are required to obtain a comprehensive knowledge of soil science, but the department permits considerable variation in the selection of courses depending on the background of the student and the particular area of specialization. Graduates with knowledge or a major in soil science have had excellent career opportunities with agribusiness, environmental-land use agencies or firms, and regulatory agencies. M.Sc. and Ph.D. graduates are employed in land inventory activities, research in the

various areas of fundamental and applied soil science, environmental consulting and extension.

Fields of Research

Research interests of academic staff in the Department of Soil Science includes transport and transformation of organic and inorganic chemicals in soil, agrometeorological modelling of crop and agricultural processes and impacts of climate change, soil microbiology and biochemistry, agricultural pesticides and sustainable agriculture, soil fertility, soil chemistry and mineralogy, landscape ecology and land resource management, manure management, nutrient dynamics and chemistry of soil fertility.

Research Facilities

The Department of Soil Science and its research facilities are located in the Ellis Building. Facilities within the department include excellent instrumentation to measure soil physical, chemical and biological characteristics, and to quantify soil nutrient and pesticide residue levels in soil extracts and water samples. The department conducts field-based research at a number of locations, both in the province and beyond, in collaboration with scientists from other universities in the federal and provincial organizations. Within the department, full-time technicians add quality assurance and quality control to the research programs, and provide a positive effect on the training of students. In addition, the department has the opportunity to share research facilities with other departments within the university and at several locations throughout the province.

M.Sc. in Soil Science

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

Start Date	Canadian/U.S.	Non-Canadian
September	June 1	March 1
January	October 1	July 1
May	February 1	November 1
July	April 1	January 1

Please send applications to: Terry Ramm, University of Manitoba, Department of Soil Science, 362 Ellis Building, Winnipeg, MB, R3T 2N2, Canada.

Program Requirements

In addition to the minimum course requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this calendar, a "B" is the minimum passing grade in the major subject area.

Second language reading requirement: none
Expected time to graduation: two years

Ph.D. in Soil Science

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Application Deadlines

Start Date	Canadian/U.S.	Non-Canadian
September	June 1	March 1
January	October 1	July 1
May	February 1	November 1
July	April 1	January 1

Please send applications to: Terry Ramm, University of Manitoba, Department of Soil Science, 362 Ellis Building, Winnipeg, MB, R3T 2N2, Canada.

Program Requirements

In addition to the minimum course requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*, a "B" is the minimum passing grade in the major subject area.

Second language reading requirement: none
Expected time to graduation: three years

Course Descriptions

040.710 Soil Physical Chemistry (3-0:0-0) 3 Topics of discussion: ionic equilibria, ion exchange and ionic transport including soil-plant relationships. Offered in 2003/2004 and alternate years.

040.711 Soil Physics 1— General (3-0:0-0) 3 First and second laws of thermodynamics, Darcy's law, saturated and unsaturated flow, simulation modelling of moisture movement, soil aeration, water availability to seeds, strength properties of unsaturated soils. Offered in 2002/2003 and alternate years.

040.712 Soil Physics 2 — Special Problems (0-0:3-0) 3 Each student will be required to prepare a comprehensive review of literature on an assigned topic and present a seminar. In addition, each student will conduct a minor research project and submit a written report on the project. Currently not offered.

040.713 Soil Chemistry (0-0:3-0) 3 Chemical equilibria and soil solution chemistry; surface chemistry and solid-solution reactions; mineral structure, colloid chemistry and analytical techniques; fate of nutrients and pollutants; reactions of fertilizers. Offered every year.

040.714 Soil Nitrogen (0-0:3-0) 3 Discussion of organic and inorganic nitrogen in soils, nitrogen fixation, mineralization, nitrification, denitrification, and plant availability of soil nitrogen. Students will be required to review literature on assigned topics. Offered in2003/2004 and alternate years.

040.717 Agricultural Micrometeorology (0-0:3-0) 3 Discussion of mass and energy transport in the boundary layer, evaporation and transpiration of water, transmission of carbon dioxide in plant canopies and climate change impacts on micrometeorological processes. *Prerequisite:* 040.306 and/ or consent of instructor. Offered in 2003-2004 and alternate years.

040.718 Environmental Chemistry of Pesticides and Related Compounds (0-0:3-0) 3 Pesticide chemodynamics, biological and non-biological transformations of pesticides in water, soil and biota, bioaccumulation and food chain distribution of pesticides and related xenobiotics and environmental fate models will be discussed. *Prerequisite:* 040.715 or consent of instructor. Offered in 2003/2004 and alternate years.

040.719 Environmental Chemistry of Humic Substances (0-0:3-0) 3 All aspects of humic substances synthesis, structures, analysis and transformations in soil. Interactions of humic substances with soil minerals, organic molecules, microbes and metals and effects on soil function and health. Currently not offered.

040.720 Advanced Soil Microbiology (3-0:0-0) 3 This course examines the role of the microbial community in decomposition, nutrient cycling, and pathogen/pest suppression. Methods of studying biochemical activity and microbial composition of soil are discussed. The soil environment and agricultural management are considered as to their role in regulating the composition and activity of microbial communities. *Prerequisite:* 040.412 or consent of instructor. Offered in 2003/2004 and alternate years.

040.721 Topics in Soil Fertility (0-0:3-0) 3 Advanced study of behaviour and crop requirements for selected nutrients (except for nitrogen, as covered on 040.714). Students will be required to review literature and prepare seminars on assigned topics. *Prerequisites:* 040.452 or consent of instructor. Offered in 2002/2003 and alternate years.

040.722 Principles of Scientific Research and Communication (3-0:0-0) 3 Principles of scientific research; management skills; writing skills; oral and poster presentation; preparation of research proposal and thesis (pass/fail). These topics will focus on aspects of soil science and will give students experience in writing and presenting scientific material to increase their professionalism as soil scientists. *Prerequisite:* Consent of instructor.

040.723 Topics in Landscape Characterization and Processes 1 (3) An examination of methods of landscape characterization and of landscape processes, their impacts, interactions and modelling. *Prerequisite:* Consent of instructor. Offered in 2003/2004 and alternate years.

040.724 Topics in Landscape Characterization and Processes 2 (3) A continuation of 040.723. *Prerequisite:* Consent of instructor. Offered in 2002/2003 and alternate years.

040.725 Topics in Soil Science (3) Several courses in soil science are sectioned into modules. Modules of one credit hour on special topics are also available. Students may select three modules from the various courses or from special topics for 40.725. *Prerequisite:* Written consent of Department Head.

040.726 Pesticide Residues in Food, Water and Soil (0-0:3-0) 3 Discussion and application of research protocols for examining pesticide fate in the environment and for quantifying pesticide residues in food, water and soil. *Prerequisite:* consent of instructor. Offered 2002/2003 and alternate years.

SECTION 67: Statistics

Head: Smiley W. Cheng
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Website: www.umanitoba.ca/statistics

Academic Staff

Senior Scholars

Johnston, B., B.Sc. (Hons.), M.Sc., Ph.D. (North Carolina); **Sinha**, S.K., B.A., M.A. (Putna), M.Sc. (London Sch. Econ.), A.M. (Chicago), Ph.D. (London).

Professors

Brewster, J.F., B.Sc.(Hons.) (UBC), M.Sc. (Toronto), Ph.D. (UBC); **Cheng**, S.W., B.Sc. (Taiwan), M.A., Ph.D. (Western); **Fu**, J.C., B.A. (Taiwan), M.Sc., M.A. (Cornell), Ph.D. (Johns Hopkins); **Macpherson**, B.D., B.Sc., M.Sc. (Manitoba), Ph.D. (Iowa State); **Samanta**, M., B.Sc.(Hons.) (Presidency College), M.Sc. (Calcutta), Ph.D. (Arizona); **Thavaneswaran**, A., B.Sc.(Hons.) (Sri Lanka), M.Math, Ph.D. (Waterloo);

Associate Professors

Mount, K.S., B.Sc. (Stevens Institute of Technology), M.A. (Columbia), Ph.D. (Iowa State)., **Wang**, X., B.Sc. (Central China Normal), M.Sc., Ph.D. (Saskatchewan).

Assistant Professors

Mandal, S., B.Sc. (Hons.), M.Sc. (India), Ph.D. (UK); **Slonowsky**, D., B.Sc. (Winnipeg), Ph.D. (Ottawa); **Wang**, L., B.Sc. (Northern Jiaotong), M.Sc. (Beijing), Ph.D. (Austria); **Zhang**, J. B.Sc., M.Sc. (Yunnan), Ph.D. (York),

Adjunct Professors

Keen, K., B.Sc. Hons. (S.F.U.), M.Sc., (McGill), Ph.D. (Toronto), **Spiring**, F.A., B.Sc., M.Sc., Ph.D. (Manitoba).

Program Information

The University of Manitoba offers graduate programs in statistics leading to the M.Sc. and Ph.D. degrees as well as B.Sc. in Statistics degree. Applications are encouraged from students with strong interest in statistics, mathematics or engineering.

A recent addition to the Master of Science graduate program and an undergraduate honours program includes an applied statistics option, where students are encouraged to study and explore the role of statistics in other disciplines and sciences.

Fields of Research

Areas of research interest in the department include: biometrics; data analysis; design of experiments; large sample estimation theory; linear models; multivariate analysis; nonparametric statistics; reliability and life testing; statistical inference; statistical quality control; survey sampling theory; time series; stochastic processes; and probability theory.

Research Facilities

In addition to the vast network of computing facilities maintained by Computer Services at the University of Manitoba, the Department of Statistics maintains two smaller networks for use by their students. The graduate computing laboratory consists of a blend of environments including IBM compatible personal computers, Macintosh computers, and Sparc/Sun Workstations supported by Computer Services. The undergraduate computing facility includes a local network of Macintosh computers and terminals also linked to Computer Service's University and Unix Networks.

M.Sc. in Statistics

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. An honours/major degree in Statistics, is normally required for entry into the Master's program.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. The Master's degree may be earned in one of three ways:

- Submission of a thesis, nine credit hours of approved work at the 700 level in statistics which must include 005.708 and 005.722, and six credit hours of approved coursework at the 400 or 700 level in Statistics.
- Submission of a practicum, nine credit hours of coursework at the 700 level, which must include 005.708, 005.722 and 005.729, and six credit hours of approved work at the 400 or 700 level in Statistics.
- Eighteen credit hours of course work at the 700 level, which must include 005.708 and 005.722, and six credit hours of approved coursework at the 400 or 700 level in Statistics, and passing a set of comprehensive examinations.

Students are also expected to take part in laboratory instruction.

Second language reading requirement: none

Expected time to graduate: one to two years depending the option selected

Ph.D. in Statistics

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. Completion of a Master's degree in Statistics is usually required for admission to the Ph.D. program.

Application Deadlines

Canadian/U.S. students should submit their application and supporting documentation to the Department at least 3 months prior to their intended start date. International students should submit their application and supporting documentation to the Department at least 7 months prior to their intended start date.

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. Students are required to satisfy the following requirements:

- Candidates are required to attempt and successfully complete twelve credit hours at the 700 level. These courses will normally be taken from the Department of Statistics. Courses will normally be recommended by the candidate's supervisor.
- Candidates are required to pass the Ph.D. qualifying examination within twelve months of first registration.
- Candidates are required to pass a candidacy examination which will normally be administered twelve months prior to the completion of all degree requirements. The candidacy examination will be set and administered by the candidate's Ph.D. advisory committee. The format may vary.

Second language requirement: none

Thesis: required

Expected time to graduation: five years

Course Descriptions

005.414 Statistical Inference (3)

005.452 Sampling Techniques 1 (3)

005.453 Design of Experiments 1 (3)

005.458 Sampling Techniques 2 (3)

005.459 Design of Experiments 2 (3)

005.460 Statistical Topics 1 (3)

005.462 Mathematical Probability (3)

005.463 Stochastic Processes (3)

005.469 Applied Multivariate Analysis (3)

005.470 Statistical Consulting (3)

005.706 Advanced Theory of Probability (3) Probability as measure, convolutions, limit laws, conditional probability and expectation, law of large numbers and other selected topics. *Prerequisite:* consent of instructor.

005.708 Advanced Statistical Inference (3) Selected topics from recent developments in parametric and/or non-parametric statistical inference. *Prerequisite:* consent of instructor.

005.709 Advanced Statistical Analysis (3) Construction of regression models, response surfaces, nonlinear model ANOVA as regression model, variance components, and selected topics. *Prerequisite:* consent of instructor.

005.710 Analysis of Discrete Data (3) Inference concerning discrete distributions, analysis of categorical data, and other selected topics. *Prerequisite:* consent of instructor.

005.712 Nonparametric Inference (3) Order statistics, Kolmogorov-Smirnov tests, Wilcoxon-Mann-Whitney tests, and other selected topics. *Prerequisite:* consent of instructor.

005.714 Linear Models (3) Theory of linear models, regression analysis, and analysis of variance. *Prerequisite:* consent of instructor.

005.718 Selected Topics in Advanced Sampling Theory (3) Selected topics from recent and current literature. *Prerequisite:* 005.452 or consent of instructor.

005.720 Multivariate Analysis 1 (3) Multivariate normal distribution, Hotelling's T2, Classification methods, principal components and canonical correlations. *Prerequisite:* consent of instructor.

005.721 Multivariate Analysis 2 (3) Advanced topics in multivariate analysis. *Prerequisite:* 005.720 or consent of instructor.

005.722 Seminar in Statistics 1 (3) A seminar course on new development in statistics.

005.723 Seminar in Statistics 2 (3) A seminar course on current research topics in statistics.

005.724 Advanced Topics in Statistics 1 (3). Special advanced research topics in statistics.

005.725 Advanced Topics in Statistics 2 (3). Special advanced research topics in statistics.

005.726 Time Series (3) The auto-correlation function and spectrum, various processes, model identification, estimation and forecasting. *Prerequisite:* consent of instructor.

005.727 Bayesian Inference (3) Bayesian decision problems, priors, Jeffrey's Rule, robustness of posteriors, Bayesian justification of ANOVA. *Prerequisite:* consent of instructor.

005.728 Reliability Analysis and Risk Assessment (3) Fault tree, event tree, common-mode failure analyses, cut set, path set, estimation of system reliability, quantitative evaluation of the consequences of disastrous accidents, risk-benefit analysis. *Prerequisite:* consent of instructor.

005.729 Statistical Consulting (3) The role of a statistics consultant. Practical consulting experience. *Prerequisite:* consent of instructor.

SECTION 68: Surgery

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Academic Staff

Professor Emeritus

Blanchard, R.,M.D.,B.Sc.(Med.),M.Sc. (Surg.) (Minn.), F.R.C.S.C., F.A.C.S.; **Barwinsky,** J., M.D. (Manitoba), F.R.C.S.C., F.A.C.S., F.A.C.C.P.**,** D.A.B.S., D.A.B.T.S., F.A.C.C., F.R.S.M. (England); **Stranc,** M.,M.D.(Ddub.), F.R.C.S. (Lond.), F.R.C.P.I., F.A.C.S.S., F.R.R.C.S.C.

Professors

Black, G., B.Sc., M.D. (Dalhousie), F.R.C.S.C.; **Cristante**, L., M.D., Ph.D.; **Danzinger**, R., M.D., F.R.C.S.C., B.Sc. (Manitoba), F.A.C.S.; **Hosking**, D., M.D., M.B.Ch.B., F.R.C.S. (Edinburgh), F.R.C.S.C., F.A.C.S.; **Kirkpatrick**, J., M.B.Ch.B., Ch.M., F.R.C.S. (Edinburgh), F.R.C.S. (England), F.R.C.S.C., F.A.C.S.; **MacDonald,** P., M.D.,BSc.(Med.),F.R.C.S.C.; **Oppenheimer**, L., M.D. (Barcelona), F.R.C.S.C.; **Parkinson**, D., M.D., C.M. (McGill), B.A., M.Sc. (Neuro.) (Minnesota), F.R.C.S.C., F.A.C.S., **Postuma**, R., B.Sc.(Med.), M.D. (Manitoba), F.R.C. S.C., F.A.C.S.; **Rennie**, W., B.Sc., M.D. (Manitoba), F.R.C.S.C.; **Unruh**, H., M.D., F.R.C.S.C; **West,** M**.,** M.D., B.Sc. (Med.), Ph.D. (Physiology) (Manitoba), F.R.C.S.C.

Associate Professors

Abdoh, A., M.B.B.Ch., Ph.D.; **Chochinov**, H., M.D. (Manitoba), F.R.C.S.C., F.A.C.S., B.Sc.(Med.), D.A.B.S.; **Dolynchuk**, K, B.Sc., M.D., Ph.D, F.R.C.S.C.; **Duerksen**, F., M.D. (Argentina), F.R.C.S.C.; **Fewer**, H., B.Sc., M.D.C.M. (McGill), F.R.C.S.C.; **Glavin**, G., B.A., M.A., Ph.D.; **Gray**, P., B.Sc., M.D. (Manitoba), F.R.C.S.C.; **Guzman,** R., M.D.,F.R.C.S.C.; **Kassum**, D., B.A. (Cambridge), M.B., B.Chir., M.A., F.R.C.S.C., F.R.C.S. (England); **Kauffman**, T., M.D., MSc. (Manitoba) F.R.C.S.C.; **Khan**, T., M.B., B.S. (East Pakistan), F.R.C.S. (Edinburgh), F.R.C.S. (England), F.R.C.S.C., M.Sc. (Physiol.) (Manitoba), F.A.C.S.; **Krahn**, H., B.Sc.(Med.), M.D. (Manitoba), F.R.C.S.C.; **Lipschitz**, J., M.B.B.Ch. (Rand.), R.C.S. (Ireland), F.C.S. (Rand.); **Lyttle**, D., B.Sc. (Belfast), M.B.B.Ch., B.A.O. (Ireland), F.R.C.S. (Edinburgh), F.R.C.S.C.; **MacMahon**, R., M.B.B.Ch., B.A.O. (Ireland), F.R.C.S. (Edinburgh), F.R.C.S.C.; **Monson**, R., M.D., F.R.C.S.C.; **Murray**, K., B.A., M.D. (Dalhousie), F.R.C.S.C.; **Nason**, R.W., B.Sc. (Acadia), M.D. (Dalhousie), M.Sc. (Alberta), F.R.C.S.C.; **Nathaniel**, E., M.B., B.S. (Madras), M.S., Ph.D. (UCLA); **Pascoe**, E., M.D. (Manitoba), F.R.C.S.C.; **Robertson**, G., M.B.B.S. (London), M.Phil. (London), F.R.C.S. (England), F.R.C.S.C.; **Taylor**, M.C., M.D., F.R.C.S.C., M.Sc.; **Thorlakson**, R., M.D. (Manitoba), F.R.C.S. (England), F.R.C.S.C., F.A.C.S.; **Thorlakson**, T., M.D. (Manitoba), F.R.C.S. (England), F.R.C.S.C., F.A.C.S.; **Trepman,** E., BSc (Hon.), M.D.; **Vajcner**, A., M.D. (Manitoba), F.R.C.S.C., F.A.C.S.; **Wiseman**, N., M.D., B.Sc.(Med.) (Manitoba), F.R.C.S.C., F.A.C.S; **Ziesmann**, M., M.D. (Manitoba), F.R.C.S.C.

Assistant Professors

Assuras, G., M.D. (Toronto), F.R.C.S.C.; **Bard**, R., M.D. (Manitoba), F.R.C.S.C.; **Bartlett**, L., M.D. (Western Ontario), F.R.C.S.C.; **Berrington,** N., M.B.B.Ch., M.Med., F.R.C.S., F.C.S. (S. Africa); **Bhattacharya**, M.B., B.S. (Calcutta), D.A.B.S., F.R.C.S.C., F.A.C.S.; **Bohm,** E., B.Eng, M.D., F.R.C.S.C.; **Boyar**, R., D.M.D.C.; **Bracken**, J., M.D., B.Sc., F.R.C.S.C.; **Caplan**, B., M.D. (Manitoba), F.R.C.S.C., F.I.C.S., F.A.C.S.; **Cross**, H., D.M.D., M.Sc. (Manitoba), C.P.D. (US); **Curran**, J., B.D.S., F.F.D. (Ireland); **Decter**, A., M.D. (Manitoba), F.R.C.S.C.; **de Korompay**, V., B.Sc., M.D. (Saskatchewan), F.R.C.S.C.; **Drachenberg,** D.,BSc.,M.D.,F.R.C.S.C., **Dubberley,** J.,B.Sc.,M.D.,F.R.C.S.C.; **Fong**, H., M.D., F.R.C.S.C.; F.A.C.S.; **Fraser**, M.D., F.R.C.S.C.; **Goytan**, M., B.Sc., M.D., F.R.C.S.C.; **Hancock**, B., B.Sc., M.D. (Manitoba), F.R.C.S.C; **Hayakawa,** T., BSc., M.D., F.R.C.S.C.; **Hedden**, D., M.D., B.Sc., F.R.C.S.C.; **Huebert**, D., B.Sc., M.D., F.R.C.S.C.; **Huebert**, H., M.D. (Manitoba), F.R.C.S.C.; **Irving**, J., B.Comm., B.A., M.D. (Manitoba); **Kettner**, J., M.D. (Manitoba), F.R.C.S.C., M.Sc.; **Koulack**, J., M.D., M.Sc., F.R.C.S.C.; **Kowalski**, S., M.D. (Manitoba), F.R.C.P.C.; **Latosinsky**, S., M.D., F.R.C.S.C.; **Leboldus**, L., M.D., F.R.C.S.C.; **Lekic**, C., D.D.S., M.Sc., Ph.D.; **Louridas**, G., M.B., B.Ch., F.C.S. (South Africa), M.Med., F.A.C.; **Lysack**, A., B.A., M.D. B.Sc. (Manitoba), F.R.C.S.C; **Mayba**, I., B.Sc., M.D. (Manitoba), F.R.C. S.C. (Ortho.); **McDonald,** P., M.D.(Hon.),M.D.,F.R.C.S.C.; **McGoey**, J., B.A. (Saskatchewan), M.D. (Toronto), F.A.C.S., F.R.C.S.C.; **MacIntosh**, E., B.Sc., M.D., M.Sc., F.R.C.S.C.; **McPherson**, J., M.D. (Manitoba), F.R.C.S.C.; **Nasser-Sharif,** M., M.D. (Iran), L.R.C.P., M.R.C.S., F.R.C.S.C., F.R.C.S. (London); **Parham**, S., B.Sc., M.D., F.R.C.S.C.; **Psooy,** K., BSc., M.D., F.R.C.S.C.; **Raabe**, M., B.Sc., M.Sc. (Manitoba) M.D., F.R.C.S.C.; **Reynolds,**D.,M.D.,F.R.C.S.C**.; Ross**, J., M.D. (Manitoba), F.R.C.S.C., F.A.C.S.; **Saadia**, R., M.D., F.R.C.S.C.; **Saettler**, E., M.D., L.M.C.C., F.R.C.S.C.; **Scurrah**, J., M.B.Ch.B. (Liverpool), F.R.C.S. (Edinburgh), F.R.C.S.C., F.I.C.S., F.A.C.S.; **Silverman**, R., M.D., F.R.C.S.C.; **Singh**, G., M.B.B.S. (India), F.R.C.S.C., F.A.C.S.; **Skoracki,** R., BSc.(Hon), M.D., F.R.C.S.C.; **Stimpson**, R., M.D. (Manitoba), F.R.C.S.C; **Stoykewych**, A., B.Sc., D.M.D. (Manitoba), N.D.E.B.; **Tan**, L., M.D., C.M. (McGill), B.Sc., F.R.C.S.C. (Dalhousie); **Tanner,** J., M.D., B.Sc.(Med), F.R.C.S.C.; **Torchia**, M., M.Sc., M.C.I.C., M.A.C.S.; **Violago**, F., M.D. (Manila), D.A.B.S., F.R.C.S.C., F.A.C.S.; **Warrian**, K., M.D., F.R.C.S.C., F.R.C.S.C., **Williams**, O., B.Sc. (Alberta), M.D., F.R.C.S.C., **Yaffe**, C., M.D., F.R.C.S.C.; **Yip**, B., B. Human Kinetics (Windsor), M.D. (Western Ontario), Master of Surgery (Manitoba).

Adjunct Professors

Tian, G. M.D., M.Sc. (Hubei-China), Ph.D. (Ottawa); **Ye**, J., M.Sc. (Wenzhou-China), M.D. (Jujian-China).

Program Information

The program is designed to grant surgical residents a year free of clinical duties to work on a research project of their own design under the mentorship of a senior investigator. The purpose of the program is to encourage the development of surgical clinician scientists, who will become the academic leaders of surgery in the future. Many recent MSc recipients have gone on to careers in academic surgery or are still undertaking fellowship training with plans to assume an academic career in surgery.

Fields of Research

The research interests of the department reflect the diversity of the clinical specialties contained therein. These specialties comprise the following: general surgery; cardiac surgery; thoracic surgery; neurosurgery; orthopedics; urology; plastic surgery; vascular surgery.

Research Facilities

Research occurs within facilities provided by the advisor. Such individuals are University of Manitoba faculty, and generally have research facilities located at the Health Sciences Centre / University of Manitoba Bannatyne Campus or the St. Boniface Hospital Research Centre.

M.Sc. in Surgery

Admission

In addition to the admission requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar,* this program is open to holders of an M.D. degree who are currently enrolled in a residency program at the University of Manitoba. Candidates incorporate the program as part of their residency training, qualifying for both.

Program Requirements

In addition to the minimum course requirements of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar,* students must complete:

Twelve months' work of research, under the supervision of the director of research, Department of Surgery;

Submission of a major thesis on the research project and a minor thesis on an allied subject;

Demonstration to an examining committee of satisfactory theses and an adequate knowledge of the subject involved.

Two fields of study must be chosen for the M.Sc. degree: one as a major and the other as an ancillary study. Major studies must be taken in any surgical problem, while the ancillary study should be selected from some related field (e.g., pathology, physiology, biochemistry).

Second language reading requirement: none
Expected time to graduate: three years

Ph.D.

Surgery does not offer a Ph.D. program

Course Descriptions

094.701 Surgery: Major course in Surgical Problems (6)

094.702 Surgery (6)

094.703 Advanced Surgery (3)

094.704 Surgical Epidemiology and Biostatistics (3) Prepare students to design studies suitable for a wide variety of research questions including diagnostic, etiologic and prognostic, and treatment outcomes, with focus on surgical issues. It should also provide the students with the essential biostatistical and epidemiologic tools to critique medical literature. The evaluation will be based on submission of a complete proposal to answer a research question of each student's choice.

SECTION 69: Zoology

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Academic Staff

Distinguished Professor

Eales, J.G., B.A.(Hons.) (Oxford), M.Sc., Ph.D. (UBC), F.R.S.C.

Senior Scholars

Dandy, J.W.T., B.Sc.(Hons.), M.Sc. (Natal), Ph.D. (Toronto); **Pruitt**, W.O., Jr., B.S. (Maryland), M.A., Ph.D. (Michigan); **Stewart**, K.W., B.Sc. (Colorado), M.Sc. (Miami), Ph.D. (UBC); **Ward**, F.J., B.A.(Hons.), M.A. (UBC), Ph.D. (Cornell).

Professors

Abrahams, M.V., B.Sc. (Western), M.Sc. (Queen's), Ph.D. (Simon Fraser); **Dick**, T.A., B.Sc. (Toronto), M.Sc. (New Brunswick), Ph.D. (Toronto), Canada Northern Chair; **Hann**, B.J., B.Sc.(Hons.); **Huebner**, E., B.Sc.(Hons.) (Alberta), Ph.D. (Massachusetts); **MacArthur**, R.A., B.Sc.(Hons.), M.Sc. (Alberta), Ph.D. (Manitoba); **Riewe**, R.R., B.S., M.S. (Wayne State), Ph.D. (Manitoba); **Sealy**, S.G., B.Sc. (Alberta), M.Sc. (UBC), M.Sc., Ph.D. (Michigan); **Valdimarsson**, G., B.Sc. , M.Sc. (Manitoba), Ph.D. (Western); **Wiens**, T.J., B.A.(Hons.), M.A. (Saskatchewan), Ph.D. (Pennsylvania).

Associate Professors

Graham, L.C., B.Sc.(Hons.), M.Sc. (Alberta), Ph.D. (Tulane); **Hare**, J.F., B.Sc. (Toronto), M.Sc., Ph.D. (Alberta); M.Sc. (Waterloo), Ph.D. (Indiana); **McGowan**, R., B.Sc.(Hons.) (Brock), Ph.D. (SUNY).

Assistant Professors

Campbell, K.L., B.Sc.(Hons.), Ph.D. (Manitoba); **Gillis**, D.M., B.Sc. (Dalhousie), M.Sc. (McGill), Ph.D. (Simon Fraser); **Lovejoy**, N.R., B.Sc., M.Sc. (Toronto), Ph.D. (Cornell);

Adjunct Professors

Arnold, T.W., B.Sc. (Minnesota), M.Sc. (Missouri), Ph.D. (Western); **Blanchfield**, P., B.Sc. (Hons.) (Waterloo), Ph.D. (York); **Bodaly**, R.A., B.Sc.(Hons) (Simon Fraser), Ph.D. (Manitoba); **Forbes** S., B.Sc. (UBC), M.Sc. (Manitoba), Ph.D. (Simon Fraser); **Franzin**, W., B.Sc., M.Sc., Ph.D. (Manitoba); **Hara**, T., B.Sc. (Yokohama), M.Sc., Ph.D. (Tokyo); **Kidd**, K.A., B.Sc.(Hons) (Guelph), Ph.D. (Alberta); **Palace**, V., B.Sc., M.Sc., Ph.D., (Manitoba); **Reist**, J.D., B.Sc.(Hons.) (Calgary), M.Sc. (Alberta), Ph.D. (Toronto).

Program Information

The Department of Zoology offers graduate training leading to the Masters of Science and Doctor of Philosophy degrees in a broad range of biological disciplines in both the field and laboratory.

Zoology department research and graduate student training is conducted in**:** ecology, evolution, fisheries, behavioural ecology, physiology, parasitology, cell and developmental biology. A number of research programs focus on aquatic organisms and aquatic Biology. Past graduates have gained employment in a variety of areas including fisheries and wildlife management, government scientists, researchers in biomedical agencies, consulting biologists and university researchers or professors.

Fields of Research

Ecology, Evolution and Fisheries: Fleet dynamics, fisheries management, fish population dynamics, interaction between behaviour and population processes; emphasis on quantitative analysis, mathematical and simulation modeling based upon historical data and field work when appropriate. Wetland foodweb structure and dynamics, invertebrate grazer-algal interactions; Cladocera ecology, palaeoecology of communities in the littoral zone of lakes, systematics and evolution. Ecology and management of carnivores, ungulates, and small mammals; Circumpolar Aboriginal peoples and their domestic economies, hunting and trapping, land use, land claims, and impacts of northern development on their lifestyles. Phylogenetic systematics using both molecular and morphological data, historical biogeography, speciation, molecular evolution, population genetics, and evolution of development.

Behavioural Ecology: The impact of environmental variation and life histories (modified through transgenic manipulation) on predator-prey interactions in aquatic ecosystems, use of behavioural and physiological information to generate individual-based population models, sensory compensation. Behavioural and evolutionary interactions between the parasitic cowbirds and their passerine hosts. Cowbird selection of host nests; host quality; nest defense; host tolerance of parasitism; nest placement; consequences of parasitism.

Physiology: Thyroid function in fish; particularly regulation of peripheral metabolism of thyroid hormones and determination of thyroidal status. Thermal biology, diving physiology and bioenergetics of northern semi-aquatic mammals, mainly muskrat and beaver; physiological problems encountered during swimming and diving in cold water; seasonal bioenergetics and nutritional studies of these species. Motor control of crustacean limbs; structures and central synaptic interactions of inhibitory and excitatory limb motoneurons; distributions of their synaptic outputs in the limb musculature; phylogenetic comparisons with other arthropods.

Parasitology: Comparative immunology of fish and mammals, particularly mucosal immunity. Host-parasite interactions, including transmission of fish parasites and the role of host immune responses in protection and regulation of parasite populations. Host-parasite relationships of metazoan parasites of invertebrates. Life history strategies of free-living triclad flatworms. Zoogeography and community ecology of Unionidae.

Cell and Developmental Biology: Oogenesis, early development and cell differentiation in invertebrates. Origin and fate of germ cells. Cellular mechanisms that regulate oogenesis and the establishment of polarity. The

roles of the cytoskeleton, bioelectical properties and ions in oogenesis and development using an array of microscopical and electophysiological techniques. Early development in zebrafish, specifically the genes and gene interactions involved in early developmental decision making processes. Genetic control of vertebrate (mainly zebrafish) embryonic development. Cellular mechanisms directing the formation of tissues and organs, using molecular, cellular, morphological and physiological techniques.

Research Facilities

Laboratories are well-equipped in areas of individual faculty expertise. Special facilities include a large animal colony for small terrestrial and aquatic animals, operated by a trained technical staff. A scanning-transmission electron microscope is housed in an adjacent building. The location of the facilities permits work on a variety of prairie, marsh and woodland habitats and on a wide spectrum of inland lakes and rivers, as well as Arctic tundra and marine habitat along the coast of Hudson Bay. The University Field Station, fully equipped with living accommodations and laboratory space, is 80 km away at Delta Marsh on the south shore of Lake Manitoba. Additional field studies are conducted from the Taiga Biological Station on the Canadian Shield, 240 km north east of Winnipeg, and at the Experimental Lakes Area near Kenora, Ontario, in conjunction with the Freshwater Institute, Winnipeg.

M.Sc. in Zoology

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. If a student applies with a three-year general B.Sc. degree or equivalent, a pre-Master's program must be taken which will be individually prescribed. Students with a four-year major or honours degree apply for direct entry into the M.Sc. program.

Application Deadlines: Applications must be received in the Department of Zoology by the following dates.

Session	Start Date	Canadian/US	International
Regular	August	June 1	March 1
Winter	January	October 1	July 1
Spring	May	February 1	November 1
Summer	July	April 1	January 1

Program Requirements

Minimum program requirements of the Faculty of Graduate Studies are found in the Graduate Studies Regulations Section of this *Calendar*. The program requires completion of a research thesis and course work consisting of one or two Zoology 700 courses and one or two ancillary courses, suitable to the candidate's program, from other departments or from Zoology 400 courses. Study and research will extend to a minimum of twelve months. Normally an M.Sc. program takes approximately two years. All students must submit a research-based thesis and defend it orally.

Second language reading requirement: none
Expected time to graduate: two years

Ph.D. in Zoology

Admission

Admission requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*. Candidates normally have completed an M.Sc. degree before entering the Ph.D. program however under certain circumstances transfer from an M.Sc. to Ph.D. program and entry into the Ph.D. without an M.Sc. is possible. Individual qualifications other than these will be considered.

Applications must be received in the Department of Zoology by the following dates:

Session	Start Date	Canadian/US	International
Regular	August	June 1	March 1
Winter	January	October 1	July 1
Spring	May	February 1	November 1
Summer	July	April 1	January 1

Program Requirements

Program requirements are those of the Faculty of Graduate Studies found in the Graduate Studies Regulations Section of this *Calendar*.

Second language requirement: none
Expected time to graduation: three years

Course Descriptions

Ancillary Courses

The following half or full Honours courses may be taken for ancillary credit: 022.400, 022.414, 022.415, 022.417, 022.420, 022.421, 022.422, 022.423, 022.424, 022.448, 022.460, 022.471, 022.472, 022.480, 022.481, 022.482, 022.483, 022.484, 022.488, 022.489.

022.707 Advanced Parasitology (6) The methods of descriptive and experimental parasitology are considered in lectures, seminars, and laboratories and related to contemporary parasitological problems. *Prerequisite:* 022.346 or consent of instructor.

022.713 Ichthyology (6) Not currently offered.

022.714 Advanced Physiology (6) A study in depth of topics selected from the physiological research interests of the department.

022.715 Selected Topics in Avian Biology (6) Seminars, assigned projects and discussions designed to familiarize advanced students with topics of current interest in avian biology. *Prerequisite:* 022.424 or consent of instructor

022.716 Animal Ecology (6) Detailed examination of special ecological subjects and assignments of special research projects.

022.722 Advanced Topics in Zoology (3) A seminar on current research topics in Zoology.

022.723 Advanced Topics in Zoology (6) A seminar on current research topics in Zoology.

022.727 Problems in Evolution (3) Lectures, seminars, and research in selected topics of biological evolution with emphasis on selection mechanisms.

022.730 Advanced Embryology Not currently offered.

022.731 Selected Topics of Animal Behaviour (6) Assigned projects, seminars, and discussions designed to familiarize advanced students with topics of current interest in animal behaviour. *Prerequisite:* 022.448 or consent of instructor.

022.732 Nematology Not currently offered.

022.734 Problems in Developmental Zoology 1 (3) A seminar and lecture course dealing with current advances in the field of developmental zoology.

022.735 Problems in Developmental Zoology 2 (3) A seminar and lecture course dealing with current advances in the field of developmental zoology.

022.736 Problems in Biological Statistics (3) The course discusses statistical problems and techniques which specifically apply to biological research. Laboratory exercises will be based primarily on examples from field research. *Prerequisite:* 005.313 or the consent of the instructor.

022.738 Advanced Limnology (6) The biological productivity of lakes. A seminar and tutorial course given with the help and co-operation of scientists in the Freshwater Institute and the Department of Botany. *Prerequisite:* 022.350 or equivalent.

022.739 Advanced Mammalogy (6) Lectures and seminars on mammals, their evolution, physiology, and ecology.

022.740 Biological Resource Management 1[1] (3) A survey of the principles of ecology in relation to renewable resources, with emphasis on ecosystem concept ecological homeostatis, and energy flow. Open to students of the Natural Resources Institute or by consent of instructor.

022.741 Biological Resource Management 2[1] (3) Examination of natural resource management practices, in discussions with resource managers. Open to students in the Natural Resources Institute or by consent of instructor. *Prerequisite:* 022.740.

022.788 Ecology Project Course (3) This course provides experience in the organization and execution of team research into current ecological issues. Teams consist of a graduate student team leader, 3-6 undergraduates, and a faculty advisor. Each project team identifies a specific research question, creates a proposal for answering it, and presents their results in a public forum. This course is also given in the Botany department as 001.788.

NOTE: [1]Students registered in 022.740 and 022.741 may be required to pay a portion of costs associated with field trips. For details contact the Department of Zoology.

Services

Chapter Contents

SECTION 1: Student Support

1.1 Introduction

Vice Provost Office

208 Administration Building

Telephone: (204) 474 8279
Website: www.umanitoba.ca/student/provost
Vice Provost (Student Affairs): David Morphy

The mandate of Student Affairs is twofold: providing services and programs to students of an academic, personal and developmental nature, and providing administrative support to the university community.

Student Affairs coordinates the functions of the Aboriginal Student Centre, Counselling Service, Enrolment Services (Admissions, Financial Aid and Awards, Student Recruitment), Housing and Student Life, International Centre for Students, Student Advocacy/Student Resource Services, Student Employment Services, Student Records/Convocation, and University Health Service.

The Vice-Provost (Student Affairs) works in liaison with all student groups and academic and administrative units that provide services and functions that affect students. The office provides an important link for students with the total university community. Students are encouraged to contact the office with issues or concerns, or positive initiatives of a general nature that affect the quality of student life at the university.

1.2 Aboriginal Student Centre

Office: 537 University Centre
Telephone: (204) 474 8850; Fax: (204) 275 3142
E-mail: ASC@UManitoba.CA
Website: www.umanitoba.ca/student/asc/
Director: Kali Storm

Mission Statement

"Providing student support in a manner consistent with the cultures and values of Aboriginal Peoples for the purpose of increasing/enhancing the accessibility and retention of Aboriginal students. The Aboriginal Student Centre is dedicated to the creation of an educational environment that includes the affirmation of Aboriginal cultures, values, languages, history, and way of life by increasing the knowledge foundation offered at the University of Manitoba."

Services Provided

Mental/Academic Assistance: Application, course selection and registration assistance, tutorial referrals, advocacy and assistance dealing with professors and the university system (e.g. appeals, voluntary withdrawals and special consideration).

Spiritual/Cultural Support: Cultural supports and Elder-In-Residence, Traditional Teachings, sharing circles, Annual Traditional Graduation Powwow.

Emotional/Personal Supports: Advocacy and support, someone to talk to in a family environment, on and off campus resource information and referrals, peer supports and an Aboriginal Student Lounge, (541-0 University Centre).

Physical and recreational information: Funding information and applications (First Nations, Metis, student aid, bursaries), job postings, social activities, Volunteer Initiative Program(VIP).

University of Manitoba Aboriginal Students Association (UMASA)

The University of Manitoba Aboriginal Students Association provides support and information on Aboriginal issues. The student association plans and organizes recreational, political and cultural events throughout the year. All registered U of M students who support these initiatives are encouraged to join. The UMASA lounge in 113 Helen Glass is open from 8:30 a.m. to 10 p.m. for student use.

1.3 Student Counselling and Career Centre

Director: Don Stewart
Fort Garry Campus : 474 University Centre; telephone (204) 474 8592
Bannatyne Campus : S207 Medical Services Building; (204) 789 3857
Website: www.umanitoba.ca/student/counselling

Personal Counselling

We offer a wide range of services to help students achieve personal, career and academic success including group programs, individual counselling, workshops (career, personal and educational), consultation and assessment. We help students deal more effectively with a wide variety of issues, such as career and academic indecision, adjusting to life transition, stress, depression, loss, family issues, relationship difficulties, abuse, academic performance, self confidence, motivation and procrastination, and finding meaning in life.

Our staff includes professionals from Clinical Psychology, Counselling Psychology, Educational Psychology and Social Work.

Fort Garry Campus

Students interested in seeing a counsellor at the Fort Garry Campus may drop in during intake hours for a brief introductory meeting. Intake hours are between 9:30 - 11:00 and 1:30 - 3:00, Monday to Friday (hours may be reduced during the summer months - please call for summer intake hours). Students are usually seen on a first-come, first-served basis. Following intake, referral is made to a counsellor, group program or career service within the Student Counselling and Career Centre, or to services elsewhere.

(Students may go directly into career counselling without going to intake by attending a Career Exploration Workshop)

Bannatyne Campus

The Bannatyne counselling team is available for noon-hour, late afternoon, and early evening appointments Monday to Thursday. Appointments may be booked through the SCCC receptionist at 474 8592. Drop-in contacts are welcome whenever the door is open.

Group Programs

A variety of group programs are offered throughout the academic year. Groups have addressed assertiveness, graduate student support, depression, procrastination, single parent support, stress management, men's issues, women and self esteem, exploration of self, eating disorders, Aboriginal healing and exam anxiety. Group program information is posted regularly throughout the University on the web.

Career Services

The Student Counselling and Career Centre provides a comprehensive program to assist in career decision-making and planning. The following resources are available to all students:

Career Exploration Workshop

This 2-hour interactive workshop was designed to help students begin to make decisions about their career path. Students will be shown a career decision-making process to help make career decisions with confidence. Interactive exercises will be conducted to help students begin identifying important career factors as well as potential career options. Students will also be introduced to all career services available at the Student Counselling and Career Centre. Opportunities for discussion with a career counsellor may be possible depending on time constraints. Career Exploration Workshops are held throughout the year and are open to University of Manitoba students at no charge. Students should pre-register at the Student Counselling and Career Centre.

Career Counselling and Career Inventories

Help Students resolve career questions and develop career plans. Students are eligible to receive one-on-one career counselling from a professional career counsellor for any career-related question or concern. Career inventories currently offered by the Student Counselling and Career Centre include the Myers-Briggs Type Indicator (personality instrument), the Strong Interest Inventory (interest instrument) and the Self-Directed Search (interest instrument). A modest fee will apply for each of these inventories. Students must ordinarily attend a Career Exploration Workshop prior to attending a career counselling session or prior to completing a career inventory. Students can also attend a drop-in, first come first serve Career Consultation Meeting for any career-related concern without a prior appointment. Check at the Student Counselling and Career Centre front desk for these drop-in times.

Career Resource Centre

The Career Resource Centre houses the combined career resources of the Student Counselling and Career Centre and Student Employment Services. Exploring occupational options? Searching for educational alternatives? Planning a comprehensive job search? Thinking of starting you own business? If you need career information, stop by the Centre. Career Resource Assistants are available to help you, Monday – Friday, 8:30 a.m. - 4:30 p.m. No appointment is necessary. Visit us on-line: www.umanitoba.ca/student /counselling/crc.html

Career Mentor Program

Students are invited to explore the world of work through the Career mentor Program. Hundreds of mentors, many of them University of Manitoba alumni, are eager to meet with students for informational interviews and workplace tours. A short orientation is provided to ensure that students are prepared for the visit.

For over a decade, students have been making professional connections, exploring occupational options and receiving practical career advice through the Career Mentor Program. Start turning your career dreams into reality. Sign up for the Career mentor Program today!

The Career mentor Program runs from September – April. A nominal, one-time fee applies.

Visit us on-line: www.umanitoba.ca/student/counselling/mentor.html

Referral and Consultation

Counsellors are also able to provide a confidential referral and consultation service to other members of the university community.

1.4 Enrolment Services

421 University Centre
Telephone: (204) 474 8820
Director: Peter Dueck

Admissions Office

424 University Centre
Telephone: (204) 474 8808; Fax: (204) 474 7554
E-mail: admissions@umanitoba.ca
Website: www.umanitoba.ca/student/admissions
Application forms and information on all undergraduate programs are available from Admissions.

Admissions officers are available to give advice and assistance, particularly with respect to prerequisite courses and admission requirements to professional faculties and schools.

Financial Aid and Awards

422 University Centre
Telephone: (204) 474 9531 Fax: (204) 474 7554
E-mail: awards@umanitoba.ca
Website: www.umanitoba.ca/student/fin_awards
Students seeking information about scholarships, bursaries, prizes, loans or the food bank should inquire at the general office. The Financial Aid and Awards Office administers numerous awards in trust with, or offered annually to, the university by individuals, organizations, and businesses. It maintains a close liaison with the Student Financial Assistance Branch of Manitoba Education and Training and, as a cooperating agency, carries out numerous detailed procedures for the government's student aid programs. It also acts as a channel for grants and loans provided to students from other provinces and jurisdictions and for scholarships and bursaries provided by other organizations.

Student Recruitment

424 University Centre
Telephone: (204) 474 8805 Fax: (204) 474 7554
E-mail: admissions@umanitoba.ca
The Student Recruitment section of Enrolment Services coordinates and delivers informational services to prospective students, their parents/families, and their schools. Requests for school visits, participation in career fairs, or on-campus tours should be directed to this office.

1.5 Housing and Student Life

416 University Centre
Telephone: (204) 474 9717
Website: www.umanitoba.ca/student/housing
Director: Garth Wannan
E-mail: housing_studentlife@umanitoba.ca

Off-Campus Accommodation

This office, 415 University Centre, maintains lists of accommodation available in all areas of Winnipeg. Students may consult these listings 24 hours a day at the Website above, by calling the computerized housing registry at (204) 474 8570 or, for more detailed information, by visiting the office between 8:30 a.m. and 4:30 p.m. Monday to Friday.

Living arrangements listed include room and board, rooms with kitchen privileges, suites, apartments, houses and townhouses. The university does not approve, license nor inspect housing, but lists accommodation for referral only. Landlords are required to offer their accommodation in accordance with existing housing legislation and on the same basis as the university offers its facilities; i.e., without regard to race, colour, religion, nationality, sex, age, marital status, ethnic origin, or source of income.

Residence (On-Campus Accommodation)

By September 2003 the six residences on the University's Fort Garry campus (Mary Speechly Hall, Tache Hall, University College, Aurthur V. Mauro Student Residence, St. John's College, and St. Andrew's College) provide accommodation for 1260 students. Each residence has its own unique personality and living options. Living on-campus can be an important part of being a student. For information about on-campus housing con-

tact the Residence Office, 110 Pembina Hall, University of Manitoba, Winnipeg, Manitoba R3T 2N1; telephone (204) 474 9942 or toll free 1 800 859 8737.

Mary Speechly Hall and Tache Hall Residences

Speechly/Tache is characterized by a commitment to unity and diversity. Though the Speechly and Tache residences are administered jointly, each building retains its own character. Tache Hall boasts antique oak trim, open fireplaces and expansive stairwells; Speechly Hall, with bright rooms and friendly lounges, provides a modern complement to Tache's old-world charm. Together, they house almost 600 students in a choice of single and double rooms on both non-co-ed and co-ed floors.

In addition, Speechly/Tache offers a number of residence life options for needs and interests of specific student groups that offer programs and activities tailored to suit a particular lifestyle. The special interest communities include: Architecture/Interior Design, Engineering/Sciences; Graduate House; Health and Fitness; International House and Scholars House.

Residents' meals are served in Pembina Hall, a large dining hall. Enclosed walkways from residence halls to the dining hall provide protection from Winnipeg's weather.

Residents of Speechly/Tache also enjoy easy access to: An in-house computer lab; piano practice areas; comfortably furnished lounges with fireplaces; furnished study/hospitality lounges on most floors; two gymnasia (with stationary bicycles, rowing and weight machines); large multi-purpose areas (for social, cultural or recreational events); student-run coffee shop (with a large screen TV and a satellite dish, video games, board games, a pool table and refreshments); sewing room; and kitchen for use on special occasions when Food Service is not in operation (i.e., during holiday periods).

The Resident Student Association Council (RSAC) works with residence administration to provide the students with many exciting programs, activities, and services. In order to ensure that residents are able to maintain a balance between social and academic activity, evening quiet hours are scheduled.

University College Residence

University College is a constituent college of the University of Manitoba. Its residence offers a smaller more personal atmosphere where students, both day and residence, can interact with each other and with academics in an informal setting. The residence accommodates 250 men and women in mostly single rooms. Tunnels connect the college residence to most buildings on campus. The residence package includes a "declining balance" meal card which can be used at any food service outlet.

University College provides comfortable accommodation with a central lounge on each floor with a TV (satellite), a VCR and a microwave. Each floor has separate wings for men and women, connected by the lounge. Special interests are served by the Scholars' and Professional/Graduate student floors. The residence also houses recreation areas (with fitness equipment, pool table, and grand piano), a study hall, computer lab, and laundry room.

The student government organizes residence social activities throughout the year including intramural sports, as well as on-and off-campus activities. In addition to personal development and academic success programs, which are provided by the on-site student staff, the college offers guest speakers to enable students to expand their knowledge outside the classroom. Courtesy hours are in effect during exam preparation and writing periods.

Aurthur V. Mauro Student Residence

For students in their 2nd year of University or higher, the Aurthur V. Mauro Student Residence offers an alternative to traditional residence living. Scheduled to open in September 2003, this residence will accommodate 310 students in 2 bedroom suites. Each suite includes 2 furnished bedroom with telephone, cable television and high speed internet connections. It also includes a kitchenette and its own washroom.

Facilities in the building include a games room, fitness centre, convenience store, laundry and storage. Meal plans for residents of Aurthur V. Mauro Student Residence are optional.

St. John's College Residence

St. John's College was founded in 1849, but its origins date back to the early days of the Red River settlement. In 1877 St. John's together with St. Boniface and Manitoba colleges founded the University of Manitoba. This record is evidence of St. John's historical commitment to higher education.

St. John's College Residence embodies a unique blend of the social and the academic. Residence provides opportunities for students to participate in college and residence social and athletic programs, to take advantage of both formal and informal tutorial and study sessions, and to live and study in the context of a small, personal community. Other events provide students opportunities to socialize and meet with college professors outside of the confines of the classroom. In addition, a regular schedule of study hours ensure residents of the quiet necessary for academic work.

Located in the centre of the Fort Garry Campus, St. John's Residence provides accommodation for 100 men and women. Residence student affairs are governed through the Residence Student Association, which works in close cooperation with the four student dons and the dean of residence. St. John's Residence includes the following features: single occupancy, carpeted rooms; full meal plan, offering excellent value and quality; two student lounges, both equipped with TV and VCR; residence study room; games room, with table tennis and pool table; fully equipped student kitchen; laundry room; full access to college facilities, including the chapel, food services, library, common room and computer lab.

St. Andrew's College Residence

St. Andrew's College, an affiliated college, was established in 1964 on the University of Manitoba campus. It presently houses the Centre for Ukrainian Canadian Studies, and the Theology Faculty of the Ukrainian Orthodox Church of Canada. Students in any faculty, however, may live in residence as long as they hold membership in St. Andrew's College.

Residence is available for 38 women and men in small single, large single and double rooms. Special facilities include a library, TV lounge area, multi-purpose room, seminar rooms, dining hall and storage space. St. Andrew's College also has a Ukrainian Orthodox Chapel. The kitchen provides 19 meals per week which are characterized by home style cooking, including Ukrainian cuisine.

The residence is administered by the residence supervisor and residence assistants along with an active Residents' Council. An attractive feature of the residence life is the rich Ukrainian cultural program whereby the students have the opportunity to participate in choral music, folk dance, and theatre. In addition St. Andrew's students participate in an inter-university exchange program each year.

1.6 International Centre for Students (ICS)

541 University Centre
Telephone: (204) 474 8501 Fax: (204) 474 7562
Website: www.umanitoba.ca/student/ics
Interim Director: Fred Drewe

The mission of the International Centre for Students (ICS) is to facilitate the success of University of Manitoba students in their international learning experiences. ICS has a three-fold mandate:

- assist and support international students.
- facilitate student participation in international exchanges and provide information on other international opportunities.
- promote intercultural understanding and internationalization of the student body.

Services and programs for international students include pre- and post-arrival handbooks, campus and city orientation sessions, a welcome family program, student advising, and a variety of workshops and events designed to facilitate adjustment to life in Canada. The World W.I.S.E. Resource Centre, located within ICS, contains information on study, work, and volunteer opportunities abroad. ICS also coordinates a number of international student exchange programs open to all UM students. ICS sponsors a number of activities and events to promote intercultural understanding, such as the Campus Buddy Program and World Fusion Multicultural Week.

1.7 Student Advocacy/Student Resource Services

Director: Lynn Smith

Student Advocacy

519 University Centre
Telephone: (204) 474 7423 Fax: (204) 474 7567
Website: www.umanitoba.ca/student/advocacy

The Office of Student Advocacy provides centralized services for receiving student complaints and grievances.

This centre serves as an information source for students regarding their rights and responsibilities. Students are assisted in the resolution of problems or concerns resulting from academic and/or discipline decisions. Students are advised of policies and procedures, both informally and formally. Where indicated, students are referred to other units on campus.

Pre-appeal Stage: Information, advice, consultation, mediation and referrals.

Appeal Stage: Assistance with appeal letters and communications with the appeal chair, assistance with preparation of appeal presentation, appearance with students at appeal hearings.

Post Appeal Stage: Follow up with administrative staff or chairs of appeal committees and students.

Bannatyne Campus, the St. Boniface General Hospital: Advocacy services for students are also available at these sites by contacting the general office at (204) 474 7423.

Peer Advisors

150 University Centre
Phone: (204) 474 6696
E-mail: peer@umsu.org
Peer advisors are student volunteers committed to providing support to their peers. Peer advisors are supportive listeners and may be approached on any academic, health or personal concern. All Peer Advisor services are free of charge and completely confidential.

Student Resource Services

520 University Centre
Telephone: (204) 474 9251 Fax: (204) 275 8098
Website: www.umanitoba.ca/student/resource
The director has administrative responsibility for the Chaplains' Association, Disability Services, English Language Centre; Learning Assistance Centre and the Playcare Centre.

Chaplains' Association

Website: www.umanitoba.ca/student/resource/chaplains
The chaplains at the university are appointed by religious bodies, but offer support to all students regardless of religious preference. They provide a wide variety of services to students and staff. The chaplains are located on the first floor of University Centre and can be reached at the following numbers:

Chaplains' Secretary	(204) 474 8721
Jewish	(204) 474 9325
Lutheran	(204) 474 8386
Mennonite	(204) 474 9691
Pentecostal	(204) 474 8389
United	(204) 474 8387

In addition, religious programs and worship services take place at St. Andrew's College (Ukrainian Orthodox (204) 474 8895); St. John's College (Anglican, (204) 474 8363); and St. Paul's College (Roman Catholic (204) 474 8575). Students may contact the colleges for more information.

Disability Services

155 University Centre
Telephone: (204) 474 6213
TTY: (204) 474 9790
Website: www.umanitoba.ca/student/resource/disability-services
Students and staff with disabilities are encouraged to contact Disability Services for information and advice on accessibility and services available to them at the university. This office should be contacted to register for use of the on-campus transportation system, a service designed mainly for students in wheelchairs and for students with mobility limitations. Elevator keys are also available through this office.

English Language Centre

520 University Centre
Telephone: (204) 474 9251
Website: www.umanitoba.ca/student/resource/english
The English Language Centre provides English language instruction for international students enrolled at the University of Manitoba and for individuals preparing to study at the university. The focus of all the courses is on the English required in an academic setting at both graduate and undergraduate levels. ELC courses are offered in fall, winter and summer sessions. The Centre provides the following:

Homestay Program

The Centre offers Homestay where students may practice English and learn about Canadian culture.

Intensive Program

The two Intensive Programs are offered three times a year in 14 week sessions.

- Academic English Program for University and College Entrance (AEPUCE)

- This course is designed to prepare students for admission to the University of Manitoba. Individuals who have achieved a TOEFL score of 500 (173 Computer Version), CanTEST band 3.5 or equivalent are eligible to take the course. Upon successful completion, students have met the English requirements for admission to the University of Manitoba.

- Intensive Academic Program (IAEP)

This course is designed to prepare intermediate and advanced students for academic study. At the end of each IAEP session, students write the CanTEST. These test results may be used to meet the English requirements of the University of Manitoba.

NOTE: In addition to providing courses, the centre is an official testing site for the Canadian Test of English for Scholars and Trainees (CanTEST), an English proficiency test, the results of which are accepted by the University of Manitoba admissions.

Short Term Program

The English Language Centre offers short term courses four times a year for University of Manitoba students and potential students as well.

Courses include:

- Oral English for Academic Purposes: conversation and discussion; seminars and presentations.
- Academic Writing Courses: grammar review and practice; critical reading and summary writing; essay writing.
- For Graduate Students: pronunciation seminar; oral English (Fort Garry and Bannatyne campuses); research writing (Fort Garry and Bannatyne campuses).

Learning Assistance Centre

520 University Centre
Telephone: (204) 474 9251
Website: www.umanitoba.ca/student/resource/learning
The Learning Assistance Centre is the place on campus where students can get help with: time management, goal setting, textbook reading, note taking, preparing for exams, multiple choice and essay exams, motivation, memory and concentration, essays, and research papers.

One-to-One

Students can drop by to see one of our learning skills specialists for help with study skills or writing. Also, they can work more intensively on specific assignments or papers. Our staff is available on a walk-in basis, Monday to Friday, 8:30 a.m. to 4:30 p.m.

Writing Help Centre

Student volunteers are available for extra help with essays and research papers. This extra help is available during regular session.

Weekly Workshops

Free study skills workshops are offered Wednesdays from 2:30 to 3:20 p.m. The Wednesday Workshops are: Memory & Concentration, Your Learning Style, Tips on Writing Papers, How to Remember What you Read, Study Tips That Reduce Stress, Tips on Preparing for Exams, Tips on Writing Essay Exams, Tips on Multiple-Choice Exams.

Handouts

A collection of handouts is available on a variety of study topics such as time management, concentration & memory, notes, reading, stress, exams, and any other study concerns.

Courses

- University Preparatory Program

In Summer, students who need to brush up on their academic skills can take an intensive course in: Power Learning and Reading, or Essay Writing. There is a charge for these 18 hour, non-credit courses.

The PlayCare Centre

109 University College
Website: www.umanitoba.ca/student/resource/playcare

This facility is a full-time licensed daycare. The centre provides care for full days or half days for children between two and five years of age and for ages 6-12 on school in-service days. For information, telephone (204) 474 6949 or visit the facilities.

1.8 Student Employment Services

474 University Centre
Telephone: (204) 474 9456
Website: www.umanitoba.ca/student/employment
Director: Raymond Côté
Student Employment Services (SES) assists students in career planning and with their employment searches. This is accomplished through the On-Campus Recruitment Program, permanent, summer and part-time job listings, volunteer opportunities in the community, individual consultations and workshops on resume writing, interview techniques and job search strategies. SES posts all job openings including volunteer on the workopolisCampus.com website. Complete postings, including job descriptions and duties, are input daily and are available 24 hours a day, 7 days a week. Students can link to workopolisCampus.com through the SES website but first they must obtain the access code from 474 University Centre which allows them to register and take advantage of the many options.

1.9 Student Records Office

400 University Centre
Telephone: (204) 474 9423; Fax: (204) 275-2589
Website: www.umanitoba.ca/student/records
Director: Neil Marnoch

Major services of the office which directly concern students are: address changes, application and information for graduation, application for Letters of Permission, Convocation ceremonies, fee assessment (charges and refunds), external examinations, examination timetable, fee appeals, final examinations, final grade reporting, graduation parchment replacement, international student health insurance, name changes, Photo ID cards, registration, transcripts, and T2202A education tax forms.

The current edition of the *Registration Guide* and the Student Records website contain up-to-date information on these services.

1.10 University Health Service

104 University Centre
Telephone: (204) 474 8411; Fax: (204) 474 7573
Website: www.umanitoba.ca/student/health
Director: Wade Glew
The University Health Service is available to all university students and staff, their spouses and dependent (under 21 years) family members. To assist students in maintaining a high level of personal and community health, the University Health Service is available for episodic and continuing care during regular university hours. Doctors also provide emergency after-hours care.

All Canadian students must carry health insurance through their home province. All international students not covered by a provincial health plan must purchase insurance through the special plan provided for by the university (see the *Registration Guide* for specific details).

Health examinations are not required for registration at the University of Manitoba. However, students registering in the following programs are advised to undergo a health examination with their family physicians or University Health Service:

- All students registered in Nursing
- All students registered in the Bachelor of Physical Education degree program
- All students who are participating in intercollegiate and/or organized intramural sports competition programs
- All students from countries other than Canada.

Immunizations are considered essential in some faculties or schools (e.g.,School of Nursing). Students are advised to contact their own faculties or schools for specific regulations and immunization schedules.

Services required for occupational and educational institutions are not covered under provincial health insurance plans and will be provided on a fee for service basis.

The University Health Service provides travel health advice and required immunizations to all faculty, students and staff of the University of Manitoba on a fee for service basis.

SECTION 2: Student Support

2.1 Book Store

Store Hours Information Line: (204) 474 8178
Website : www.umanitoba.ca/bookstore
The Book Store is owned and operated by the University of Manitoba. The university Book Store has two locations: The main Book Store in University Centre on the Fort Garry Campus, and a health sciences book store in the Brodie Centre on the Bannatyne Campus. Both locations provide services in textbooks, reference books, special orders, computers and software, art supplies, stationery, crested clothing and giftware.

Computers on Campus, located at both stores, offers educational prices on computer hardware and software and is an authorized IBM and Apple repair centre.

Lists of required textbooks and course materials are available in August so that course materials may be purchased before classes begin. The Book Store also "buys back" reconfirmed textbooks for cash.

Mail order service is also provided by writing, phoning or Faxing the Book Store, University of Manitoba, Winnipeg, Manitoba, R3T 2N2. Payment can be made by credit card or ordered COD within Canada. Total charges will include COD fees, postage and handling.

Fort Garry Campus
(204) 474 8321, or Toll free: 1 800 310 3331
Fax: (204) 474 7555
Bannatyne Campus
Telephone: (204) 789 3601
Fax: (204) 789 3901 or Toll Free Fax: 1 800 361 2005

2.2 Bison Sports

The University of Manitoba is a member of Canada West Universities Athletic Association, a regional association within Canadian Inter-university Sport (CIS).

Bison teams include basketball, football, golf, cross-country, ice and field hockey, swimming, track and field, volleyball, and wrestling. To be eligible for CIS and CWUAA competition, a student must be registered in at least 18 credit hours, with a minimum of nine credit hours in each term.

Information on all activities including schedules is available by telephoning (204) 474 9611 or (204) 474 9243, or from 124 Frank Kennedy Physical Education Centre.

2.3 Campus Parking

General office: 125 University Centre
Telephone: (204) 474 9483 Fax: (204) 261 8884
Approximately 2900 parking spaces are available for purchase by students. These spaces are situated in lots around the campus and assigned to students for long-term parking. The Parkade, meters and ticket-dispenser areas supply additional 1,300 spaces for short-term or casual parking. Motorcycles are accommodated in two convenient locations.

Parking permits go on sale in June through the university telephone registration system. Detailed instructions are included in the current edition of the *Registration Guide*.

On weekends, holidays and after 4:30 p.m. on weekdays, free parking is available in most parking lots except 24-hour reserved areas, areas designated for handicapped parking, the Parkade and other restricted areas. Fines are levied for parking violations.

For information regarding parking, contact Parking Services.

The complete text of the Parking Regulations as authorized by the university Board of Governors is published in the *Registration Guide*

2.4 Food Services

General office: 207 Pembina Hall
Telephone: (204) 474 9916 Fax: (204) 474 7538
Food Services is operated by ARAMARK Canada, which is responsible for providing the food requirements for students and staff as well as catering university special functions. Cafeterias, canteens and national branded franchises are located throughout the Fort Garry Campus.

Flexible meal plans are available to both residence and non-residence students. These plans provide regular meals at economical prices.

Information on food service locations and meal plans is available from the Food Services office.

2.5 Recreation Services

General office: 124 Frank Kennedy Physical Education Centre
Telephone: (204) 474 8234
Facilities

To encourage recreation on campus, the university has a wide variety of recreation facilities. On the Fort Garry campus, the Frank Kennedy Physical Education Centre, the Max Bell Centre, and the Investors Group Athletic Centre contain indoor jogging tracks, a swimming pool, indoor and outdoor tennis courts, weight and fitness areas, a combatives room, a dance studio, gymnasia for basketball and volleyball, squash and racquetball courts, and an international-size year round ice arena. The Joe Doupe Recreation Centre, in the Brodie Centre, Bannatyne Campus, provides recreation facilities and programs to students and staff there. Access to these facilities requires a facility use membership available from the equipment desks in Frank Kennedy, Max Bell and Joe Doupe locations. An eight-month student membership is $75. (Sept. 1, 2002 - April 30, 2003)

Intramural Competition and Sports Clubs

Intramural sports give students and staff an opportunity to participate and compete in recreational activities of their choice. There are men's, women's and co-ed divisions. Basketball, ice hockey, floor hockey, soccer, ultimate frisbee and volleyball are examples of the sports available. In addition, more than a dozen sport clubs give opportunity to get more involved in a particular sport. Some examples include squash, kayaking, tennis, karate, wall climbing, judo, and wilderness adventure.

Adult Recreation Instructional Programs

Recreation Services offers instruction on a fee per course; some examples include the martial arts, dance, weight training, outdoor recreation, relaxation and flexibility, kayaking, CPR and first aid.

Fitness

Recreation Services is a provincial leader in fitness assessment and counselling, fitness programming and fitness leadership development. Fitness is currently divided into two operational units:

Fitness Assessment and Counselling: Fitness assessment and counselling services range from general fitness assessment to body composition analysis; sport training to nutrition counselling. Staff are prepared to help set up a fitness program tailored to individual needs, interests and goals.

Fitness Programs*:* There are more than 40 classes weekly in such activities as bench stepping, toe box, aqua-fitness, and low impact. Access to all regular fitness classes is included with a Facility Use Pass. Specialty classes include pre- and post-natal, and older adult classes. Individual and group nutritional programs conducted by a registered dietitian and certified sports nutritionist are also offered.

Children's Camps

The year-round program includes sport, skill and fitness development, creative dance, Mini University and computer camps for children 3-16 years of age. University students can gain practical work experience conducting these camps or assisting in coaching clinics. Call 474 9142 for information.

Joe Doupe Recreation Centre, Bannatyne Campus

Located in the lower level of the Brodie Centre, the Joe Doupe Recreation centre provides a full sized gymnasium with an elevated walking/running track, weight training and aerobic exercise equipment and an aerobics studio. For information, call Recreation Services at 789-3866 or the Joe Doupe Equipment Desk at 789-3858, or visit the centre on the lower level.

2.6 University of Manitoba Students' Union

General Office: 101 University Centre
Telephone: 204 474 6822
Fax: 204 269 1299
Website: www.umsu.ca
Who we are?

Established in 1919 and incorporated in 1975 by a provincial statute, the University of Manitoba Students' Union (UMSU) is the largest student organization in Manitoba and has numbers in excess of 25,000 graduate and undergraduate student members.

Over the course of its existence, UMSU has had many individuals involved with the organization who have added to its historical relevance in the community. People once involved with the Union include television personality Monty Hall, former and current Chancellors Arthur Mauro and William Norrie, Harold Buchwald of the law firm Pitplado and Israel Asper of Canwest Global. The list of influential UMSU Alumni will continue to grow, adding to the diversity and stimulus of our society.

What we do?

UMSU advocates on behalf of students to all levels of government involved with post-secondary education - Federal, Provincial, Municipal and Administration. UMSU also offers numerous services including a health and dental plan, campus radio, tutor registry and scholarships and bursaries for its members. The expansion and continued success of the businesses includes the UMSU Digital Copy Centre, GPA's Convenience Store, Archives Used Bookstore, IQ's Cafe and Billiards. The businesses supplement UMSU's annual revenues exceed $8 million and add to the flexibility and opportunity to better serve students.

Student Governance

Student Governance is an important function of the UMSU. Through campaigning and election, many student representatives are chosen to serve their respective constituents. The UMSU President, UMSU Vice-President, UMSU Council Representatives, and Student Senators go through the process of campaigning and election in order to serve the student body as advocates at the different levels of government. For important decisions to be made at the University, student opinion is necessary for due process. There is imperative need for accountable and responsible student representatives. UMSU has had a long standing tradition of strong student advocacy at all levels of government involving post-secondary education.

The UMSU Executive consists of five members. The President and Vice-President are elected for a one-year term by the entire student body. The Director of Public Relations, Director of Student Affairs, and Director of Programming are appointed to one year terms by UMSU Council. Along with the five UMSU Executives, UMSU has 25 full time staff and 150 part time staff.

UMSU Businesses

Answers Information Booth

General Office: 1st floor University Centre
Telephone: 204 474 8211

If you have a question, there's no better place to go than Answers. Answers can provide you with information on nearly everything on campus, from registration to directions. Answers also sells tickets to most campus and off-campus events and is an official Select-A-Seat and Ticketmaster outlet. It is also the place to go for the 20% off Transit post-secondary bus passes, as well as any other transit tickets. There are three free phones, a campus lost and found and staff that will even give out change. Answers is located adjacent to the UMSU offices on the main floor in University Centre.

Archives Used Bookstore

Whether you are looking to buy or sell textbooks, Archives is the place to go. Archives sells textbook on consignment – students wanting to sell their old textbooks can set their own prices and get 80% back from any books that sell. Those students wanting to buy textbooks can choose from a great selection of affordable and used textbooks. Archives is also available online, making finding a textbook even easier. Archives is located at 107 Helen Glass Nursing Building in the UMSU Annex.

G.P.A.'s Convenience Store

Good Prices Always (G.P.A.'s) is UMSU's convenience store located in the heart of University Centre. G.P.A.'s offers drinks, a wide variety of snacks, frozen dinners, ice cream treats and bulk foods at the lowest prices on campus. Tobacco and newspapers are also sold at G.P.A.

Degrees Restaurant

Hungry? Looking for a new place to eat at the Fort Garry Campus? Make sure you check out UMSU's latest initiative. With fast, friendly counter-service and quality homestyle food at reasonable prices, Degrees is the place to be to satisfy any appetite. Degrees is located on the 3rd floor of University Centre.

Digital Copy Centre

UMSU's Digital Copy Centre offers a full range of photocopying and printing services. They offer black and white and colour copying, laser printing from Mac and PC computers, binding, faxing and a variety of other services. Lecture notes for certain classes are sold at the Copy Centre. The Digital Copy Centre is located on the main floor of University Centre.

IQ's Café & Billiards

IQ's, located on the third floor of University Centre, is UMSU's coffee shop and pool hall. With 11 pool tables and Starbuck's coffee, IQ's is the place to go for good times and cheap pool on campus. With a 2200 square foot expansion, IQ's now offers a comfortable and well lit study space and internet portals.

UMSU Services

101.5 UMFM Campus Radio

CJUM-FM 101.5 is launching its fifth year with the finest mix of music and talk. UMFM offers musical depth and diversity and intelligent talk to the City of Winnipeg 24 hours a day, 7 days a week from the state-of-the-art studios overlooking the heart of the Fort Garry Campus. The UMSU owned radio station offers work-shops to students and the public-at-large to upgrade interview, production, or show-creation skills. Orientations are offered in September, October, January and March. For more information, visit www.umfm.com

Food Bank

UMSU provides substantial support for the University's Food Bank. Students who are in need can drop in to the Financial Aid and Awards office where they will be treated with respect and confidentiality. As the food bank operates on contributions, any groups or students who are able are asked to donate non-perishable food items. Donations can be made at the UMSU office or at any UMSU event. For more information on the Food Bank, call 474-9261.

Health & Dental Plan

In January of 2002, students at the University of Manitoba made a historic decision by voting 87% in favour of UMSU's proposed health plan. For the first time in the history of the University of Manitoba, students will have extended medical and dental coverage. All graduate and undergraduate students are automatically enrolled in the plan when they register as a full-time student (18 credit hours or more). If you are already covered under an extended health and/or dental plan, you may choose to opt of the UMSU plan(s) and have your fees reassessed. A summer mail-out will be distributed to all full-time students with further details every year.

Income Tax Services

Each spring, an accountant or qualified student comes to University Centre to complete tax returns for students. This service is subsidized by UMSU as an economical and convenient alternative for the university community. This service is located in 105 University Centre.

Peer Advisors

Peer Advisors are student volunteers that are committed to providing support to their fellow students. Each Peer completes an intensive training program led by counselling professionals. Peer Advisors are approachable resources for students who need information or support concerning health, academic or personal issues. Peer Advisors are non-judgmental. We offer a safe environment for all students to talk about any concerns and make referrals to other campus and community resources as appropriate. Peer Advisors can provide information and pamphlets on an array of topics for students. We also offer free condoms to students. Students can drop by during office hours at 150 University Centre, phone the office at 474-6696 or e-mail us at peer@umsu.ca. All services are free, confidential and open to any student or member of the university community.

Registries

Tutor Registry

From essay writing to math help, UMSU maintains a listing of tutors for a wide variety of subjects. It is a listing of tutors, their qualifications and hourly rates. Any student requiring additional assistance from fellow peers for course work or examination may visit the Answers Information Booth, the UMSU Office in 101 University Centre or visit on-line www.umsu.ca.

Carpool Registry

UMSU will be providing a carpool registry for all students and staff at the University of Manitoba. This cost-effective and environmentally friendly initiative will be available through the UMSU web page at www.umsu.ca. Students will be able to register themselves as car pool participants or recipients from any part of Winnipeg.

Student Housing Registry

Available through the UMSU website will be an easily accessible on-line housing registry for students. Rental properties in Winnipeg are grouped by type of dwelling (i.e. Apartment, room with kitchen privileges, sublets, etc.), and by area of the city. Renters can post their properties on this site for a small fee and students can access this information for free on the internet or by telephone.

UMSU Publications

Annual Daytimer/Handbook

A free daytimer is available for all students by UMSU during the first week of fall orientation. It contains a yearly calendar, information about UMSU including its businesses and services, a Bison Sports Schedule, University Student Services, important phone numbers, and brief information from all student councils and student groups.

Convocation Guide

This guide accompanies the official University Convocation Guide and is given out during the Spring and Fall Convocation Ceremonies to each graduate. It contains crosswords, word searches, and other fun activities to occupy the graduate's time during this special ceremony.

UMSU Scholarships and Bursaries - *Students Helping Students*

In response to the U of M's inadequate scholarship and bursary program, in 1996, the UMSU Council passed a resolution creating a new student fee of $30.00 per student. Distribution works as follows: 30% for scholarships, 40% for bursaries, and 30% for the Endowment Fund. Scholarships are distributed to the top 4% of all students by Faculty and are based on academic merit. Bursaries are awarded, on a capita basis, to all students based on financial need. The long-term goal of the endowment fund is to phase out the student fee collection. Financial Aid and Awards distributes the fund and a Board of Trustees administers the fund.

www.umsu.ca

UMSU's website, *www.umsu.ca* is a student's portal to information on every aspect of their university experience. One can find information about the history of UMSU, Executive and Council Members, Student Councils and Groups, UMSU's businesses and services, the Health and Dental Plan, student advocacy, press releases, and links to the University of Manitoba, Bison Sports, CASA, and UMFM.

UMSU Special Events

The UMSU Event Department is responsible for providing students with all social, cultural, and academic events. All events produced by the UMSU Events Department are fully funded and supported by the students at the U of M.

Major Events for 2003-2004

Orientation Week (September)
Malpractice Social (October)
EBC Christmas Charity Ball (December)
Twelve Bells New Year's Bash (December)
Celebration Week (January)
Spring Break Trip (February)
Shalayleegagan (March)
UMSU Events Concerts (various)

Student fee components

NOTE: Students at the Bannatyne Campus (Medicine, Medical Rehabilitation, Dentistry, and Dental Hygiene) pay different fees from those paid by Fort Garry Campus students. These differences are noted below:

$37: Operating costs of UMSU, finance and subsidize the programs, operations, services, salaries and administration. Included is support for programming events, student groups, student services, debt reduction, publications and lobbying services. Bannatyne campus students pay $11 into this portion of the UMSU fees.

$30: Scholarship and bursary program sponsored by UMSU that provides aid based on academic achievement and financial need.

$7.75 - $27.75: Allocated to individual faculty/school student councils varies from $7.75 to $27.75. More detail can be obtained from the senior stick (president) of that council.

$6: Capital cost of University Centre; Bannatyne students pay $11.50 into the Joe Doupe Fund, which is administered by UMSU.

$5: Operation of the CJUM-FM radio station.

$1: Capital sinking fund to fund major UMSU projects. Bannatyne students pay $0.50 into the fund.

$0.75: Faculty reallocation fund. Established by UMSU to assist smaller faculty/school councils offer a minimum level of programming. All students with membership in one of the colleges or the Resident Students' Association Council (RSAC), are required to pay half of their student organization membership fee to their college of membership to cover activities sponsored by the college or residence council. The other half of their fee goes to their faculty or school.

$6: Support of the student newspaper, The Manitoban.

$0.50: Local committee of World University Students' Council to assist in bringing refugee students to the university from other countries.

$0.50: All students pay 50 cents per credit hour, to a maximum of 22 credit hours, to purchase UMSU space in the Helen Glass Nursing Centre.

$0.50: World Wise program for student study and travel abroad.

$2: Support of the U of M Recycling Group.

UMSU Health & Dental Plan

$197.00: All full-time graduate and undergraduate students (enrolled in 18 credit hours or more) are automatically members of UMSU's Health & Dental Plan. The 2002/2003 fee schedule is:

Health - $85,
Dental - $107,
Administration - $5 (fee is subject to change).
Students, who chose to and can show evidence of existing coverage, may opt out of either or both plans and will have the student record amended. The administration fee will be used to cover the costs associated with the plan including such items as an office, staffing and the opting-out administration.

2.7 Graduate Students Association

The University of Manitoba Graduate Students' Association (GSA) is an umbrella organization consisting of and representing all graduate students from every discipline within the University of Manitoba. The GSA is governed by a Council of departmentally elected graduate-student representatives. The daily business of the GSA is undertaken by an Executive Committee elected by and from the graduate student body.

Funding

The University of Manitoba Comptroller collects student-organization fees from graduate students, a portion of which are remitted to the GSA by the University of Manitoba Students' Union. Of these monies received by the GSA, some moneys are used to provide services and run the GSA office, others are used to maintain an Executive to promote the needs and concerns of graduate students, and the remainder is channeled to the graduate student associations within each department in order to provide for operation of local, departmental activities.

Representation

The GSA coordinates graduate student representation on most of the university's governing councils, boards and committees. The President of the GSA represents the interests of graduate students to the University of Manitoba, the University of Manitoba Students' Union, the Faculty of Graduate Studies and all three levels of government. Students with concerns that can be addressed through administrative channels should contact the President.

Advocacy

The Vice-President of the GSA is a provider of advocacy services to graduate students with academic problems. If you are a graduate student and have been encountering difficulties of an academic nature, please contact the Vice-President at vp@umgsa.org.

Social Life

The Graduate Students' Association's membership is to be found everywhere across campus, in most faculties and departments. To offer this diaspora some social cohesion - and some fun - the GSA holds regular social events, like the Happy Hours in the Graduate Lounge.

Newsmagazine

To keep its members informed of important graduate-student-related events and development, the GSA produces a regular newsmagazine, The Gradzette, featuring news and features of interest or importance to graduate students. The Gradzette is circulated to all graduate departments for distribution. The Gradzette is also intended to serve as a forum for graduate students to express their views and opinions on important themes. It is free to all graduate students. To submit articles or to advertise, call 474-9181.

Grad-Student Grants

The GSA offer graduate students a variety of cash grants, including conference travel grants, disbursed to students presenting papers at conferences, and special projects grants, for student-run activities in benefit of graduate students. To find out if any of these could apply to you and your work, please call or e-mail the GSA, or drop by the office.

Departmental Grants

The GSA annually remits moneys to graduate students in each graduate department to help facilitate departmental events. Disbursement of these funds is based upon attendance of meetings of the GSA Council by each departmental representative. Funds are disbursed in proportion to the number of graduate students enrolled in each program.

Bursaries

The GSA funds the University of Manitoba's Financial Aid and Awards office in provision of bursary awards to graduate students. Graduate students interested in these bursaries should contact Financial Aid and Awards.

Library Acquisition Fund

Graduate research is, in these times, frequently impaired by under-funded libraries forced to cut back their acquisitions budgets. To help graduate students lacking materials integral to their programs, the GSA maintains a budget line for library acquisitions. If you know of materials our libraries ought to have, but don't, please contact the GSA.

Photocopying, Fax and Laser Printing

Through the GSA, grad students have access to inexpensive photocopying, fax and laser-printing services.

Computer Services

The GSA runs several public computer terminals available to graduate students. Both Mac and IBM platforms are available.

2.8 Office of the Ombudsman

Ombudsman: Evelyn Bernstein
406 University Centre
Telephone: (204) 474-8439 **Fax:** (204) 474-7526
www.umanitoba.ca/staff/ombudsman
The Ombudsman is a designated neutral person who provides confidential and informal assistance for resolving university-related concerns, especially those that are not being adequately addressed through usual procedures. The Ombudsman is independent of the University's formal administrative structure and will consider all sides of an issue in an impartial and objective manner. The Ombudsman cannot impose solutions, but will identify options and strategies for resolution. The Ombudsman also has the power to conduct investigations, and to make recommendations with regard to policies, prodedures, or other systemic issues.

When should you go to the Ombudsman?

When you have a situation requiring help in communication or negotiation with faculty, staff, or others.
When you are unsure which policies, procedures, or regulations apply in your situation.
When you feel a policy, procedure, or regulation has been unfairly or erroneously applied to you.
When you have a complaint about an office or a service at the University of Manitoba.
When you want to discuss a sensitive issue in confidence.
When you are uncertain of where to go or the options available to you.

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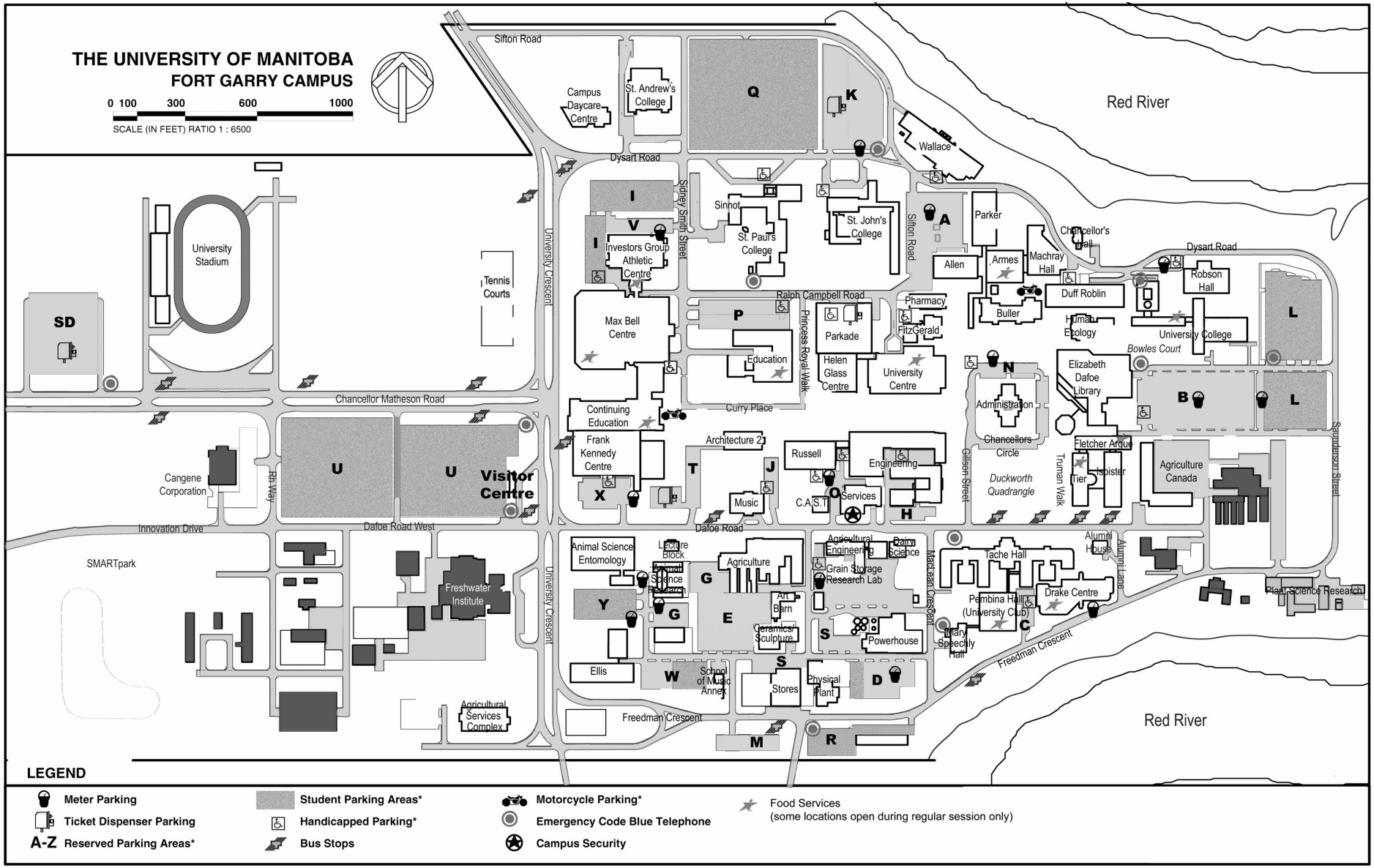
THE UNIVERSITY OF MANITOBA
FORT GARRY CAMPUS
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SCALE (IN FEET) RATIO 1 : 6500
Sifton Road
Red River
Campus Daycare Centre
St. Andrew's College
Dysart Road
Wallace
Sidney Smith Street
Sinnot
St. Paul's College
St. John's College
Parker
Allen
Armes
Machray Hall
Chancellor's Hall
Robson Hall
University Stadium
Tennis Courts
University Crescent
Investors Group Athletic Centre
Ralph Campbell Road
Pharmacy
Buller
Duff Roblin
Human Ecology
University College
Bowles Court
Max Bell Centre
Princess Royal Walk
Parkade
FitzGerald
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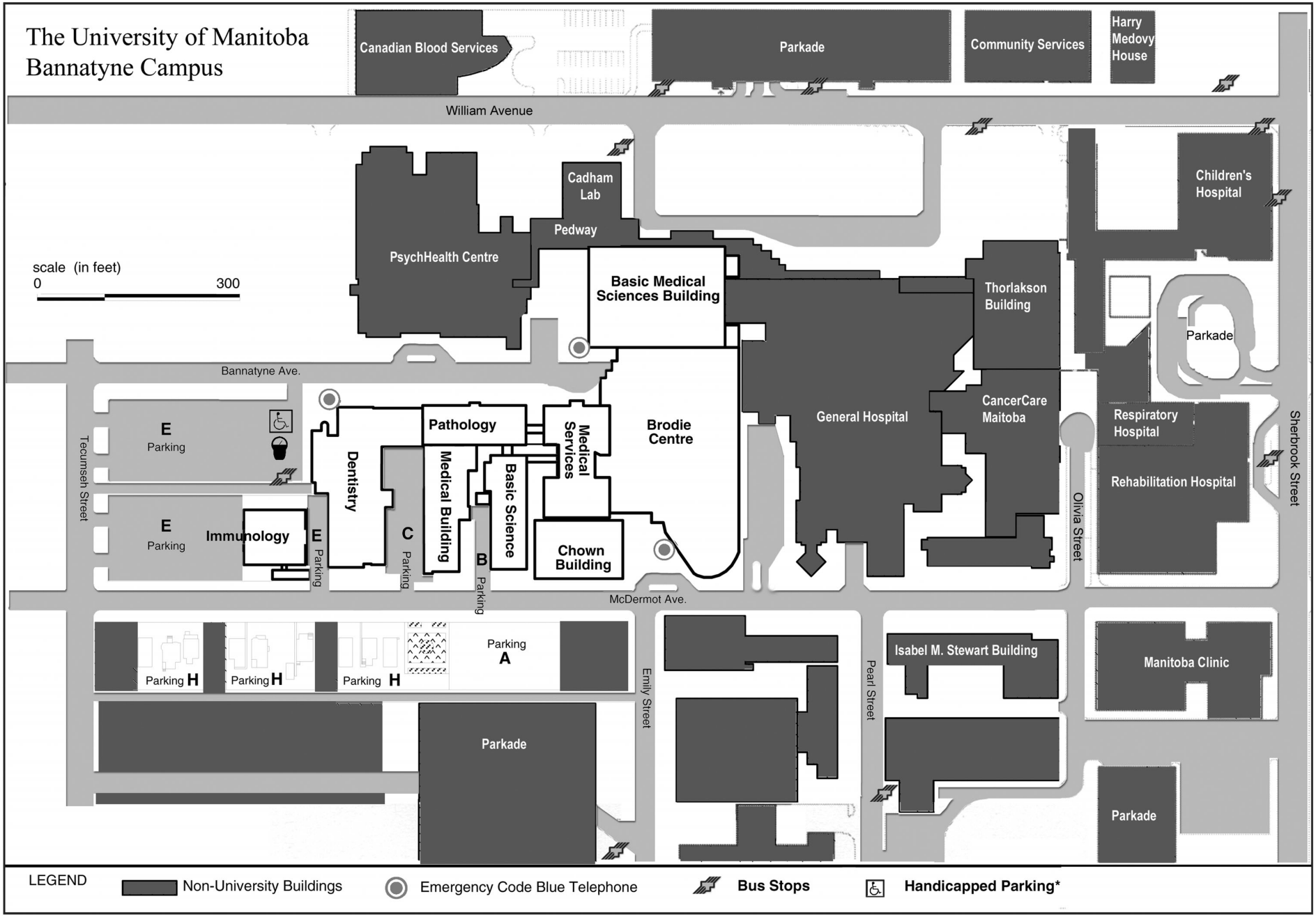
Elizabeth Dafoe Library
Administration
Chancellors Circle
Duckworth Quadrangle
Fletcher Argue
Tier
Isbister
Agriculture Canada
Saunderson Street
Continuing Education
Curry Place
Frank Kennedy Centre
Architecture 2
Russell
Engineering
Gillson Street
Truman Walk
Chancellor Matheson Road
Cangene Corporation
Rh Way
Visitor Centre
Music
C.A.S.T.
Services
Innovation Drive
Dafoe Road West
Dafoe Road
SMARTpark
Freshwater Institute
Animal Science Entomology
Lecture Block
Animal Science Research
Agriculture
Agricultural Engineering
Grain Storage Research Lab
Dairy Science
MacLean Crescent
Tache Hall
Alumni House
Alumni Lane
Art Barn
Ceramics/ Sculpture
Powerhouse
Pembina Hall (University Club)
Drake Centre
Plant Science Research
Mary Speechly Hall
Freedman Crescent
Ellis
School of Music Annex
Stores
Physical Plant
Agricultural Services Complex
LEGEND
Meter Parking
Ticket Dispenser Parking
A-Z Reserved Parking Areas*
Student Parking Areas*
Handicapped Parking*
Bus Stops
Motorcycle Parking*
Emergency Code Blue Telephone
Campus Security
Food Services
(some locations open during regular session only)


The University of Manitoba
Bannatyne Campus
Canadian Blood Services
Parkade
Community Services
Harry Medovy House
William Avenue
Children's Hospital
Cadham Lab
Pedway
PsychHealth Centre
Basic Medical Sciences Building
Thorlakson Building
Parkade
scale (in feet)
0
300
Bannatyne Ave.
CancerCare Maitoba
General Hospital
Respiratory Hospital
Rehabilitation Hospital
Sherbrook Street
E
Parking
Tecumseh Street
Pathology
Dentistry
Medical Building
Basic Science
Medical Services
Brodie Centre
Olivia Street
E
Parking
Immunology
E
Parking
C
Parking
B
Parking
Chown Building
McDermot Ave.
Parking H
Parking H
Parking H
Parking A
Emily Street
Isabel M. Stewart Building
Pearl Street
Manitoba Clinic
Parkade
Parkade
LEGEND
Non-University Buildings
Emergency Code Blue Telephone
Bus Stops
Handicapped Parking*